

First Flight



*They went to space because they wanted to
They built a space program because they had to*

By KSK

A Kerbal Space Program Novel

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Prologue

Before the Space Program, before Mainsails and Mün rovers, before there was even such a thing as a probe core, there was just a group of friends with a shared dream who refused to let that dream go.

This is part of their story.

It was a bright sunlit afternoon as Geneney walked out to the launch pad. He could see the rocket in his mind's eye. A gleaming tower of sculptured metal rising into the sky with a cluster of the latest generation engines at the base and the newest, most spacious capsule sitting proudly at the top. Ready to take him to the Mün, to Minmus or anywhere else he cared to go.

He sighed. The reality of course was rather different. A rusty launch tower constructed from old scaffolding. A bunker full of worn out monitors and other abandoned electronic gear. And a last ditch attempt at a rocket that they had built from whatever junk they could scavenge up and weld together. Wernher's original LV-1 engine had proven far far more difficult to scale up than any of them had imagined. Getting the stability augmentation system to work had eventually been an exercise in stubbornness rather than elegant engineering. And as for the decouplers.

Geneney shook his head. Best not to think about the wretched decouplers.

He reached the first of the launch clamps and inspected it carefully. The rocket loomed above him, a battered metal cylinder with a tangle of plumbing at the base, connected to the familiar ribbed shape of the LV-15 engine bell. Four RT-5 solid fuel boosters attached to the sides by explosive bolts and a simple capsule secured to the top with more explosive bolts completed this most unlikely looking spacecraft. In Geneney's opinion 'booster' was an optimistic name for a squat drum of firework propellant with a cone attached to the bottom. As for sticking them on with explosive bolts...

No - best not to think about the decouplers. Besides they had worked well enough in testing and none of them had been able to get the hydraulic pusher system to work reliably.

Geneney could hear voices far above him as Lucan helped the three cosmonauts into the capsule. An occasional mumbled comment from Bill, Bob's nervous chatter and Jeb, talking up a storm in his enthusiasm. Geneney smiled to himself. Bill was still a believer, Bob... well Bob was loyal. If his best friends were risking themselves in a home-brewed rocket, then Bob would be there alongside them. And as for Jeb, he had never given up, despite all the difficulties, frustrations and exploded prototypes. He'd kept them going, with his permanent grin and irrepressible enthusiasm, even as the other members of the Kerbin Interplanetary Society had gradually drifted away. It helped that the grin hid a surprisingly competent engineer, otherwise Geneney was fairly sure that Wernher would have stuffed Jeb headfirst into the engine bell of the LV-10 test model and probably fired it too.

His smile faded. The LV-10 test had been a definite low point and they still hadn't figured out exactly what went wrong. The LV-15 worked, although it wasn't close to being powerful enough and all their attempts to cluster multiple LV-15s together had failed. Eventually even Jeb had conceded that the multiple LV-15 design was just too prone to overheating and suggested using a set of RT-5 'Trashcan' engines instead.

All the launch clamps seemed to be in order and a loud clang from above announced that Lucan had finally closed the hatch of the *Kerbal 1*. Geneney waited as Lucan clambered down the launch tower and the two kerbals hurried back to the control bunker.

Geneney tapped his microphone.

"Kerbal 1, this is Control. How are you guys doing up there?"

Jeb's voice crackled from the speakers.

"Cool, calm and collected, Genie. How's that telemetry looking?"

If Geneney knew Bill and Bob, then calm was most probably a lie, let alone collected. No point in breaking the facade though.

"Wernher's just running the last tests on the decouplers now Jeb. Five minutes to launch."

Wernher pressed a button on his console and grunted in satisfaction as a set of indicator lights winked out. He flicked a switch and all five lights flickered briefly then lit up with a reassuring green glow.

"All rocket systems check out. Guidance control and launch sequencing transferred to booster. Ready when you are, Gene."

"OK then. We all know what we're doing. LV-15 engine start on my mark, 3 second hold down at full power as a last check, then we release the clamps and light up the Trashcans. That last bit is probably going to be a bit bouncy guys, so as soon as the LV-15 lights you'll probably want to hold on to something."

"Gotcha, Genie."

Geneney took a deep breath. "LV-15 ignition in five...four...three...two...one.. Mark!"

Lucan and Geneney turned towards the main monitor screen. Behind them they could hear Wernher rattling through the ignition checklist.

"Firing gas generator, turbopumps powering up and IGNITION!"

Fire erupted from the base of the *Kerbal 1*, rapidly focusing into a single hard bright flame. A steadily increasing rumble could be heard outside as the LV-15 throttled up to full power.

"Holding for three...two...one..."

The bunker shook to a thunderous roar as all four RT-5s ignited, sending sheets of flame washing across the launch pad. The image on the monitor flared brightly. Spots danced in front of Geneney's eyes as he stared at the screen trying desperately to spot the *Kerbal 1* amongst all the static. As the image came back into focus, all Geneney could see was a badly scorched launch pad. The noise in his headphones suggested that this was due to a successful launch rather than a catastrophic explosion but the faint screams didn't sound at all good. The static on monitor 2 didn't look promising either.

"Wernher - talk to me!"

"LV-15 performing well, all four RT-5s are running. All decouplers intact," came the calm response. "Capsule telemetry and sensors offline."

Geneney gripped the arms of his chair tightly. "Which means?"

"We have no way of telling how high the capsule is travelling, how fast or at what angle."

Lucan interrupted him "If the decouplers haven't fired...I can still hear the engines in my headset, so the rocket should still be in one piece." He snapped his fingers. "The main data cable - it probably just came loose during the launch. Wernher, try SCE to Aux."

Geneney's knuckles turned white as Wernher searched for the switch on his console. Then, with a click, monitor 2 lit up, as telemetry suddenly flooded in from the *Kerbal 1*. A slow smile spread across Geneney's face as he got to his feet and slapped Lucan on the back. Above his head, the numbers for altitude and velocity of the *Kerbal 1* were both steadily increasing.

"10 seconds till burnout."

Geneney kept his fingers firmly crossed as he waited for the Trashcans to shut down. Five seconds to go, two, one... and nothing. The roar of the engines still filled his headphones. Five more seconds, ten more seconds. He was just turning towards Wernher, when everything went quiet. There was a series of muffled explosions and four lights on Wernher's console winked out. He grabbed the microphone.

"Kerbal 1, this is Control. Come in Kerbal 1! Jeb, Bill, Bob - can you hear me!"

Jeb chuckled. "Hearing you loud and clear, Genie if you'd let us get a word in edgewise!"

"Jeb - thank the Kerm! Are you guys OK up there?"

"The Bobcat here is looking a bit blue but we're all good. Nothing but Class A Badasses on *this* rocket ship!" Jeb paused to savour the moment. "Yeah, this rocket ship...", his voice trailed away. "Dammit guys we did it! Faster than any kerbal has ever travelled, higher than any kerbal has ever travelled and way way noisier than any kerbal has ever travelled! I told you those Trashcans would do the trick!"

"Well we've still got a couple of things left to do, Jeb but yeah - those Trashcans definitely made it happen. Thirty seconds of fuel left for the LV-15."

Lucan was keeping a close eye on the telemetry. The *Kerbal 1* was actually accelerating slightly now as the last litres of fuel drained away, until at last the engines shut down. The last light flickered out on Wernher's console accompanied by a final muffled bang from the speakers.

"Shutdown and booster separation confirmed, Jeb. We figure you should top out at around thirty to thirty five thousand metres."

"Thanks, Luco. Not bad for a first flight, not bad at all! Looks like I won that bet with the Bobcat too - he reckoned we'd get to twenty five thousand at best!"

Bob laughed nervously. "Are you sure they were just the standard Trashcans, Jeb? If we get down from here in one piece, I'm not sure I'll be able to get out of this seat, I got mashed into it so hard."

"Didn't touch them, Bobcat. They sure did make for one heck of a ride though. What did you think, Bill? Hey - are you OK there, Bill? That window isn't coming loose is it?"

"Oh... Oh wow... Guys you need to see this." Bill silently reached out a hand and Jeb wordlessly passed him the camera.

Geneney blinked. He'd never heard Jeb sound like that before. Almost awestruck.

"What is it, Jeb?"

"It's Kerbin... just Kerbin. Only not quite and all of it at once. And the sky - it's full of more stars than you can believe. Greens and blues and brilliant white clouds and then black and stars."

"You're not making any sense, Jeb."

"No, no I don't think I am. You're gonna have to see this for yourself, Genie."

Geneney sighed. "You know we're never going to get another shot at this. The Kerbal 1 was all we had left," he said sadly.

"Actually, Genie, if even half of Bill's photos come out, I think you're going to get to see this quicker than you can imagine and in a bigger and better rocket than you can imagine too."

Hey, Bill, if you're done with that camera, pass it over here. Genie, I'm taking off my helmet, sticking the camera into it and wedging it under the control panel for safekeeping."

Geneney's jaw dropped. "What, why, what are you doing? What happens if you get an air leak?!"

Jeb's voice was uncharacteristically serious. "I'll just have to hold my breath, Genie. Whatever happens to Bill, Bob and me, you *need* this camera. It's all the proof that the Kerbin Interplanetary Society needs and it's going to change everything."

Two small green figures stood on the roof of a makeshift concrete bunker, anxiously peering out to sea. Geneney glanced at his watch and then scanned the horizon again, too nervous to look away for more than a moment. He knew that he probably wouldn't see the capsule from this distance but the parachute should be visible. And it should be visible any moment now. Beside him, Wernher suddenly stiffened and pointed at the sky. An orange streamer popped into view, plunged towards the ground and then fluttered skywards. Geneney's heart was in his mouth. If that was the drogue chute then...

YES! Two orange discs burst into the sky and then unfurled into the welcome, welcome sight of two fully opened parachutes. Geneney and Wernher looked at each other, grinned in triumph and then threw themselves down the stairs as fast as they could.

"Lucan, Wernher - boat. Now! We've got three kerbonauts to pick up!

Epilogue - two days later

Four members of the Kerbin Interplanetary Society were lounging about at the Jebediah Kerman Junkyard and Spare Parts Company. Bill was in Jeb's office working on his camera, whilst Jeb was out with a pair of customers, helping them rummage through a pile of old engine parts. As the three of them strolled back towards the office, Geneney overhead snatches of conversation.

"Were you boys anything to do with a mighty lot of noise out by that old rusty tower the other day?"

Jeb nodded, "Yup, that was us, sir. Testing some bits and pieces from the junkyard."

The older of the two customers chuckled. "People back in town reckon they saw one of those rockets flying into the sky." He snorted. "Load of nonsense if you ask me, never mind what those crazy interplanetary characters keep talking about. Although I have to admit, they do make some mighty fine explosions."

Geneney stifled a grin as Jeb tried his best to keep a straight face. Just then Bill popped his head around the office door.

"Hey guys - photo's came out nicely. You want to take a look?"

Jeb smiled. "Love to, Bill." He turned towards his customers politely, "and would you good kerbals care to join us?"

Geneney stared at Jeb's office wall. Most of Bill's photographs were blurry views of not very much, taken out of what was obviously a very small window. Several more showed what looked like maps. But none of the eight kerbals crammed into the room had eyes for anything other than the largest picture in the middle. This too was clearly a view through a window but beautifully sharp. A very obviously curved line down the middle separated inky blackness from brilliant blue, dusky brown and lush green. Far away in the distance, the familiar battered grey ball of the Mün rose over Kerbin.

Geneney blinked back tears. Jeb was right. They had really done it. They could do it again. And there would be a Space Program.

Part One

The Interplanetary Society

Chapter 1

Space Program Rising

Ornie whistled cheerfully to himself as he drove along. The soft electric purr of the truck's motors and the rattling of the trailer provided quite a tuneful accompaniment, apart from the occasional loud clanking as the truck bounced over a bump in the road. To his left, well tended green fields stretched out to the coast, interspersed with the usual copses of Kerm trees. On the horizon, sunlight sparkled off the waves of the Great Tranquil Sea. To the right the fields gradually petered out into rougher grassland and woods whilst straight ahead, the road wound down towards the Dasqu bridge, which arched over the river in a graceful series of steel cobwebs. Over the bridge, the road continued south as far as Ornie could see.

A motley collection of brightly coloured boats drifted past underneath him, as Ornie cautiously steered his unwieldy vehicle over the bridge. The trailer was rocking noticeably as it bumped over the expansion joints in the roadway and he had no desire to dump hundreds of kilograms of metal onto a passing barge, or worse still a yacht. He doubted that the swimmers using the bridge piers as impromptu diving boards would be very impressed either. At last he rolled over the final section of roadway and off the bridge. After a brief stop at the side of the road to cinch up the chains holding everything in place on his trailer, he drove onwards looking for a signpost to the small town of Barkton.

As he reached the outskirts of town, Ornie was rather surprised to find complete strangers waving at him or pointing to the back of his truck and talking excitedly to their friends standing next to them. It was strangely pleasant to be treated as some kind of minor celebrity though and he soon found himself smiling and cheerfully waving back. Surprise turned to outright astonishment as he drove up outside Jeb's junkyard. A sea of people were milling around the gates, pointing at a figure on the roof and chattering amongst themselves. Ornie decided that there was no way that he was going to be able to push through the crowd, so he rolled to a stop. wound down the truck window and leaned out to see what was going on.

The kerbal on the roof turned around and spotted Ornie leaning out of the window. "Ornie, my friend", Jeb shouted, "you're just in time!" He waved at the crowd below and raised his arms for silence.

"Good Kerbals. Today marks a new start for my humble business empire!" He paused, "An empire so humble in fact that most of you were probably blissfully unaware of it." Polite laughter rippled through the crowd as Jeb continued. "But today, I think that is going to change. From today this building will no longer be called 'The Jebediah Kerman Junkyard Company'. He picked up a large pair of shears and with a flourish, cut a rope holding a large canvas sheet in place.

"From today, this building will be known as 'Jebediah Kerman's Junkyard *and Spaceship Part* Company!"

Jeb whisked away the sheet and the crowd cheered as he revealed a freshly painted signboard. A stylised rocket pointed jauntily into the sky, trailing a horizontal line of flames out behind it. Above the flames, the words 'Jebediah Kerman's Junkyard were written in a bold script, leaning towards the rocket as if dragged along behind it. Below the line, the words 'and Spaceship Part Company' were also leaning towards the rocket.

Jeb slid down a nearby drainpipe and bounded through the crowd towards Ornie. He hopped up onto the running boards of the truck and thumped on the hood for attention. "Make way," he cried, "make way! Important spacecraft parts coming through!" He leaned through the cab window. "There's parking space to the left as you go through the gates, Ornie. We'll unload her later."

Ornie started up the motors and slowly edged his truck forward towards the gates.

Ornie climbed out of the cab, stretched and looked around in bemusement. The old junkyard was buzzing with activity - everywhere he turned somebody was building something, carrying material to the builders or watching things being built. A brand new outbuilding had been put up in one corner of the yard. Just three walls, a roof and a workbench inside but already, a kerbal was sitting at the bench hard at work with a soldering iron and a pile of electronic parts. Another two kerbals were watching in fascination. Beside them, more kerbals were busily laying bricks on the half completed walls of a second outbuilding with a gang of volunteers ferrying a constant supply of new bricks and buckets of cement to them. Another gang of volunteers were digging the foundations of a third workshop.

Jeb jumped down off the running board and came to join him. "Things have changed quite a bit since you were here last haven't they?" he said with a grin.

Ornie shook his head. "Has the whole town gone rocket crazy?" he asked. "I've only been away for a couple of days and I come back to find crowds outside the gate, a building site in here..."

Jeb laughed. "You can blame Richlin for that," he said, "I'm not sure what he's been saying to the good people of Barkton but its certainly had an effect! And you haven't even seen the best bits yet. Let me show you around!"

They strolled over to the out buildings. Ornie wasn't particularly surprised to see that the kerbal at the workbench, soldering iron in hand was Bill, working away on a circuit board and apparently oblivious to the noise of all the construction work going on around him. Jeb waited patiently until Bill put the soldering iron down and then tapped him on the shoulder.

"Hey, Bill - look who made it back here."

Bill looked up startled. "Oh - hi, Ornie", he said, "did you manage to find some tanks then?"

Ornie nodded. "Right over there on the truck, Bill. Along with a couple of crates of spare parts and odds and ends that I think you're going to find useful."

Bill gazed past him distractedly. "Good... that's great Ornie... thanks." he said before picking up his soldering iron again.

Jeb gestured to Ornie and they quietly left Bill to his tinkering. As they walked past the half finished outbuilding, Jeb greeted the builders enthusiastically. "Great work, guys! That wall is gonna be solid enough to hang a booster off. Have any of you guys seen Wernher or Richlin anywhere?"

One of the volunteers pointed across the yard. "Over there Jeb. They dug out some dirty great piece of machinery from the back room. Not sure what it was but Richlin seemed pretty excited about it."

Ornie looked over to where the volunteer was pointing. The dirty great piece of machinery looked very much like an old model automatic lathe to him and sure enough, Wernher and Richlin were both hard at work stripping it down and cleaning it.

In the far corner of the yard past Wernher and Richlin, another smaller group of kerbals stood around a framework of metal girders. A fountain of sparks shot into the air as one masked kerbal carefully welded a cross beam into place. Jeb spotted where Ornie was looking. "Ahh yes," he said happily as they walked over, "the new test stand. Looks like it's all going well. Hey, Malmy - did you find that spare fuel valve?"

"Couldn't find one anywhere, Jeb," replied Malmy. "Got the old one working again though. Nothing that a replacement seal, a new handle and a bit of cleaning and greasing couldn't fix."

"Excellent. I tell you, guys, Wernher's gonna love having a new stand to get some decent data for his smaller engines! The big stand out the back is OK for an LV-15 or a Trashcan but we could never get it calibrated for anything much smaller than that."

One of the kerbals looked up from the girder he was holding. "Sounds interesting. What were you using to measure your structural load?"

Jeb looked momentarily nonplussed. "Not really sure to be honest - you'd need to speak to Bill or Wernher. Feel free to have a look at the old stand too but please let Wernher know before you start playing around with it. Hey Ornie, I could do with a drink - you coming?"

Chapter 2

Space Program Rising - Part II

Jeb pulled the door of his office shut and started rummaging around in the fridge under his desk. Ornie looked around. For a self proclaimed spaceship parts manufacturer, Jeb had a rather ordinary office; desk, filing cabinet, a pile of paperwork on a chair. Not even one of Bill's photo's left on the wall. Then Ornie reminded himself that until a couple of hours ago, this had just been the office of a small scale junkyard owner.

Jeb fished two cans of sapwood juice out of the fridge and tossed one to Ornie. "It's only sapwood," he said apologetically, "but it's a bit early for anything stronger. Besides, I'm thinking that beer and spaceship engineering probably shouldn't be mixed. It's good and cold though." He noticed Ornie looking around the office. "I know," he said, "I'd love to get one of Bill's photos put back on the wall to make this place look more the part. We don't really have any spares at the moment though."

Ornie frowned, "I thought..."

Jeb nodded, "Yes - Bill took lots of shots but... well see for yourself." He led the way through into the main warehouse.

Ornie stared. The yard outside was one thing but the atmosphere and sheer noise in here was unbelievable. A large open space had been cleared near the front of the warehouse. All of Bill's pictures were on display on boards around the outside and in the centre, in pride of place, the *Kerbal 1* capsule rested in a wooden cradle, with steps leading up to the hatch. Near the warehouse doors, Geneney stood behind a makeshift table, handing out tickets and collecting coins from the visitors who were patiently waiting in a queue that stretched out of the doors and far back down the street. If Ornie was any judge, there were over three hundred kerbals waiting in line just to get in and at least another hundred wandering around, gaping at the photographs of Kerbin from space and chattering to themselves as they inspected the *Kerbal 1*. A few daring souls were actually reaching out and touching it, wherever they could get close enough.

Away to one side, outside the impromptu museum, Lucan was sorting through boxes of junk and patiently answering questions from the small group of enthusiastic onlookers that had apparently volunteered to help. As far as Ornie could see, Lucan was taking an inventory, picking out anything that might still be useful as a rocket part and marking it off on a clipboard. Meanwhile, the volunteers were packing the rest of the junk away into various boxes and bins.

Ornie shook his head in disbelief. People volunteering to sort through dusty, oily old *junk*, just because it might become part of a rocket.

Another queue was forming as a large number of kerbals waited to actually climb inside the *Kerbal 1*. Bob was standing at top of the steps by the hatch, checking tickets and letting pairs of kerbals through the hatch. There was a continuous popping of camera flashes as other kerbals poked their heads through the empty spaces in the capsule (windows now removed) to photograph their friends inside. Occasionally Bob would climb in too, much to the excitement of the crowd, whereupon the brilliance of the camera flashes would become almost painful.

Jeb chuckled. "I think Bob is quite enjoying being the heroic kerbonaut," he commented.

Ornie raised an eyebrow, "Are you trying to tell me that you haven't taken a shift or two by the capsule yourself, Jeb," he asked dryly.

Jeb had the grace to look a little bit sheepish. "Well maybe one or two," he confessed.

Ornie sipped at his drink and let his thoughts drift back to that first meeting.

The younger customer's jaw dropped open at the magnificent sight of Kerbin seen from space. Even the older customer looked startled for a moment. "Well now," he said quietly, "looks like the folks in town weren't just spinning a tale. I'd say you interplanetary boys did send a rocket up - and sent it up a good long way too." He stuck out his hand. "I'm Ornie and this here is Richlin. Pleased to meet you all."

Jeb shook him by the hand. "Likewise," he said, "I take it you like our holiday pictures then?"

"They're not bad," said Ornie, "not bad at all." He tried his best to hide his excitement behind a nonchalant look but had to give up as his face cracked into a broad grin. "In fact a long way past 'Not Bad' I'd say!" He looked over at Richlin who nodded eagerly. "Say - how do you join this here Interplanetary Society anyway?"

Jeb grabbed a sheet of paper from his desk and scribbled six names on it; Jeb, Bill, Bob, Wernher, Geneney, Lucan..., he paused for effect, ...Ornie and Richlin.

"You already know me but this is Bill, Bob, Wernher, Geneney and Lucan. Bill is our avionics and remote sensing guy, Wernher does engines, Geneney and Lucan do launch prep, fuelling and mission control and Bob and I do whatever else needs to be done. More or less anyway - mostly we just all pitch in and build stuff. Anyway - welcome aboard!"

Bill smiled shyly at the newcomers, Wernher nodded politely and Bob, Geneney and Lucan waved happily. Ornie grinned. "Well you know me and Richlin now. We do airplanes mostly but I figure we could probably help build a rocket or two. Richlin knows his way around a workshop and I'm a fair hand with a pipe bender."

"Sounds like you're going to fit in just fine," said Jeb cheerfully, "you couldn't be much worse at pipes than Bob here anyway."

Bob coughed. "Says the kerbal who accidentally drilled a hole through the main fuel tank when he tried to fit the bracing struts."

Jeb waved airily. "That tank needed patching up anyway. One more hole wasn't going to make much of a difference. Anyway, this office isn't really built for eight. How about you lot go and find a seat outside in the yard and I'll see what I can dig out of the fridge."

The sun was setting over the distant hills as the now expanded Kerbin Interplanetary Society arranged itself on a set of spare tyres. After a respectful pause for each kerbal to pop open his beer and take a swig, Ornie asked the question that was on everybody's mind.

"So what happens next?"

Geneney looked glum. "Nothing much for a while, until we find enough parts for the Kerbal 2. We've got enough spares to build another engine and we might just manage half a capsule." He shrugged. "As for everything else, we're open to suggestions."

Richlin looked thoughtful. "We could probably find a spare fuel tank. I think we've got some old avionics and tail fins lying around somewhere too. Ornie could head back with the truck and bring them over in a couple of days."

Geneney brightened up but then his face fell as he remembered. "That'll help but we've still only got enough spare fuel for one, maybe two Trashcans"

Ornie looked puzzled, "Trashcans?"

Wernher took another pull of beer and wiped his mouth. "Solid rocket motors. The LV-15 isn't quite powerful enough on it's own, so we... augment it slightly with solid boosters. Gene is right - we could probably build a couple of new ones with what we have left over from the Kerbal 1 but that won't be enough."

Then Bob spoke up hesitantly. "You know guys, I think we may be looking at this the wrong way. Instead of flying another capsule, how about we try for something smaller. Say about 100-200 kilos. We could easily launch that - heck we could probably get it into orbit!"

Geneney looked confused. "200 kilos isn't much. You'd barely be able to lift a seat, a passenger and a parachute for that. Even if you made a capsule out of tinfoil it wouldn't work."

Jeb grinned. "So we don't bother with a capsule. Nothing between you, your rocket and the wide open skies." He looked thoughtful. "Actually that sounds pretty sweet... Mind you,

we'd need a big comfy chair, so the poor old passenger doesn't get mashed into it - right, Bob?"

Bob rolled his eyes. "We're putting a paying customer on top of a pile of rockets held together with explosives." he said dryly, "Us type A badasses can handle a little acceleration but I think everyone else might feel entitled to a properly padded seat. But anyway, I was thinking more of a camera or maybe a big radio rather than a passenger."

Geneney frowned. "What's the point in that. We're supposed to be the Interplanetary Society not the hobbyist high altitude camera club."

Bill looked rather put out at this and opened his mouth to speak, only to be interrupted by Jeb.

"Actually, Genie, I think Bob might be on to something. Bill's pictures in the office - everyone is going to want to see them!" Bill looked mollified by this show of support as Jeb continued. "Now imagine what they'll do if we manage to get some pictures from actual orbit. Sunrise from space. The Mün from close up - we may even get a snap of Minmus! Or if we launch a radio transmitter. Just think of it - a message from space, broadcast by the Interplanetary Society to every radio station and amateur radio enthusiast across Kerbin!" His eyes shone. "Besides we're going to need to build some unmanned probes eventually to scout for landing sites."

"What do you mean?" asked Geneney, "we've already got good maps of Kerbin - no need to do any scouting."

There was a collective intake of breath as everyone realised what Jeb was about to say.

"True, Genie, very true. But as far as I know, we don't have any maps of the Mün!"

Ornie shook himself awake from his reverie, Right now, he thought that Jeb's crazy plans weren't so crazy after all. In fact the only major problem that he could see would be dealing with the hordes of kerbals eagerly waiting for a seat in whatever contraptions the Kerbin Interplanetary Society could put together.

Chapter 3

New Directions

Jeb stood at the window and watched the queues build up outside the doors of his warehouse. It looked like today was going to be busier than yesterday but he was worried. Ever since the meeting the night before, Geneney had been rather quiet and withdrawn. At first Jeb had put that down to a hangover, certainly the Genie had managed to pack away a good bottle or two that evening. As the day went on though, even the excitement of setting up Bill's pictures and posing for photos outside the *Kerbal 1* with the first few visitors had failed to lift his mood.

Jeb thought that he knew what the problem was but he wasn't at all sure what to do about it. He sighed, turned away from the window and walked back into the warehouse. On a sudden whim, he wandered out into the back yard and found Ornie packing his truck for the journey home

Ornie slammed the truck door shut and noticed Jeb staring pensively around the yard. "Morning, Jeb," he called, "that's me about to head home. I'll be back in a couple of days with the parts."

Jeb didn't answer at first and when he did he was strangely hesitant. "Before you go, Ornie, could I ask you something?"

"Sure, Jeb - what's troubling you? I wouldn't say you've got a face like a mile of bad road but it sure looks like you can spot that road coming."

"It's Genie. He's normally about the most cheery kerbal you could wish to meet but yesterday..."

Ornie interrupted, "Yeh. Looked like he could see that bad road as well at times." He looked shrewdly at Jeb. "Reckon you know as well as I do why that would be."

Jeb grimaced. "I think so. Putting the Kerbal 2 on hold hit him pretty hard. But dammit, Ornie - he knows that we don't have the parts yet and we can't afford to wait around until we do. We got a few folks in here yesterday but not that many. We need something quick, something to show everyone that the Kerbal 1 was just the beginning."

"Oh he knows," Ornie said quietly, "but knowing and accepting are two different things." He held up a hand. "And before you ask, *you* need to do two things too. Give him something important to do now and let him know that you have a plan. Doesn't much matter how big the plan is but Geneney needs to know that you've thought about how to get from where we are now to where he wants to be: sitting in the Kerbal 2 waiting for launch. Telling him that him, Wernher and Lucan are still next in line wouldn't hurt either."

Jeb opened his mouth and then shut it as an idea started to take shape in his mind. "Thanks, Ornie... Yeah, thanks!" Jeb straightened up and jogged back towards the warehouse with a new spring in his step.

Inside, the rest of the Interplanetary Society had arrived. Bob had brewed up a large pot of coffee and everyone was standing around, sipping the brew, chatting idly and waiting for Jeb to open up the warehouse for the day. Geneney was already standing behind the reception desk they had hastily put together the day before. Jeb wandered over to him casually.

"Hey, Genie, I've been thinking about the Kerbal 2".

Geneney's face was expressionless.

"Not the stand in machine we were talking about the other night, I'm talking about a proper rocket with a capsule on top and you, Lucan and Wernher sitting in that capsule". Geneney straightened up imperceptibly and Jeb could sense that he was beginning to get some attention. "Mainly I'm thinking that we're going to have to be a lot more organised about the whole thing. Don't get me wrong, I think we've done wonders given what we had to work with but it's time to stop working with what we've *got* and start thinking about what we *need*. And that means designing our own parts. If we can find some useful stuff lying around still, then all the better but we can't keep on relying on just finding stuff."

Jeb paused. "We still can't afford anything custom but that's not a problem. We can afford the bare metal and we've got the talent - and we're getting the tools - to turn bare metal into spaceships! That's where I need your help, Genie. We need to sort through all the junk out there, pick out the useful bits and make an inventory. Then we need to draw up some proper plans for all the various rocket systems, match what we've got to those plans and figure out what we need to buy to make the rest ourselves."

Jeb's voice trailed away as he glanced over at Geneney's stony face. "I know it doesn't sound very exciting", he said "but right now I think it's about the most important thing we can be doing. When I said that the next rocket is a stand in machine, I wasn't joking. Once we launch it, we're nearly out of parts - if we're going to launch anything else at all, we need a change of direction."

Geneney's voice was mildly curious. "Why me?" he asked.

"Because you're our best systems guy," Jeb said frankly. "Bill is great with electronics; you can't beat Wernher when it comes to engines but there's only one kerbal in this team that I trust to keep everything in one piece once that rocket leaves the ground."

Geneney was silent for a moment. "Sorting through all that junk," he waved a hand towards the back of the warehouse, "is going to be a big job."

Jeb nodded in agreement, "It will be but everyone can help out with the first sorting. The detailed inventory, planning and matching though... that's another job altogether. Anyway, have a think, Genie. I'll need to talk everyone else through the plan as well but I wanted to run it past you first. For now, I should probably open this place up for the day."

A loud explosion rocked the back yard of Jebediah Kerman's Junkyard and Spaceship Parts Company, followed by a tirade of equally explosive swearing. Ornie switched off the lathe and went out to investigate.

An oily cloud of smoke hung over the test stand and the acrid tang of scorched metal and burnt rocket fuel tickled the back of his throat. Some enterprising, not to mention prescient, kerbal had erected sturdy corrugated iron sheets around the stand to serve as a crude blast shield. Judging by the scattering of twisted metal fragments that had blown over the top of them, this had turned out to be a good decision. Wernher stood next to one of the sheets scowling sullenly into the distance.

Ornie bent down to inspect one of the fragments. "That's why we test them, Wernher," he said. "Better that they blow up now than on the launch pad. Lets have a look at the test data and..."

Wernher's voice was ominously quiet. "Stop trying to give me solutions, Ornie because at the moment I really couldn't care less about solutions. Ranting - yes, swearing - yes. Rational analysis - screw it. Or explode it. Which seems particularly appropriate at the moment." Wernher aimed a surly kick at the blast shield but missed and stubbed his toe on the corner.

Ornie kept a carefully expressionless face as Wernher vented his feelings in no uncertain tones. Eventually the flow of imprecations came to a halt and Wernher rubbed his eyes wearily. "I'm sorry, Ornie," he said, "but this was supposed to be the easy part of the whole machine. The LV-9 was *working* - that's why we chose this design in the first place remember? We even had a prototype all ready to go. I put it on the test stand just to check it out and..."

"Blam?" suggested Ornie.

"A little more than 'blam' but yes - no more LV-9 prototype. So I built a new one. I even made some improvements along the way. Nothing too far from the original design but they should have fixed some problems that we noticed before and made the whole engine a bit

more robust. Instead..." Wernher jerked a thumb behind him wordlessly. "And we don't exactly have an endless supply of spare parts to keep doing this."

Ornie nodded. "Gotcha. Tell you what we'll do, Wernher. We're going to take a walk, we're going to grab a bite to eat and then we're going to come back, check over those strip charts and figure out what went wrong." Wernher's face darkened but he forced out a terse laugh as his stomach rumbled audibly. "Alright, alright. Maybe this smoke will have cleared away too by the time we get back."

Wernher and Ornie strolled back towards the junkyard chewing on the last of their sandwiches. Finally Ornie decided to break the silence. "So what happens if we don't get the LV-9 working, Wernher? Could we go for an RT-5 upper stage instead?"

Wernher swallowed his mouthful of sandwich. "We could," he said " but I'd prefer not to. The RT-5's don't have a lot of control at ignition, so I'm not really happy with the idea of trying to light them in mid-air. And once they're lit, they stay lit until they burn out, which doesn't give us many options if the rocket does go off course. I think solids have their place but they're going to need some work before I'm convinced by them."

Ornie frowned thoughtfully. "I bet that the Kerbal 1 launch was a fun moment for you then," he commented. "Which makes me think - why not just go for a Kerbal 1 design but with two RT-5's instead of four?"

"That might work," said Wernher "and if we can't get the LV-9 to work, it's probably what we'll have to do. I'm not sure it would get us to orbit but it would be better than nothing. We would launch with the Trashcans only, or with the LV-15 running at minimum thrust and then just see how far we get with a single stage once we drop the solids."

"It does sound like an LV-15 lower stage lifting an LV-9 second stage is the best plan then," said Ornie. "One decoupler for simplicity, better control for the second stage."

"And a symmetric mass distribution as well," said Wernher. "Which will make guidance and control a lot easier. Also a single point of thrust, rather than having to worry balancing thrust from the Trashcans."

They walked back through the side gate into the back yard and made their way over to the test stand. Wernher tore off a strip of paper from one of the chart recorders behind the main stand and unrolled it on a nearby workbench. "This is the recording for the fuel supply pressure," he said. Ornie bent over to examine it as Wernher continued. "Engine start is here, pressure builds up to maximum, keeps steady for a minute, begins to oscillate here," he jabbed a finger at the chart, "goes out of control here and then settles at a lower pressure until we turn it off."

Ornie tapped the chart absently, thinking it through. "Sounds like a turbopump problem," he said at last. "The engine runs fine to begin with, then we get a problem with the fuel flow here, failure here and then fuel just sprays out of the busted engine at whatever pressure you're feeding it in from the tank. Do you have any pump data?"

Wernher went over to the recorders and tore off a second strip. "Impeller rpm," he said, unrolling the paper onto the bench below the first strip. "A pump failure was my first thought too and the data seems to fit. Normal spin-up, runs for a minute and then we start getting variations in speed - which matches the pressure changes in the fuel line. Failure here and then the rpm goes off the scale as the shaft is running freely without any blades attached."

Ornie looked closely at the chart. "Looks like we're getting some secondary oscillations on the edge of the larger ones," he said thoughtfully, "They're not very regular though, almost random."

Wernher shrugged. "Noisy data. I really need to move the recorders back from the stand."

Ornie shook his head. "There's background noise in the whole trace but these secondary wiggles are still quite distinct." His eyes suddenly widened. "Of course! How could I forget!"

Wernher raised his eyebrows.

"The bearings! Richlin and I had the same problem with our early jet engines. The bearings weren't holding the impeller shaft steady enough and the blades were knocking against another part of the compressor. Just tiny knocks at first - the bearings weren't that bad - but they were enough to set the impeller shaft wobbling. The wobbles build up quickly until the impeller blades start rubbing against the pump casing." Ornie looked up wryly. "At which point it doesn't take long at all until you get a blade failure cascade. These secondary wiggles are the blades 'ringing' after each of those initial small knocks."

Wernher's eyes lit up hopefully. "So we just need better bearings? We can easily do that with the parts and tools we have on site!"

Ornie nodded enthusiastically. "Better yet, I can still remember how we redesigned our bearings. Can't guarantee that they'll work for a rocket engine but it has to be worth a try!"

The yard went silent as everyone stopped to watch Wernher and Ornie carry the LV-902 out to the test stand. Ornie plugged in the fuel and oxidiser lines as Wernher checked over the test program. They pulled the blast shields into place and retreated back to the control console. More than one pair of fingers were crossed as Wernher scanned the console settings one last time, before flipping back the cage over the master start button and depressing it with an audible clunk.

A billow of smoke marked the ignition, followed by a familiar high pitched roar as the LV-902 throttled up. Blazing light poured out of the gaps between the blast shields and the whole test stand shook under the thrust. Wernher watched the timer tensely as it climbed past the one minute mark.

One minute thirty seconds...two minutes....

Wernher held his breath, alert to any slight change in the engine noise.

Two minutes thirty....three minutes.... three minutes thirty.

The light dimmed and the roar of the engine died away and went out. A great cheer went up as Ornie pulled back the blast shields to find the LV-902 still intact on the stand. Wernher let out his breath in a great sigh of relief. His voice shook slightly as he called out to Ornie.

"Test 1 complete. Let's review the data, check over the engine and then set up for a full mission duration burn."

Chapter 4

Satellite

A cloud of dust trailed behind the car as it wound slowly up the steep hillside. From the passenger seat Lucan could see out over the plains, down to the twinkling river and beyond. In the far distance, he could just make out a sparse scattering of buildings marking the outskirts of Barkton. Jeb sat at the wheel, jaw clenched in concentration as he drove up the narrow series of switchback curves that masqueraded as a road. Behind him, Bill sat silently next to a large conical object. Four equally spaced bulges around the rim were the only features to break its smooth surface which tapered upwards to a gently curved tip.

Loose gravel crunched under his wheels as Jeb swung into the car park and came to a halt. Lucan pulled a collapsed metal trolley out of the back of the car and began unfolding it. Jeb and Bill grunted with effort as they heaved the cone out through the trunk of Jeb's car and set it carefully down onto the trolley. Sweating in the warm afternoon sun, the three kerbals set about wheeling the cumbersome vehicle up the nearest hill. Fortunately the ground was dry and the trolley wheels hissed as they trundled through the short scrubby grass.

They reached the top of the hill and Lucan locked the brakes on the trolley. Bill fussed around it, double checking the brakes and carefully rolling the cone until it rested point downwards on its cradle. Satisfied at last he stepped back and pulled a portable radio from his pocket.

"Control, this is Bill. We're ready to go."

There was a long pause as the three friends waited expectantly. Then abruptly four green lights lit up around the base of the cone and a long antenna extended out from each bulge. Richlin's voice crackled from the radio. "Control here. Confirming payload activation and incoming test signal. Let me see if I can..."

Richlin's voice faded out into static and then a muffled but unmistakeable tone echoed out of the speaker.

"beep... beep... beep..."

The last few weeks had seen a buzz of activity at Jebediah Kerman's Junkyard and Spacecraft Parts Company, much to the fascination of the steady stream of kerbals queuing up outside the doors. Quite apart from the wondrous pictures of their planet from space and a chance to sit in the very spacecraft that the pictures were taken from, hundreds of visitors had watched in mounting excitement as the two sections of the *Kerbin 1* rocket were slowly assembled in the yard. Others had watched in awe as the two test stands shook to the fire and fury of rocket engines at full power. Still others had lined the streets as Ornie's truck took the completed rocket stages out to the launch pad for assembly.

Hundreds had watched from behind the ropes as the lower stage of the rocket was carefully lowered into place on the launch pad and secured to the four restraining pylons. They had held their breath as two kerbals climbed out onto an arm of the launch tower and the second stage of the rocket, complete with conical tip, was hoisted into the air. Some of them swore that they had only started breathing again once the two sections had been gingerly brought together and made secure.

On the whole, Jeb thought, it was probably just as well that none of the onlookers realised the significance of the dozen slender looking bolts that held the two rockets together. He unrolled the tube of paper that he was carrying and pasted it firmly to the warehouse door.

CLOSED

Jebediah Kerman's Junkyard and Spacecraft Parts Company will be closed today.

All visitors are cordially invited to join us for the opening of our new out of town facilities.

Launch at 1.37pm. Final countdown begins at 12.00 noon.

We look forward to seeing you!

- The Kerbin Interplanetary Society -

Jeb turned out the lights and went inside.

The weather the next day was bright and clear, with only a whisper of a breeze to take the heat off the noon sun. Jeb stood in the doorway of the control bunker and looked out over the launch site. Far to his right, the freshly painted *Kerbin 1* stood gleaming in the sunlight. Wernher had muttered something about 'white paint keeping the sun off' and 'keeping the fuel tanks cooler' but Jeb suspected that, like everyone else, he just wanted to launch a smartly painted rocket for a change. Next time, Jeb thought, they would make sure that the launch tower was cleaned and painted too. If nothing else, the rusty old scaffolding could hardly inspire confidence in anyone outside of the Kerbal Interplanetary Society.

Over at the far end of the field, at what they hoped was a safe distance, a grandstand of tiered wooden benches had been built. Jeb could already see a line of small green figures queuing to get in. Bob had been down to the grandstand earlier that morning to check that the countdown clock was running and that the broadcast link to the launch bunker was working properly. Out at the launch tower he knew that Geneney, Lucan and Richlin were busy fueling the *Kerbin 1* and running final checks on the launch clamps and decoupler systems.

By noon, the grandstand and the grassy area around it were full to bursting with enthusiastic kerbals. Some, more entrepreneurial types were meandering between the benches selling a variety of cold drinks, snacks and clothing and several hats with the jaunty tilted rocket logo of the Junkyard and Spacecraft Parts Company could be seen bobbing through the crowds. Elsewhere small knots of kerbals were standing around the radio speakers listening avidly to the launch preparations. Everyone was keeping at least half an eye on the countdown clock as it slowly marked off the minutes.

"T minus thirty minutes. Weather is holding and lower stage fueling is complete. Bringing telemetry and guidance systems online."

"T minus twenty minutes. Upper stage fuelled and ready. Launch vehicle on internal power. All tower systems to launch positions."

Geneney and Lucan clambered over the gantries, disconnecting fuel lines and other umbilical connections. Satisfied, they scrambled to the ground and joined Richlin at the winch. With a great creaking and squealing of rusty joints, the tower rotated out of the way, leaving the *Kerbin 1* standing alone, tethered to the ground only by its four launch clamps.

"T minus five minutes. Launch site is clear, weather is good."

"T minus three minutes and counting. Tank pressures nominal. Decoupler systems are Go, guidance is green."

"T minus two minutes and counting. We are Go for engine start."

Gradually the grandstand grew quiet as everyone watched the last few seconds tick away.

"T minus 12, 11, 10..." All eyes turned to the slim pencil of metal on the launch pad.

"7, 6, 5..."

Fire blossomed from the base of the *Kerbin 1* and thunder rolled across the field towards them. For a brief moment the watching crowds feared the worst as the rocket remained stubbornly anchored to the ground.

"2, 1 and LIFTOFF!"

The launch clamps fell away and the *Kerbin 1* rose from the launch pad on a great billow of smoke and flame. A thousand small green faces watched in awe as it accelerated smoothly away, soaring gracefully into the sky and climbing out over the sea until only the bright flame of its exhaust could be seen against the blue.

Down in the launch bunker, Geneney sat in his chair watching the main screen. Altitude, velocity and projected apoapsis were all racing upwards. "Lucan, Wernher - systems report."

"Trajectory is good, stability augmentation systems within operational parameters."

"First stage propulsion performing well. One minute to staging."

Outside on the grandstand, even over the radio link, the crowd could sense the tension in Wernher's voice. Very few of them knew what 'staging' was but it was clearly something important.

"3...2...1... First stage shut down. Decouplers firing...separation and second stage ignition confirmed!"

The kerbals standing closest to the speaker could just make out Wernher's voice over the cheering in the background.

"KIS - we are go for orbit!"

Lucan watched the telemetry with trepidation as the fuel drained steadily out of the *Kerbin 1* upper stage and the ship velocity climbed higher and higher. As far as he knew the projected apoapsis was now well above Kerbin's atmosphere but they still weren't quite fast enough for a stable orbit. Behind him, Wernher was calling out the remaining fuel levels in an unworried voice.

"30 seconds... 25 seconds..."

And then the final display on the telemetry screen lit up. Lucan forced himself to be calm.

"Projected periapsis 10 km and rising. Eighteen seconds of fuel remaining. Estimated six seconds till loss of signal."

Then the numbers on the telemetry display flickered into noise and random characters and went out.

Jeb broke the sudden silence that settled over the bunker. "Good job with those trajectory calculations, Luco. What's your best guess on time to reacquisition?"

"67 minutes, assuming a clean shutdown and separation," Lucan replied, "Separation should trigger payload activation, so we'll soon know if everything is working."

"In that case I think I'm going to take a walk down to the grandstand and let everyone know what's going on. Genie - could you reset the countdown clock to display time to signal acquisition and patch the satellite receiver into the broadcast system please?"

"Will do, Jeb. Lucan - could you talk me through the numbers for acquisition?"

Bob stifled a yawn. "I could do with a walk too," he said, "anyone else coming?" Richlin got to his feet. "Think I'll join you," he said, "this bunker is getting a little stuffy."

"Not me," replied Lucan quietly, "you all launched using my calculations - I want to see whether they were any good."

Wernher nodded, "I'll wait here too," he said, "I want to see if the LV-902 did it's job. Lucan can run me through the calculations too."

Ornie stayed in his seat. "Reckon I'll want to get the news straight from Mission Control," he said, "rather than watching the clock from the far end of the field."

To everyone's surprise, Bill got to his feet. "Think I'll take a walk too." he said, "Either the satellite works or it doesn't - there's not much more I can do down here."

The crowd jostled around them, voices clamouring to know what had happened to the rocket. Jeb did his best to answer their questions as he made his erratic way towards the grandstand, Bill and Richlin following closely behind. Bob took everything in with rather more aplomb, even stopping to buy a fistful of crispy *djan* chips from a passing vendor. Jeb cupped his hands around his mouth.

"Make way! Make way, folks - the quicker I get to a microphone, the quicker you'll all get to hear what's happening."

As the crowd parted before them, Jeb led the others over to one of the radio speakers. Seizing the microphone hooked to the side of the speaker stand he vaulted up onto a nearby table.

"Good Kerbals - I have some good news and some bad news!"

Jeb slowly scanned the crowd waiting for them to quieten down, when his eye was caught by a cheerful array of brightly coloured hats, set out on a bench beneath him. They all seemed to be printed with a rather familiar stylised rocket. The hat seller looked more than a little nervous as Jeb jumped down to inspect his wares but Jeb just grinned at him and hopped back up onto the table cheerfully waving his new purchase.

"As I was saying - we have some good news and some bad news. The good news is - we made it to space! The bad news is - we don't know how far."

The crowd laughed as Jeb continued.

"We do know that we're going to make it at least half way around Kerbin but we're not sure if we're going to make it all the way back. What we have done is to put a radio transmitter on top of the rocket, so if everything goes to plan we should have a little surprise for you in about..." Jeb glanced at the countdown clock, "in about forty minutes."

"Now I'm not sure what you good people planned to do but we're going to be right here waiting by this radio. You're all welcome to join us - and if one of you could show me where Bob got those *djans* you'd be a lot more than welcome!"

As the minutes went by, more and more eyes turned to the clock. As it ticked down past the five minute mark, the four members of the Interplanetary Society, looked at each other and

silently crossed their fingers. A brief crackle from the speaker was followed by a burst of static. Bill looked up at the clock, which was still showing two minutes to go. Another burst of static, a pause and then, out of the electronic noise, a voice.

"..nie, Richlin and too many other kerbals to mention from the great town of Barkton!"

Bill's heart leapt as the speaker gave a loud beep and the recorded message started again. It was tinny, it was difficult to hear in places but it was unmistakably Jeb's voice, reading the message that they'd recorded all those weeks ago.

"This is the Kerbin Interplanetary Society. Broadcasting from orbit, around the world, around the clock! We are Jebediah, Bill, Bob..."

Four green hands clasped in quiet triumph as Kerbin's very first artificial satellite soared through the blackness of space playing its message over and over again to the jubilant crowd around them.

Chapter 5

Two's Company

"Anyway, I'm done for the night. Speak soon, Ademone."

"Speak soon, Jerdo."

Ademone put the phone down and swung back and forth in her chair trying to summon up the enthusiasm to start on the pile of paperwork stacked up neatly in front of her. The temptation to take advantage of the clear night sky and spend an hour or two adding to the Mün map decorating her study wall wasn't helping this endeavour. For that matter she thought, going out to the sandpit and trying out some of the new colour powders would be a useful way to spend the evening and she could even justify that as work.

She sighed and flicked the radio on. May as well find something decent to listen to if she had to spend the evening working. She turned the dial back and forth looking for a good station.

Snatches of music clattered out from the speaker, interspersed with what sounded like news bulletins. Ademone reluctantly picked up the first piece of paper from the pile and was skimming it half heartedly when a sudden loud beep from the radio made her jump. She scowled. Some ham's idea of a joke no doubt. Strange though - the dial was quite a way outside the normal frequency range for the local enthusiasts. It wasn't a very good transmission either, although there did appear to be a voice talking somewhere behind the static. Suddenly intrigued, she worked the fine tuning dial, trying to get a better signal.

"Bob, Geneney, Richlin... kerbals... Barkton!"

That brought her up short. Barkton was quite a way away. Not many amateur transmissions from there and whoever was sending this one definitely sounded amateur. The radio beeped again.

"This is a message from the Kerbin Interplanetary Society. Broadcasting from orbit, around the world, around the clock! We are Jebediah, Bill, Bob, Geneney, Wernher, Lucan, Ornie, Richlin and too many other kerbals to mention from the great town of Barkton!"

Ademone burst out laughing. Definitely amateurs but with a sense of humour. Kerbin Interplanetary Society indeed! Chuckling, she turned the dial back to the nearest music station and picked up her pen.

It had been a good three months for the Speciality Fireworks Company and Ademone worked her way steadily through the stack of invoices. After deciphering one particularly illegible one, she decided it was time to take a break. She stared out of the window as the coffee pot burbled away. It really was a good night for Mün gazing - surely ten minutes couldn't hurt? Then she grinned, remembering the message from Barkton. Maybe she could just ask Bill, Bob and the rest of them for a map instead. On a sudden impulse she reached out and switched the radio back to the Barkton frequency.

The radio hissed softly as Ademone drank her coffee. Then, much to her surprise, a burst of static echoed out of the grille, followed by an indistinct mumbling. Another burst of static almost drowned out another loud beep and then the recorded message played again getting clearer and clearer as it went on.

Ademone looked up at the clock on her wall. Just over an hour. She tore off a fresh piece of paper from her desk pad and wrote out some calculations, frowning as she underlined the final figure. The time between broadcasts was certainly consistent but an orbiting transmitter? Somebody just had to be playing an elaborate joke, although it *was* an unusual frequency to choose. Then an idea struck her. Assume this thing really was in orbit. How long for it to travel another 500-600 kilometres further east? She scribbled away on the pad. Hmm, too late this time round but maybe not the next! She picked up the phone.

Jerdo sounded sleepy and rather put out. "What is it, Ademone - it's getting late."

"I know, Jerdo but this could be interesting. Can you stay awake for another hour or so?"

"I might be able to but why?"

"It's probably nothing but I picked up this odd little broadcast tonight and I was wondering if you could check it out for me. Doesn't sound like the usual crowd either."

Jerdo's voice was guarded. "I guess so - what frequency?"

Ademone read off the frequency. "You probably won't get much but static for another hour but if you could tune in in about 55 minutes that would be perfect. Oh - and call me back as well. I want to listen to this too."

As the minutes dragged by, the pile of paperwork slowly decreased, although each invoice signed was almost invariably followed by Ademone staring out the window, fidgeting with her pen or pacing up and down the office. Finally the 55 minutes were up and she eagerly switched the radio back on and telephoned Jerdo.

"Have you got the radio on?"

"Sure but I'm not getting anything but static," Jerdo yawned. "What am I waiting for anyway?"

"Oh you'll know it when you hear it, Jerdo - you'll know it when you hear it. You are at the right frequency aren't you?"

Jerdo dutifully checked the dial and read off the frequency with another stifled yawn.

Suddenly, there was a familiar beep. Ademone waited tensely. And then at last, she heard another voice down the telephone line. It was faint but perfectly synchronised with the one spilling out from her own radio. Ademone sank back into her chair as Jerdo's suddenly excited voice filled her ear. *Dear Kerm*, she said quietly to herself, *Dear Kerm...*

"Genie! Genie!" Jeb poked his head around the door of Geneney's office. "Hey have you seen Genie anywhere?" He paused, "Hey wait a minute - have we met?" Then Jeb looked around the room. "Hang on - this is Geneney's office right?"

Roncott looked up from the drafting board. "He's just out getting another filing cabinet. Should be back in a moment. Hey Camrie - how long did Geneney say he'd be?"

Camrie slowly put down her wrench. "Roncott - you might want to try *using* those eyes of yours for a change. Being a little more polite to the boss wouldn't hurt either."

Roncott jumped to his feet flushing dark green in embarrassment. "Oh my. Oh goodness I'm sorry sir!"

Jeb waved dismissively, "Just call me Jeb. But seriously, who are you guys?"

Much to Roncott's relief, there was a squeaking of rubber wheels as Geneney came into the room pushing a filing cabinet on a trolley.

"Oh hi, Jeb - you've met Camrie and Roncott then?"

"In a manner of speaking," replied Jeb. "I met Roncott anyway. Good to meet you too, Camrie!" He raised his eyebrows. "Filing cabinets, Genie?"

Geneney nodded cheerfully. "Yep. Got to have somewhere to store all the plans! We're about halfway through cataloging your stock for useful parts - got some other volunteers still working on that." He looked sheepishly at Jeb. "You might have noticed that the petty cash has taken a beating lately - I figured that the gang deserved a drink or two at the end of a hard day sorting junk. Anyway, Camrie and Roncott are helping with Phase 2."

Jeb made a mental note to top up the petty cash. "Phase 2?" he asked mildly.

Geneney gestured proudly around the room. Two large drafting boards were placed by the windows. A set of well equipped workbenches were lined up against one wall. Camrie was sitting at one of them, stripping down a piece of machinery and carefully setting the various components out in order. Two large filing cabinets stood in the corner and a selection of diagrams were pinned up around the walls.

"Phase 2. We're taking the useful parts from stock, working out where they fit and then measuring them and drawing up plans so we can make more of them! We're doing the same for parts that we've already prototyped - Camrie is working on the LV15 combustion chamber right now and I forget what Roncott is doing."

"Parachute ejector rails," said Roncott happily,

"Oh yes," said Geneney enthusiastically, "we'll need to test this, Jeb but I think we've got a much lighter design for the rails - and Roncott has figured out a way of using fewer parts too! I'm working on the electrical system for the Kerbal 2. Bill had a great idea for making the electrics more modular. Not quite sure how it's going to work yet but we're hoping that the modular system will be need less cabling and be easier to build and install!"

Jeb beamed. "Not bad at all guys - it's almost starting to look like we know what we're doing!" He moved to one side as Wernher pushed past him.

"Camrie - do you have the plans for the LV-9 propellant manifold?"

Camrie pulled open a cabinet drawer and flicked through it. "Right here, Wernher. Just leave it on the table here once you're done."

"Thanks, Camrie - Oh hi, Jeb - didn't see you there." Wernher dashed out of the door.

Jeb shook his head. "Haven't seen Wernher looking that excited for a while."

Geneney chuckled. "Me neither. I think he's quite enjoying working to proper plans for a change."

Jeb smiled. "Finally having the money to buy in some materials is helping too I think. Our little museum is bringing in some cash now and we made quite a lot from ticket sales for the Kerbin 1 launch. I have to admit that all the free advertising is helping the junkyard business too. Oh - that reminds me, Genie. There's a couple of drums outside in the yard that you may want to take a look at. Don't go too near them with a naked flame though."

Geneney's eyes lit up. "Trashcan propellant?" he asked.

"You got it. I tell you what though - I think we should look seriously at going to an all-liquid design. I had to call in a favour to get hold of those drums and even then they were pricey. Apparently they've got a big new customer and they just can't make the stuff fast enough at the moment."

Geneney nodded. "Something to talk over with Ornie and Wernher," he said, "Wernher never really liked using solid boosters anyway so he won't mind. And now they've worked out a better turbopump for the LV-9, maybe they can squeeze a bit more power out of the LV-15 too."

It was early afternoon at the Spaceship Museum and Jeb was taking a turn at the *Kerbal 1*, cheerfully posing for photographs and signing hats. Lucan trotted up and tapped him on the shoulder.

"Phone call for you Jeb," he said, "I told them you'd take it in your office."

"Jeb Kerman here - who's speaking please?"

"This is Thomplin Kerman at Stratus Ltd."

"Pleased to meet you, Thomplin - what can I do for you?"

"Well it's like this, Jeb. We're in the storage business. Gases and liquids mainly and I think we've got one or two products that you might be interested in."

Jeb fished out a notepad from his desk drawer. "Go on, Thomplin - what kind of products did you have in mind?"

"Well as I said, we're in the gas storage business. Pressurised gas mainly - although we are starting to look at cold storage solutions too. Anyway, we've come up with a design for a compact spherical tank. Very light, very strong and holds about 20 kg of fuel... I mean gas."

Jeb drew a circle around '20 kg' on his pad. "How about pressure regulation?" he asked, "and how big is this thing?" He listened intently as Thomplin rattled off details. "Hmm. I think we could certainly use that. I hate to ask but how much do you sell these for?" He winced. "Uh - I presume you offer discounts if we buy them in bulk? Oh that is with the discount... OK"

Jeb sat back in his chair. "I'm sorry but we can't afford that," he said, disappointment leaking into his voice. "It's a real pity - I've got some ideas already about how we could use those tanks and I bet the team here will have even more. But we could get an awful lot of much needed material for that price."

"Although... hmm. Maybe we could work something else out. What would Stratus say to a sponsorship deal?"

Thomplin's voice was cautious. "What kind of sponsorship are we talking about Jeb?"

Jeb thought rapidly. "We got a couple of thousand people watching our last launch and we've got some pretty big plans for the next few launches, so we expect that number to go up. No reason why we couldn't set some billboards up for you. Maybe even set aside some space where you can set up a display for your latest bits and pieces. There's a fair bit of room on the side of a rocket too - what would you say to painting a Stratus company logo on there?"

"And in return for that, we supply you with the tanks at a reduced price?"

"I'm thinking free, Thomplin. Lots of exposure for you - and we make sure that everyone knows that Stratus tanks are helping get us to orbit. That sort of endorsement has got to be worth a couple of free tanks I reckon."

Thomplin sounded thoughtful. "We might be able to work on that, Jeb. Tell you what - how about if we come over next week with some samples? Your team get to have a look at them and we get to see the launch site and talk things over."

"Looking forward to it. Would Munday afternoon at 2:00pm suit you?"

"That would be perfect, Jeb. See you then."

That evening, Jeb called a meeting. The Kerbin Interplanetary Society was growing rapidly and the original eight names had now grown to a respectable crowd of some twenty members, all sitting out in the back yard in time honoured fashion. Jeb got to his feet and waited patiently for the chatter to die down.

"OK folks. I've called this meeting after a very interesting phone call today with one Thomplin Kerman from Stratus Ltd. Apparently they sell some hardware that we could use - and I think we can do business with them. The question is - do we actually need their stuff?"

Malmy raised his hand. "Depends what they're selling, Jeb," he said, "although I'm guessing it's not complete junk if you bothered to give this Thomplin the time of day."

"Oh it's far from junk, Malmy, said Jeb, "if I'm understanding things right, it could be a nice compact propellant tank. Spherical, pressure controlled, holds 20 kg of whatever gas we put in there. Supposed to be lightweight too but I don't know how light."

"It won't be cheap though," said Ornie, "Me and Richlin know Stratus pretty well. They do nice tanks but they charge a nice price too."

Jeb coughed. "I think we can work around that," he said. "I'm kinda hoping that some billboard space at Kerbin's first Space Centre, plus maybe their name on the side of a couple of rockets, will persuade them to part with a few little propellant tanks. But, as I said, the question is - what would we do with them?"

Camrie got to her feet. "Could we use one to power a small rocket? Something we could put on the back of a satellite and actually fly it around a bit once it gets to orbit?"

Roncott jumped up excitedly, "Yeah - we could fly it to the Mün!"

Lucan laughed. "Don't think we could get it to the Mün, Roncott. It would be great for moving a heavier satellite around in orbit though. Sounds perfect for the kind of rocket control system that me and Geneney were talking about too."

There was a clamour of voices. "Rocket control system? What are you talking about?"

Lucan raised his arms for silence. "Well we're not going to need it any time soon - the Kerbal 2 won't be going that high. But one day we *will* be going a lot higher and we were just figuring out how we'd set about steering a capsule at that height. We thought a set of small rockets around the capsule would do the trick but we couldn't quite work out how the fuel supply would work. A small pressurised tank sounds like just the thing, especially if it really does hold 20 kg of gas."

"Yep - 20 kg of gas would let us do quite a bit of maneuvering," said Geneney. He snapped his fingers. "Actually - forget the rockets. A lightweight gas tank would be just the thing for taking some extra air along for longer flights!"

Jeb listened happily as the ideas flew back and forth. Then he heard Bob's voice over the noise.

"Jeb - do they make a bigger tank than 20 kg?"

"I expect so, Bob - I'll certainly ask them when they drop by next week. They'll be bringing a couple of tanks along too, so everyone can get a look at them, maybe try them out. Why do you ask?"

Bob looked thoughtful. "It was what you said about pressure control that got me thinking," he said, "I was wondering if we could fill one with something non flammable and then stick it in the top of a fuel tank. Use the pressure of the escaping gas to push the fuel out of the other end of the tank. It probably wouldn't work so well for a big engine but something smaller like the LV-9s, we might be able to do away with the turbopump altogether."

Wernher walked over to Bob and shook him by the hand. "That might just be the best idea that you've come up with yet," he said. "No reason at all why that wouldn't work and it should make the LV-9 series into a really simple and versatile engine for all kinds of things!" He looked Roncott in the eye.

"Nothing big you understand. Just little routine things like landing on the Mün."

Chapter 6

These New Engines

There was a stunned silence and even Jeb seemed a little taken aback. "I admire the ambition, Wernher," he said, "but we haven't even flown a crewed flight to orbit yet. Or flown *anything* to the Mün for that matter."

Wernher looked at him impatiently. "Of course not," he said, "and believe me, I know exactly how much we need to do before we can even think about it. Pressure fed engines are still going to be a major step forward though, especially if we use hypergolic propellants. Just open two valves and whoosh - propellants mix and engine fires. Believe me, I'd much rather be depending on something like that to get me back to Kerbin rather than a collection of igniters and pumps!"

Jeb made a placating gesture. "OK, OK. I see what you mean - I just hope the people at Stratus can come up with what we need. In the meantime, we need something a little smaller but something that will still be a useful test of the Stratus tanks."

Bob cleared his throat. "We could launch another satellite," he suggested, "Except this time we make it more like a mini capsule. We use the same LV-902 second stage that we used for the Kerbin 1 but we upgrade the LV-15 with the new turbopump. That should boost its performance enough that we can launch a heavier payload than last time."

Everyone's attention was fixed on Bob as he continued. "We build a propulsion module with one of those Stratus tanks - assuming they are all that Jeb seems to think they'll be. Then we have the satellite itself but this time it's a little bit more than a radio transmitter in a ball. It has a heat shield at one end, a parachute at the other and a couple of cameras in the middle. We lift both modules to orbit, fly them around a bit, take some pictures and then use the propulsion module to de-orbit. Satellite detaches from the propulsion module, re-enters the atmosphere and lands by parachute."

Jeb's jaw dropped. "Good grief, Bob. I'm not sure who's worse, you or Wernher."

Wernher spoke up. "Actually that sounds doable, Jeb but I suggest we keep it simple. We use the propulsion module as a very small third stage if we need a bit more speed to get to orbit. Then we use it to put the satellite into a slow spin. We do a couple of orbits, fire the propulsion module again to stop the spin and then one last time to drop out of orbit."

Lucan raised a hand. "I presume that we time things so that we do the de-orbit maneuver after an exact number of orbits?"

"Exactly," said Wernher. "Fitting any sort of guidance system into something that small is going to be difficult. I'm not saying that we can't do it but I don't think it should be a priority. So we don't bother. It does mean that we'll get a pretty odd collection of pictures though, since the satellite will be pointing in the same direction all the time, rather than tracking the horizon."

"Hmm, calculating the re-entry path is going to be fun. Might not be a bad idea to fire a couple of test flights out over the sea first to give us more idea about how much drag we'll get. Not with a full flight article though of course, just something the same size and mass..."

"I've got an idea," said Richlin, "Ornie and I have got a couple of friends out by the Eastern Wakira coast. If we did put a radio in this thing, I'm sure Sigbin and Doodlie would let us know as it passes overhead. That should give Lucan time to tweak the re-entry a bit."

"Hang on - where are we putting the heat shield and when do we lose the propulsion module?"

"Will we have room for a radio and the cameras?"

Jeb had to raise his voice as nineteen excited kerbals started discussing Bob's plan and arguing over the technical details.

"OK, OK folks! I think that's a big yes for Bob's satellite plan! But at the risk of bringing everyone back down to Kerbal for a moment, we've got another ship to launch first!"

The propulsion team surveyed their work with satisfaction. Four RT-5 boosters, complete with decoupler mounts, rested in the assembly jig, neatly arrayed around a mockup of the Kerbal 2 lower stage. Malmy's back made a popping noise as he stretched. "I think that's got it, lads. We can finish the paintwork this afternoon and then take em out to the Tent tomorrow."

Ornie opened his lunch bag. "Sounds good to me, Malmy. The lower stage is about done apart from the arming circuits for the decouplers and Gene's people are out there working on this today. Hey, Wernher - put the radio on would you? It should be about time for the news."

Familiar music drifted through the air.

"This is KBS News at 1:00pm. In our main story this lunchtime, space fever heats up in Foxham as the Rockomax Corporation announces a successful test of their new BA-A rocket booster. Our space correspondent Leland Kerman was there to watch the launch."

Ornie dropped his bag. "Rockomax Corporation?"

"Good afternoon. I am Leland Kerman and I'm standing outside the main control room at the Rockomax test site. With me today is Ademone Kerman, owner and company manager of Rockomax, who has kindly agreed to speak to KBS before this important test flight."

"Ademone, perhaps you could tell the listeners a little about this flight. Why is this such an important test?"

"Good afternoon, Leland and welcome to this test of our new BA-A booster. This is the first in what we hope will be a series of our next generation solid fuel rockets, so it's a pretty big day for us."

"I can imagine, Ademone. So what height are you expecting the BA-A to reach? Will you be aiming for orbit?"

Ademone laughed. "I'm afraid not. The BA-A is really a test bed for a number of new technologies, which we will be building into our planned orbital launcher in the coming months. It should still be quite a spectacular flight though - the rocket will reach a top speed of just over 1 kilometre per second and a height of just under 17 thousand metres."

"That's quite a way up - I hope it's not going to drop back on our heads!"

"Oh no - by the time it falls safely into the sea, the BA-A will be over 25 kilometres away."

"That's extremely impressive, Ademone. But tell me - why Rockomax? What made you decide to become a rocket builder?"

"Well as you know, Leland, Rockomax used to be the Speciality Firework Company, so we've always been a rocket company really - we're just building bigger ones now. But really, it was the Barkton Satellite that made the decision for me. The idea of launching a rocket all the way around Kerbin was just inspired!"

"So you're convinced about the Barkton Satellite? Many people have dismissed it as a hoax or a joke."

"Oh I thought so too at first, Leland. But it quickly became obvious that it was quite real. I do a little amateur radio myself and let me put it this way - it would have been easier to put a satellite into orbit than it would have been to coordinate a network of fake radio broadcasts so accurately across the whole of Kerbin."

"Well that sounds pretty conclusive to me and I hope our listeners will feel the same way. Ademone Kerman - thank you very much."

"It's now just under five minutes to launch. In the distance I can just make out the last of the Rockomax engineers making their way back from the booster..."

Ornie clicked the radio off. "Sounds like we have a little competition," he said quietly.

Wernher was still looking indignant. "A hoax - why would we bother with a hoax?"

Malmy was looking a little wide eyed. "One thousand metres a second - I wouldn't fancy sitting on top of that."

"Well you need to be going a lot faster than that to get to orbit," said Wernher, "But I don't expect they're putting much on top of their booster if those altitude and range figures are at all accurate. A solid fuel motor with a very light payload will get very fast very quickly but there's no real way of controlling the thrust. I think they're being rather optimistic with their talk of an orbital launcher."

"Even so," said Ornie, "they managed to get it off the ground without exploding - and they did it on a live news broadcast too. They might be optimistic but they're not exactly lacking in confidence either. We should tell Jeb about this."

Thomplin was feeling somewhat dubious as he pulled up outside the old warehouse. This had to be the right place with a sign like that but it all looked a little bit run down. It was busy enough, although it wasn't really what he'd expected from an organisation that had apparently launched a rocket into outer space. Someone had obviously noticed their arrival and passed a message inside, since a couple of minutes later a cheerful looking kerbal wearing a bright red hat popped his head around the warehouse door and bounded towards them.

"You must be Thomplin! Welcome to the Junkyard and Spaceship Parts Company. I'm Jeb by the way". Jeb peered into the cab. "Pleased to meet you um...

"Halnie. Is there anywhere we can put the van?"

"Absolutely, Halnie", said Jeb enthusiastically, "There's a couple of spaces in the yard, I'll just go and get them to open the gates for you! He rubbed his hands together. "I tell you - you're going to love the test we've got set up for your tanks!"

Jeb bounced away and disappeared back inside the warehouse. Moments later the main gates opened with a squeal of rusty hinges. Halnie glanced over at Thomplin, shrugged and started the van.

Both kerbals looked around the yard with interest. This looked a bit more promising and if nothing else there certainly seemed to be a lot more going on. One kerbal was crawling out of a strange squat looking pod, which appeared to be surrounded by makeshift scaffolding. Another was perched on top of the scaffolding, carefully attaching what looked like a conical lid to the roof of the pod. In the centre of the yard a group of kerbals were gathered round some kind of metal framework peering intently at something.

Jeb ran over to them. "This way!" he called, gesturing towards the framework. Their curiosity piqued, Halnie and Thomplin followed him.

The device mounted on the framework was like nothing they'd ever seen before. It appeared to consist of a small cube of metal struts stuffed with a dense tangle of plumbing. Four nozzles were attached to the outside of the cube, each one pointing in a different direction. A tube led out of the back and into a large cylindrical tank standing next to the main frame.

Jeb pointed at the tank. "You see the problem?" he said. "We can make the control thrusters pretty small but that's no good if we still need a big heavy tank for the propellant."

Halnie and Thomplin stared at him blankly. Jeb looked momentarily puzzled. "You did know that we build spacecraft right? Well this is a steering system for a spacecraft. You can't use wings in space - no air - so we use sets of small rocket thrusters to steer instead."

Halnie bent down to inspect the fuel line coupling. "Looks like we'll need a 3c adaptor," she called over her shoulder. "The tank looks standard enough, so the filler pump ought to handle it. Then she noticed the warning signs painted on the side of the cylinder. "Best bring the protective gear too I think - whatever this stuff is it looks pretty nasty."

"In that case," Thomplin said dryly, "why don't we just see if we've brought the right sized tanks first."

Everyone gathered round eagerly and craned forward trying to see as Halnie opened the equipment cart and with some effort, lifted a white metal object onto the test stand. As promised, it was basically spherical, its smooth walls broken only by a hose coupling on the top and a set of metal flanges which it was currently resting on. Malmy was skeptical.

"Well it's small enough. Doesn't look like it hold 20 kilos of anything though."

Thomplin gestured. "I assure you it's heavier than it looks. Go ahead and pick it up if you like. Actually if you could put it on the ground that would be helpful."

Malmy slipped his hands casually under the tank and lifted. His eyebrows shot up as he took a rather better grip on it and tilted it carefully down off the stand. He looked at Thomplin with new respect. Thomplin nodded slightly and rather theatrically, took a heavy looking sledgehammer off the equipment cart. He raised the hammer over his head and before the horrified crowd of kerbals around him could do anything, let it drop squarely onto the tank.

Malmy stared in disbelief as the hammer bounced off.

"Pressurised," said Halnie casually, "I wouldn't try that with an empty one but they're pretty sturdy once you fill them up. I would stand back for this part though."

Everyone moved a respectful distance from the test stand as Halnie donned her protective clothing and lifted a second tank off the cart and hooked it up to the propellant cylinder with practised ease. There was a collective drawing in of breath as the filler pump started up with a loud clatter and monopropellant flooded into the tank.

The pump shut off automatically and Halnie carefully closed the cylinder valve and disconnected the tank. Working briskly she lifted it onto the test stand and attached it to the thruster block.

"OK, Jeb - what was that test you wanted to show us?"

Chapter 7

The Courage of Conviction

Jeb regained his composure with a visible effort, although he was still looking a little wild eyed.

"Uh - if you'd care to step over here." He led Thomplin and Halnie over to the nearby control panel. A stubby handgrip protruded from the panel mounted on a complicated looking articulated arm. "This is just for testing now of course," he said, "but eventually, we're hoping to develop this into a control system for the pilots."

Jeb cupped his hands round his mouth. "Clear the stand!" he shouted, "RCS test about to start!" He waved towards the handgrip. "Go ahead."

Halnie stepped forward eagerly. "OK what do I do."

"Just take hold of the handgrip and try moving it around", said Jeb. "You'll soon get the hang of it."

Halnie pushed the controller tentatively forward and jumped as a burst of flame shot out of the top of the thruster block. She hurriedly pulled it back, only to trigger a second jet of flame from the nozzle underneath. Frowning slightly she pushed the handgrip slowly forward, until the upper nozzle just fired and then drew it back again, triggering the a brief puff of flame from the lower nozzle.

"Forward and back control pitch," said Jeb, wagging his hand to demonstrate. "Side to side will control roll eventually, although you won't see any difference now. Proper pitch and roll control will need a pair of thruster blocks." Halnie pushed the controller to one side experimentally and sure enough the upper thruster fired again.

"Twisting the handle gives you yaw control," Jeb continued "but again, proper control needs a pair of blocks". Moving more confidently now, Halnie twisted the handgrip back and forth and grinned with delight as first one and then the other of the side nozzles burst into life.

Jeb grinned too. "We're running a calibration test on the controller later today, he said. "You're welcome to help if you like - we need to test it with as many people as possible to get an idea of where best to put the trigger points. You'd be welcome to have a go too, Thomplin!"

Thomplin was still mulling over Jeb's first comment. "You mentioned something about pilots, Jeb. What exactly will they be piloting?"

"Easier to see than describe, Thomplin. Come and have a look at the Kerbal 2!"

Halnie gazed at the squat pod with delight but now it was Thomplin's turn to look a little wild eyed. "You're going to put a kerbal in *that*?" he asked incredulously.

"Kerbal-s actually," Jeb corrected him. "The capsule is a bit cosy but it does seat three."

Halnie was walking around, inspecting the *Kerbal 2* from all angles. "I don't know much about spaceships," she commented, "but this one looks almost finished. I don't see where your thruster blocks are going to go, let alone our propellant tank."

Jeb nodded. "The Kerbal 2 won't really need them," he said. "It's only designed for sub-orbital flight. You get a nice view from 35 kilometres up but you're not high enough to need RCS control. We're thinking that the orbital capsule will be a bit smaller actually and it'll probably only have room for one pilot by the time the other systems are in place."

"A nice view," said Halnie lightly, "Sounds like you've already been there, Jeb!"

"I have," Jeb said simply. "The Kerbal 1 is inside if you want to take a look at it later but I thought you'd want to see the launch site first. We'll be mating the Kerbal 2 with its launch vehicle too, so you can have a good look at the whole ship."

Ornie's truck bumped over the grass as he drove out to the launch pad. Beside him, Thomplin's head was swivelling back and forth as he took everything in. Plenty of room to put up a Stratus billboard or two, just like Jeb had promised. Lots of people to look at them too, if the number of seats was anything to go by.

Halnie's eyes were fixed firmly on the approaching launch tower, although at the moment, it looked like nothing so much as a very large shower booth. She commented on this to Ornie, who chuckled. "It does a bit now that you mention it. We call it The Tent with all those drapes hanging around it. They do a decent enough job of keeping the vweather off during assembly although I'm looking forward to the day that we can put up a proper building for the job!"

As the truck came closer, pairs of kerbals emerged from behind the drapes and started rolling them out of the way, exposing the tall central tank and stubby side boosters of the rocket. Both Thomplin and Halnie's eyes widened. Halnie was practically bouncing up and down in her seat in her eagerness to get out and inspect the *Kerbal 2* at close quarters. For his part Thomplin wasn't any more convinced by the rocket than he had been by the capsule.

The truck rolled to a stop. A shadow fell over the cab as high up on the launch tower, the assembly crane swung around and lowered a cable down towards the waiting spacecraft. Hahnle hopped out the cab and watched as the capsule was hoisted into the air and set delicately down on top of the rocket. Two kerbals, both securely tethered to the launch tower, set about attaching a set of what looked like clamps to the capsule, although Hahnle couldn't help noticing that they were being handled rather gingerly.

Ornie followed her gaze. "Decouplers," he said briefly. "Basically, small explosive bolts that we use to detach the booster once it's out of fuel."

Even Hahnle looked slightly taken aback at that and beside her, Thomplin just rolled his eyes.

"I know," Ornie acknowledged, "they do work though. On a different note, we were wondering - do Stratus make larger versions of those spherical tanks?"

"Depends what you mean by larger but yes we do another tank that has about twice the volume of the demo model we showed you." Hahnle cocked her head. "Difficult to say how heavy that would be - depends what you put in it and at what pressure."

"Hmmm," said Ornie, "I'm not sure what Bob and Wernher had in mind but that sounds like it should work." He pointed at the side boosters. "At the moment, those things are solid fueled but we're really hoping to stop using solids. We were thinking about a pressure fed liquid design but that would need us to store quite a lot of high pressure gas in a small space. Your larger tank sounds worth a try."

He looked at Thomplin. "You'd be more than welcome to talk things over with them tonight and come and watch the launch tomorrow."

Thomplin didn't need to see Hahnle's face. "That would be most generous," he said.

Geneney waited by the capsule, clutching the gantry rail and trying to ignore the beads of sweat running down the back of his neck. Lucan stood beside him, his bright orange pressure suit highlighted against the grey sky, one hand swinging his flight helmet casually back and forth. There was a knock from inside the *Kerbal 2* and then Bob clambered carefully back out through the hatch. Geneney steeled himself and climbed inside, squeezing in past the control panel and settling himself into the centre seat.

Bob passed his helmet through the hatch and then climbed in himself. He set to work connecting Geneney's suit to the capsule systems whilst Geneney shuffled around trying to make himself comfortable in the confines of his seat. Finally, Bob placed the helmet over his head and locked it carefully into place on the neck ring of his suit. He rapped on the transparent visor and gave Geneney a cheerful thumbs up before crawling back out of the capsule to let Lucan take his place in the third seat.

Geneney stared around the inside of the capsule listening to Lucan chattering away as Bob plugged him in. Then Lucan too got a good luck rap on the visor and a thumbs up. With a final "Good Luck," Bob climbed out onto the gantry, slamming the hatch shut behind him.

Lucan reached over his head and twisted the locking wheel closed. A detached part of Geneney's mind nodded in satisfaction as the hatch bolts slid smoothly into place with a reassuring clunk.

Geneney flicked a toggle switch on the control panel. "Control, this is Kerbal 2."

Ornie's voice came back over his headset. "Reading you loud and clear, Gene. Running final checks on the booster."

"Understood Control."

Geneney flicked off the external comms link. "You know guys, this capsule looks a lot more sturdy from the outside."

Lucan turned his head awkwardly towards him. "Just as long as you remembered to stick the parachute on top. Besides you *built* this thing."

"I know - that's what's worrying me."

Wernher cleared his throat. "How do you think I feel then," he said wryly, "given that I built the engines. Better switch the external loop back on Gene - they shouldn't be too much longer with those checks."

Bob's voice filled their ears. "All rocket systems check out. Guidance control and launch sequencing transferred to booster. Ready when you are, Ornie."

"OK then. We all know what we're doing. LV-15 engine start on my mark, 3 second hold down at full power as a last check, then we release the clamps and light up the Trashcans. That last bit is probably..."

Geneney smiled and found himself relaxing at last. *Going to be a bit bouncy*, he murmured to himself.

"... so you might want to hold on something. Ignition in five...four...three...two...one.. Mark!"

Geneney braced himself, as the *Kerbal 2* came to life around him. The capsule shook with the steadily increasing rumble from the LV-15 far below his back.

"Holding for three...two...one..."

The RT-5s ignited right on schedule with a deafening roar, ramming Geneney back into his seat as the *Kerbal 2* hurtled skywards.

Halnie and Thomplin held their breath with the rest of the crowd as the *Kerbal 2* soared out over the sea trailing a thick plume of roiling grey smoke behind it. Despite his earlier misgivings, the sheer spectacle and controlled fury of a live rocket launch had touched even Thomplin's cautious soul and he had cheered himself hoarse with everyone else as the *Kerbal 2* lifted off. Halnie was simply starstruck as she watched the fiery dot disappear into the sky.

It was noisy beyond belief, the shaking was terrifying and it was the most exhilarating thing he had ever done in his life! Geneney's face was pulled back into a broad grin as the acceleration built up to painful levels. How long had the Trashcans been burning? Lifting his head was out of the question, so there was no way to check the fuel gauge on the control panel. No way of checking the altimeter either. No matter *Geneney*, he told himself, *just enjoy it while it lasts*. Outside, the sky was gradually fading into a deep midnight blue as the capsule rose higher and higher.

The RT-5s stuttered briefly, once, twice, before finally falling silent. All three kerbalnauts were flung forward in their straps as the thrust abruptly died away. Four loud bangs announced the departure of the Trashcans as the LV-15 pushed them gently onwards.

"Kerbal 2 this is Control. Come in Kerbal 2!"

Geneney forced himself to speak. "This is the Kerbal 2," he whispered.

"Say again Kerbal 2."

Wernher spoke up. "We're all good, Control. Clean separation on RT-5s. Gene got a little squashed but he's OK."

Lucan's voice sounded a little strained. "There has *got* to be a better way of doing this," he said, "I mean - I didn't think Bob was exaggerating when he was talking about getting mashed but sheesh - he really really wasn't joking either!"

Ornie laughed. "Bob's just wondering if you're all going to join him in persuading Jeb to fit some extra padding to those seats. Thirty seconds to staging, guys!"

After the crushing acceleration of the Trashcans, the last moments of powered flight were almost soothing. Geneney leaned forward and watched the reading on the fuel gauge drop lazily downwards. There was a brief moment of quiet as the engine shut down, followed by a familiar bang as the booster dropped away, leaving the capsule to coast upwards under its own momentum. Geneney was delighted to find himself feeling unexpectedly light, so light in fact that he was floating off his seat and bobbing gently against his harness.

"Look guys - I'm floating!"

Next to him, Lucan was looking happier than he had all flight. "This is *awesome*! Hey, Control - how come nobody told us about this?"

"No response from here," said Ornie, "I'm guessing they were just wedged a bit more tightly into their seats. Looks like you're all getting a first on your flight too!"

"Hey that's a thought," said Geneney, "Move your head, Lucan - I want to see out of the window!"

Absolute silence filled the capsule.

"Are you guys OK up there?"

"Oh yes," said Geneney softly, "Oh we really are. I don't how to describe this, Ornie. I know how Jeb felt now - there just aren't good words for this. Bill did a great job with his photos but... I guess it's like trying to photograph a sunset. Even the best pictures just don't compare."

Shadows slowly drifted over the capsule walls as it coasted onwards, lit from beneath by the bright glow of Kerbin's atmosphere. It rocked slightly as it reached the top of its arc and started the long descent. The kerbaleonauts could hear a gradually increasing thrumming noise from outside the capsule as it dropped back into thicker air.

Geneney kept one eye on the altimeter as the *Kerbal 2* plummeted back towards the ground, acutely aware that his life and Lucan and Wernher's too were entirely dependent on the folded pieces of fabric mounted on the capsule roof. He glanced at the control panel uneasily as the capsule continued to accelerate.

CRACK! Geneney jerked against his harness as the drogue chute deployed. The queasy feeling in the pit of his stomach told him that the *Kerbal 2* was finally slowing down. Moments later, there was another sharp crack as the drogue departed, followed by a deeply reassuring thump as the main chute shot off its rails. The capsule was slowing down rapidly now as the parachute bit into the surrounding air.

Geneney watched the altimeter unwind. Three thousand metres, two thousand... one thousand.

The main parachute unfurled, lines going briefly slack as the *Kerbal 2* slowed to a virtual standstill and then floated sedately down towards the waiting sea.

Halnie let out her breath in an explosive gasp as the orange disc unfurled and turned to Thomplin with shining eyes.

"We have *got* to be part of this, Tom! This is the future and Stratus needs to be there with it. You've seen what these people are planning - you know this is just the start!"

Thomplin embraced her wordlessly. In his heart of hearts he agreed. Selling the idea to Stratus management wasn't going to be hard either. If that fellow Ornie was correct, each rocket alone would need four of their large tanks each and then goodness knows what else the capsule would need to store. He gently let Halnie go and turned to Jeb with a wry smile.

"I think that last test just convinced us, Jeb. I can give you six of each type of tank in exchange for that sponsorship deal you mentioned. After that you'll need to start paying but I have a sneaking feeling that you'll be qualifying for a bulk discount!"

Jeb clasped his hand with gratitude. "Thank you," he said softly.

Halnie watched the *Kerbal 2* as it dropped towards the horizon. "I do have one question," she said. "How do I learn to fly one of those ships?"

Chapter 8

The Other Side

The village lights twinkled in the dusk as Jonton toiled up the hill towards his home. It had been a very interesting day indeed but for now he was more than a little footsore and simply looking forward to a bowl of something hot and maybe sitting out on the porch for a while with his feet in a basin of cool water. No wind tonight either to put a chill on things he thought to himself as he trudged up the garden path.

The front door opened, spilling out a fan of warm golden light onto the ground. Gerselle stood in the doorway looking partly amused and partly exasperated.

"What time do you call this, Jonton Kermol?"

Jonton opened his mouth to speak but saw the corner of Gerselle's mouth quirked upwards in a half smile. "I'm not sure," he answered "but I do know it's way past supper time." He sniffed the air appreciatively. "Fortunately for me, it seems like someone left some white bean stew on the stove."

He gave Gerselle a brief hug. "Think I'll just wash the road dust off before supper. This kerbal will be a *lot* nicer to be around after a quick hose down."

Gerselle wrinkled her nose at him. "You just go ahead and do that. It'll make *this* kerbal a lot nicer to be around too."

Jonton chuckled as he went inside. The house was a fairly normal kermol dwelling - a simple circular hut, built around the trunk of a Kerm tree with three walls marking out rooms for sleeping, eating or bathing. The kermwood walls were polished to a soft inviting glow and colourful homespun rugs littered the floor. Jonton stepped through into the bathing room, slipping off his rumpled travelling clothes as he did so. Grabbing a large handful of dripping sweetmoss from the pool, he sponged himself vigorously, the water running off his skin in icy rivulets. Shivering but feeling much refreshed he took a spare poncho from the rail and padded out onto the porch, fingers combing his hair back out of his eyes as he went.

A steaming bowl of stew was waiting for him on the table and was demolished in short order. By the time he had helped himself to a second bowl from the stove, Gerselle was waiting for him on the porch, rocking back and forth in her chair.

"So, were the stories true?"

Jonton pushed his empty bowl away with a contented sigh. "Sort of. Or at least the more sensible ones were. There was definitely a rocket - and three crazy kerbals packed into a can on top of the rocket too. It didn't fly around the world though - I'm guessing the kerman are probably working on that part." He looked wistful. "Actually, I say crazy but they seemed like pretty level types to be honest."

Gerselle shifted in her chair. "Were there many other kermol at the launch?"

"Quite a few actually. Patbro was there, Ludvis as well. Didn't recognise too many after that but there were plenty of grey robes dotted around the crowd." Jonton scratched his head. "The Interplanetary Society were careful to come over and talk to us too - actually, some of us went back to their factory afterwards to have a look round and meet the team."

Gerselle looked amused. "Interplanetary Society?"

Jonton nodded. "Kerbin Interplanetary Society is what they call themselves. Bit of a grand name at the moment really - the flight this afternoon was impressive but it sure didn't go near any planets other than Kerbin. He smiled. "But like I said, I reckon they're working on that. Not that I blame them after seeing those pictures."

"Pictures?" asked Gerselle curiously.

"Pictures of Kerbin, taken out of the window of the last rocket they flew. A lot of them weren't that good but there was one that was simply beautiful. Kerbin on one side, all greens and blues, the dark sky on the other but with even more stars." Jonton paused. "And the Mün rising over the horizon."

Gerselle looked at him. "We could always go kerman for a year or two you know," she said softly.

Jonton smiled again. "It's a kind offer, love but we've got plenty of time yet. I have a feeling they'll be flying into space for many years to come." He gazed fondly at the tiny tousled head peeping sleepily out of her poncho. "Besides, living amongst the Kerm does have its advantages."

Little Joenie wriggled as she was lifted out of her pouch and squeaked grumpily in the sudden cold as she was passed across to her father. Jonton wrapped his daughter in a corner of his poncho and murmured to her in soothing tones as he snuggled her into one shoulder. Joenie burrowed into the comforting warmth and promptly fell asleep again.

The two kerbals sat on the porch as the Mün rose over the trees, sometimes sitting in companionable silence, sometimes talking of this and that. Eventually, Jonton couldn't hold back any longer and yawned widely, trying his best not to disturb the sleeping kerblet at his

shoulder. Gerselle made a shooining gesture at him. "You get to your bed, Jonton Kermol - you know you've got a long night ahead of you."

He reluctantly unwrapped his daughter's fingers from his ear and gently handed her back to her mother.

The bedroom was fragrant with the faintly cinnamony odour of Kerm leaves and Jonton noted absently that the new buds near the ceiling had finally opened. The large clump of leaves at the head of his bed unfolded as he approached, making a very inviting looking pillow. They rustled slightly as he lay down, curling themselves around his head. As Jonton drifted off to sleep, he was only vaguely aware of the familiar tickling sensation of hundreds of wispy leaf hairs burrowing into his scalp.

That night he dreamed of rockets and kerbals flying far out beyond the reach of Kerbin. High above his head, the Kerm trees rustled in the still night air.

Chapter 9

Kerbal in Space Soonest

The planet Kerbin spun sedately against the starry backdrop of space. Sunlight gleamed from the polar ice caps and from the bands of cloud that streaked the otherwise clear azure skies. A major low pressure system swirled across the southern ocean, promising wet weather ahead for the larger of the two main landmasses.

A pinprick of light flared in the skies over the northernmost reach of that same ocean. The pinprick grew larger, resolving itself into a tiny flame climbing boldly out of the atmosphere. The flame winked out and a small metal tube tumbled back towards the surface, leaving a tiny, fragile looking metal shell to coast onwards around the curve of the planet. Brief puffs of incandescent gas jetted out from the sides of the shell, setting it into a slow, graceful spin. The last rays of sunlight from Kerbol glinted off its surface as it crossed the terminator and disappeared from sight.

Ademone stood on the viewing balcony at the back of the Rockomax mission control room watching the preparations for the R1 flight unfold. The room was surprisingly quiet with nothing more than a muted babble of conversation in the background as each controller checked over his console and reported various readouts back to the flight director.

A large screen on the far wall displayed a map of Kerbin, with the projected flight path of the R1 highlighted against it. Next to it, smaller screens displayed the view over the launch pad, a view from inside the capsule and the view along the rocket itself. Other smaller monitors around the central display were blank, although Ademone knew that they would display the critical flight parameters during the mission.

Ademone studied the view along the rocket intently. Most of the screen wasn't showing anything more interesting than the guidance fins for the BA-C against a uniform expanse of grey concrete. On the edges of the image you could just pick out two of the launch cradle

arms that held the booster securely in place. She shifted her gaze to the other screen to check the cradle positioning and orientation. Everything seemed to be ready. Both kerbonauts were installed in the capsule, calmly checking the spacecraft systems and chatting to the flight director.

A sudden movement from the comms console caught her eye. The controller was clearly signalling for a colleague to come and inspect something. Another kerbal walked over to the console and bent over the display screens. Ademone could see what appeared to be a heated debate, before the second kerbal went over to the flight director and whispered in her ear. The director listened intently and then pointed over to her.

The controller hurried over. "We've picked up a transmission, ma'am. It appears to be from another spacecraft."

Ademone nodded. "Are we receiving voices?"

The controller shook his head. "No. Low bandwidth data signal only. We haven't been able to decipher it but we think it's probably telemetry and flight control data."

Ademone raised her eyebrows. "Flight control data?"

"Yes, ma'am. Or at least we assume so. There appears to be a fairly regular downlink transmission but we only picked up one uplink signal before the spacecraft disappeared over our horizon."

Ademone drummed her fingers on the balcony, studying the map. "Interesting. Probably another satellite if we're not hearing any voices but it sounds like a more sophisticated one than last time if they're sending commands to it." She broke off ruefully. "*Just* another satellite. Isn't it amazing how quickly the extraordinary becomes ordinary. Anyway - please tell Communications to monitor for any new signals - and to keep a log too. We might be able to work out what's happening up there."

"Yes, ma'am."

Applause rippled around the room. Ademone turned her attention back to the displays in time to watch the rapidly departing R1 on one screen. Her breath caught in her throat as she took in the black and white image on the other screen. It was fuzzy and kept shaking out of focus but the spectacular exhaust plume from the BA-C and the equally spectacular view of Kerbin rapidly falling away behind the booster were both very clear to see. One of the controllers flicked a switch on his console and suddenly the room was full of the muted roar from the booster and excited chatter from the two kerbonauts. Ademone made a mental note to send a recording to Leland. It would make a suitable accompaniment to the video footage from the booster.

Inside the KIS launch bunker, things were rather less restrained. Bob was bouncing up and down in his chair as Lucan announced a successful communication link to the *Kerbin 2*. Moments later, even Bill smiled in satisfaction as the telemetry screen lit up. The *Kerbin 2* had separated from its booster right on schedule and the propulsion module appeared to be firing properly. Everyone's eyes were glued to the screen as the projected periapsis crept

upwards and then stopped. Seconds later there was a brief flickering of indicator lights from Lucan's console and then the bunker erupted in jubilation as three new numbers appeared on the telemetry board.

Pitch - 0 rad/s

Yaw - 0 rad/s

Roll - 0.02 rad/s.

The kitchen at the Junkyard and Spaceship Parts company had never been busier. Excited engineers sat at the long tables, busily discussing the morning launch, speculating on whether the satellite was working and making the odd surreptitious bet on whether it would land in one piece. Lucan was sitting in a corner with Geneney talking over the flight plan when his eye was caught by the image on the television screen behind him.

"Hey, you guys - looks like someone else is launching a rocket today!"

The room suddenly went quiet. Jeb got up and turned up the volume.

"We are now seeing live images from the onboard camera. Around the edges of your screen you should just be able to make out the four 'petals' holding the BA-C booster in place. In few minutes time we'll be able to watch the flight right from the booster! If you're just tuning in now, this is the maiden flight of the Rockomax R1 capsule and the new BA-C booster. We are told that this will be a *sub* orbital flight only today - the rocket will not be going all the way to space - but we should still get a good view of Kerbin."

The camera switched to a view of the Rockomax launch pad revealing the BA-C booster nestled within four ungainly looking gantry arms, much to the puzzlement of the watching Interplanetary Society engineers.

A bright torrent of flame poured out of the bottom of the booster as the on screen countdown clock ticked off the last few seconds. As the clock reached zero, the gantry arms swung smoothly out of the way and the rocket lifted sedately off the pad.

Wernher frowned at the television. From the colour of the exhaust flame the thing had to be solid fueled. But even allowing for the size of the rocket, the launch profile just didn't look right. OK, it had to be a lot heavier than a Trashcan but even then the acceleration, no - the *rate* of acceleration just looked wrong. Maybe just an odd camera angle.

Everyone in the room stared mesmerised at the screen as the viewpoint switched to the on-board camera. Even the crews of the *Kerbals 1* and *2* were lost in awe at the view of Kerbin unfolding in front of them and the normally garrulous commentator seemed to be equally lost for words. The curve of the horizon was just becoming clear when the exhaust plume from the booster flared out. The view from the camera tilted abruptly sideways as it tumbled away from the unseen capsule above it. There were several groans of disappointment as the camera feed cut out and was replaced by a view out to sea, presumably from the launch site.

Cheers rang out from two crowded rooms on opposite sides of the continent at the sight of a small red and white striped parachute floating down through the cloudy sky.

The satellite spun silently through space, its camera flashing in the raw sunlight like a miniature lighthouse as it revolved. An observer from a more martial culture would have noted that it bore a distinct resemblance to a sword hilt, with a large pommel, a somewhat stubby handle and a simple, almost hemispherical guard.

Precisely timed bursts of glowing gas took the place of the swordsman's hand as the hilt spun and shifted in a delicate slow-motion choreography. A first burst checked it's spin, bringing it to a standstill. The second burst flipped it neatly over, pommel swapping place with guard. The pommel breathed fire for two long minutes and then, in a final salute, spun precisely back into place behind the guard.

The satellite raced onwards but now its stately circular path had been nudged into a slowly decreasing spiral. The onboard camera faithfully recorded the transition from night to day as it sped over the terminator for the last time. Pinpricks of light flared briefly around the base of the propulsion unit as it broke free, gliding away along its own trajectory.

Now the satellite was dipping into the first wispy fringes of atmosphere, the speed of its passing stripping electrons from their atoms in an eerie pale glow. The glow intensified, becoming suffused with crimson as the heatshield slammed into ever thickening air. The crimson rapidly shifted to a bright yellow and then became a wake of incandescent white fire, surrounding the *Kerbin 2* and blazing out behind it.

The Rockomax mission control room was cool and quiet as Ademone let herself in and sat down at the communication console. Out by the launch pad, the party was in full swing and she strongly suspected that by now, the first celebratory toast to the crew of the R1 was rapidly becoming a whole string of toasts to anything and everything connected with the mission. Ademone smiled to herself. There would be more than one sore head tomorrow but everyone definitely deserved a break after the last hectic weeks before the flight.

Anyway, down to business. She flipped open the console logbook and switched on the secondary receiver. It was already tuned to the KIS frequency but there was no signal other than the normal background hiss. According to the log, the next transmissions were due any time now.

There it was. A steady stream of faint but audible signals and then suddenly a rapid and far stronger burst of encoded data. Two minutes of silence and then another shorter burst of data. Ademone paged through the log. Odd - this didn't seem to match up to any of the earlier signals. She looked up startled at yet another uplink transmission, before the steady stream of fainter transmissions resumed.

For the next hour, Ademone busied herself reviewing the flight data, whilst keeping half an ear open for the next overpass of the KIS satellite. For a moment she thought she heard the

transmissions start up again but they were quickly obscured by a loud fuzz of static. Try as she might, she couldn't tune it out without losing the signal altogether. Shrugging slightly she waited patiently for it to clear.

And then, over the noise she could just make out the transmissions starting up again, growing louder and louder as the static faded away. Her eyes widened in sudden understanding. These sounded like the weaker downlink signals only a lot stronger. Which could only mean that the radio transmitter was much much closer - or much much *lower* as it passed overhead.

As the first few members of the Kerbin Interplanetary Society arrived at Jeb's warehouse the next morning, they found Jeb standing quietly next to a new table in the middle of the Museum. On the table, resting on a simple, yet elegant stand was the main body of the *Kerbin 2*, its scorched heat shield still attached. By the time Bob arrived, there was a sense of expectancy in the air. Jeb still hadn't moved away from the table and there was a strange abstracted look on his face. In fact the last time Bob could remember seeing him like this was shortly before he suggested founding the original KIS.

Finally the last stragglers filed in and promptly fell silent as they sensed the atmosphere in the room. Jeb looked around to make sure he had everyone's attention and then began.

"My friends - yesterday we made history together."

An imperceptible ripple passed through the crowd as every kerbal unconsciously drew themselves up just a little straighter.

"When you work on something for so long, it's easy for it to become routine. Just something you do - no big deal. But take a step back for a moment and consider just what we *did* yesterday.

"We built a machine capable of flying so high and so fast that it flew clear around the planet and might never have come back down!

"But it did come back down - because we designed it that way. Together we reached out across the void. We touched the machine. And we brought it home.

"We brought it back down through fire hot enough to vaporise steel. We brought it back down so carefully and so precisely that after a voyage of over one hundred *thousand* kilometres, we could take a short boat trip, pluck it neatly out of the sea and put it here on this table before you!"

Jeb paused and looked each and every kerbal in the room squarely in the eye.

"But that was yesterday.

"Today is a new day and today we take the next great step! Today we embark upon the dream of countless generations of kerbals before us. Today we finally set out to do that which we founded the Kerbin Interplanetary Society for!

"Generations of kerbals to come will look back at us and see that this was when it happened. This was when we realised that we could do it. This was the day we took the decision to put a kerbal into space and bring him - or her - safely back to Kerbin!"

Quite a number of the crowd had been half expecting something like this. Even so, the passion and the conviction in Jeb's voice was enough to send a shiver down their spines. Jeb paused again, blinking hard.

"Make no mistake my friends - this will not be easy. It will require all the skills and all the technologies we have built so far. We have rocket engines - but now we'll need bigger ones. We have capsules - but now we'll need better ones.

"But most of all, we're going to need volunteers. Someone to pilot the ships. Someone to forge a new path and set Kerbalkind on the road to the stars! And I believe that each and every kerbal standing here today should be given the chance to be one of those volunteers if they so choose.

"To be a pilot for Project Moho."

Chapter 10

Project Moho

Jeb paused again and adopted a deliberately casual tone. "So if anyone wants to put their name down, just drop by my office. I've left a stack of cards on my desk - if I'm not there just write your name on a card and leave it there. You'll have plenty of time to think it over, crew selection won't be till the end of the week."

There was an amused snort from the back of the group. "Or we could just have a show of hands right now," said Ornie, "Whether they're going or not, I don't figure anyone is going to need a week to make up their minds. So - who's for volunteering?"

Twenty three hands rose into the air. Jeb looked startled but started to count the hands. "Or alternatively - who doesn't want to volunteer?"

Not a single hand went up.

Jeb blinked. "I wasn't joking about bigger engines you know. I'm not even sure how we're going to *build* them yet. And you're *all* asking to be put in a seat on top of the biggest, most dangerous rocket we've ever built, and fired into space?"

Twenty three pairs of large round eyes stared unblinkingly back at him.

Ornie coughed. "The thing is, Jeb - this is what we're all here for. We've all seen Bill's pictures but speaking for myself, that just whet my appetite to go out and see the real thing. Besides, it may be the biggest rocket we've built yet, it may even be just a mite experimental but if I was sitting in that capsule, I'd be knowing that everything underneath me was built by people that I trust." Ornie grinned. "Although I might be a bit more worried about the bits that I'd built."

Jeb surveyed his team. There was a general nodding of heads and murmurs of agreement with Ornie. He came to a decision. In that case good kerbals, I think crew selection just got moved forward a few days. I'll be right back."

Jeb disappeared into his office, hurriedly returning with a wastepaper basket, a handful of pens and a stack of small white cards. He set them all down on the table beside the *Kerbin 2*.

"Right folks. Take a card, scribble your name on it, fold it in half and drop it in the basket here."

There was a squeak from Roncott. "Uhh - are you telling us that pilots are going to be picked at *random*?"

"Yes," said Jeb simply. "I've been thinking about this a lot, folks and the problem is that *everyone* here could give me a good reason to be picked. Ornie and Richlin have some piloting experience already - but I don't think flying a spacecraft is going to be a whole lot like flying a plane. Bill, Bob, Geneney, Lucan and Wernher have already gone up, so they have some idea what to expect. Everyone else is an expert on at least part of the capsule or the launcher, which might give them that crucial bit of knowledge in an emergency. Besides, my thinking is that everyone here will have their part to play in building the Moho spacecraft, so everyone here should get their chance to fly them too. So eventually, I realised that the only fair way to do this was to get a pool of volunteers and let chance decide who gets to fly."

Roncott nodded solemnly and dropped his card into the basket. Jeb picked the basket up and gave it a thorough shake. Everyone could see the flurry of cards through the gaps in the weave. He offered it towards them, taking care to look away from the contents.

"Anyone else want to give this a shake?"

Nobody moved. Jeb closed his eyes tightly, dipped his hand into the basket and rapidly pulled out a card.

"And the pilot for Moho 1 is..."

A startled look crossed Jeb's face as he unfolded the card and read out the name printed on the inside.

"Jeb."

The tension in the room broke as everyone burst out laughing, amidst good-natured calls of "Fixed! Fixed!" Jeb grinned sheepishly and made to drop his card back into the basket, only to be greeted by a chorus of denial." He raised his hands in mock surrender and laid the card down on the table, before reaching for a second card.

"The pilot for Moho 2 is... Camrie!"

The logistics and design team went wild. Jeb could see Roncott bouncing up and down, thumping Camrie on the back in delight. He drew out another card.

"The pilot for Moho 3 is... Wilford!"

Wilford sat down with a thump and gaped incredulously at his friends, an enormous smile slowly spreading across his face.

"The pilot for Moho 4 is... Adelan!"

Adelan's mouth dropped open. She grabbed Camrie around the waist and swung her friend around joyfully. "That's even better! We *both* get to go!"

"And finally, the pilots for Moho 5 and Moho 6 are... Richlin and Joemy!"

Ornie solemnly shook hands with his friend before chuckling and pulling him into a great bear hug. "Well at least there's someone going up in one of these contraptions who knows a bit about flying!"

Joemy was the latest member of the capsule assembly team. Like Wilford, he just stared at Jeb in utter disbelief before being mobbed by enthusiastic kerbals. Jeb grinned cheerfully at the milling crowd of excited kerbals. "OK everyone - we've got our pilots - now we've got some serious work to do!"

The LV905 shut down in a brief spray of unburnt fuel, bouncing slightly as the sudden loss of thrust caused the test stand to pop and flex. The propulsion team removed their ear protectors and waited for the dust to settle before gathering round. Hando flipped up the restraining bar on the console and reeled back the strip chart for inspection.

"Looks good. I'd say we're getting about 5% more thrust over the 902. Quicker ramp up as well."

Malmie grunted in satisfaction. "Told you that the 903 chamber design was sound." He inspected the chart critically. "Combustion is nice and stable this time. Looks like Wernher's tweaks to the propellant lines were what we needed."

Wernher looked up. "Five percent is good - better than I expected actually. We could maybe get some more if we went back to the 902 turbopumps but I'm much happier working with the pressure fed design for these smaller engines." He looked apologetically at Hando. "I know you've been working hard on the load cells, Hando but are you sure they're calibrated?"

Hando shrugged and reeled the chart further back. "I ran both series of standard masses this morning. Data is right here if you want to look."

A quick glance told Wernher all he needed to know. "Excellent. That's going to help a lot, especially for the strap on boosters." He sighed. "The hard part starts now though I'm afraid. Even an extra five percent on the 905s isn't going to make up for the lack of thrust on the LV-15. I think it might be time to revisit the LV-10."

Ornie caught the reluctance in Wernher's voice. "I take it there's a story here?"

Wernher nodded. "The LV-10 was something I came up with back when we were building the *Kerbal 1*. It was obvious that a single LV-15 wasn't going to be enough and we never could get a cluster of them to work properly. So I figured we'd go for a single bigger engine and run it hotter. To stop the whole thing melting I tried running the fuel lines around the

combustion chamber walls to cool them down." He stared into the distance. "Great idea in theory but not so great in practice. We never did work out what happened with the last test but it went very very blam indeed."

At that point, Wernher looked hopefully at Ornie. "Looking back at it, I think a big part of the trouble was the fact that I just never could get the fuel lines to wrap properly around the chamber. You're a better kerbal than I am with a pipe bender though..."

Ornie looked thoughtful. "I take it we're trying to use the hot fuel somehow and not just dumping it overboard?" Wernher retrieved a pencil from behind his ear and sketched out a quick diagram on the chart paper. "Can't afford to waste the propellant. No - we use the vaporised fuel to drive the turbopumps. Engine start is a bit fiddly but once it's up and running it *should* work nicely."

Ornie nodded slowly. "I think I see how that works. OK - I'll give it a go." He scratched his head. "You're right though - that's going to be one heck of a job of pipe bending. Anyhow - reckon I'm going to take a break. Maybe head over to Shed 2 and see how the sim team are doing with the Whirligig."

Ornie let himself out of the side gate and headed across the road from the main warehouse. Now that they were building spacecraft on a larger scale, Jeb had decided that the Spaceship Parts Company needed more ship space and had leased another couple of smaller warehouses. The Spaceship Museum had been moved into it's own building, leaving the main warehouse free for vehicle development, testing and assembly. The other building - Shed 2, was for crew training.

Ornie stuck his head around the door to be greeted by a scene of organised chaos. The *Kerbal 2* capsule sat in the middle of the dimly lit warehouse floor surrounded by a cats cradle of steel frameworks, gas cylinders and tubes and cables of all descriptions. A large screen curved over the capsule from either side of the framework, each with a display projector mounted on a tripod behind it. Across the floor was a makeshift booth, sheltering what appeared to be a large and bewilderingly complicated control board which was connected to the rest of the equipment by a thick skein of cables. Three kerbals were seated behind the controls, peering intently at the mass of switches, dials and other other displays. All the electronics gear had a shop worn appearance and Ornie was fairly sure he'd seen various bits of it gathering dust in a corner of the launch control bunker.

Ornie watched in fascination as the whole unlikely contrivance wheezed into life, lifitng the capsule off the floor and tilting it into a nose down attitude. One of the kerbals behind the control board tapped the microphone in front of him. "OK, Jeb, lets try the calibration again. Give me a plus oh one pitch."

There was a sharp hissing noise and the the capsule slowly tilted up towards horizontal and then, continued to tumble over and over. From the lack of flame, Ornie assumed that the noise wasn't caused by any kind of actual rocket system, which all in all was probably a good idea.

"Looking good, Jeb. Negative oh one whenever you're ready." With another hiss of high pressure gas, the capsule came to a halt, nose pointing jauntily upwards. The simulator whirred briefly and the capsule slowly swung round to its starting position.

"Perfect. Lets go for the rest of the calibration sequence."

The staccato sound of compressed gas jets filled the air as the capsule proceeded to twist and spin in a set of increasingly elaborate maneuvers, guided all the while by a series of increasingly cryptic commands from the control booth. Finally it came to a standstill and the hatch popped open. Jeb climbed out, grinning from ear to ear.

"What a *ride* ! I can't wait to take this thing out for a proper spin! Hey, Tomcas - everything felt sharp from inside the capsule - how did it look from your board?"

Tomcas consulted one of the panels in front of him. "Looked good from here too, Jeb. I think we're finally done with the calibration. He grinned at the two kerbals sitting next to him.

"Time to move on to the real training."

"LV-T15 article 3 - beginning test."

Wernher crossed his fingers behind his back as Hando started up the test stand. The LV-T15 roared into life behind the blast shields and for one triumphant moment, Wernher thought the propulsion team had cracked it. Then there was a ominous bloom of orange light, followed a fraction of a second later by a loud explosion and a rapidly expanding fireball billowing into the sky. Hando hastily shut off the fuel supply to the test stand and waited patiently for the tinkling sound of pieces of metal ricocheting off the metal sheets to subside.

Ornie, Wernher and Malmy gloomily surveyed the twisted and blackened wreckage. The chunk of ruptured pipe hanging off what was left of the prototype engine told a painfully clear story. Ornie threw up his hands in resignation.

"Sorry guys but I don't think the coiled pipe idea is going to work. I honestly reckon that was my best piece of work yet - but it looks like my best just aint going to be good enough."

Wernher gripped his shoulder briefly. "Don't worry about it, Ornie. I doubt anyone could have any better. We're just going to need another plan."

The unspoken question hung in the air, with neither kerbal willing or able to answer it. Eventually Wernher just shrugged. "We'll think of something eventually. In the meantime, as we're not doing much here, I think I'll see if the capsule folks need a hand with anything."

The rest of the propulsion team nodded slowly and followed him into the vehicle assembly area.

Inside, everyone was hard at work on the *Moho 1*. Bill was seated at a bench, soldering iron prodding at what looked like a control panel. A thick bundle of cables was gradually being hauled in through the open capsule hatch, accompanied by the clattering of a power wrench

and odd mumbled expletive from inside. Roncott was working at another bench by the nose assembly carefully packing a parachute canopy. Two other kerbals were working with caulking guns, filling in sections of the broad saucer shaped heat shield already in place on the base of the capsule and peering critically at the already filled areas. Occasionally one of them would pick up a drill, gouge out an entire section and patiently set to work re-filling it.

In other areas of the warehouse floor, the remaining sections of the spacecraft were gradually taking shape. From the clusters of reaction control nozzles and general confusion of plumbing, Wernher recognised one of them as the retrorocket and RCS module. The benches nearby were full of neatly ordered components, presumably in strict assembly sequence order. Well away from the RCS module and indeed the rest of the *Moho 1*, two jigs were standing next to each other, each with a slim metal ring clamped carefully to it. Even from this distance, Wernher could see the yellow and black stripes painted around the outside of each ring. Geneney was kneeling on the floor next to them, slotting decoupler bolts into place.

Wernher sat down at a nearby bench feeling rather dispirited. Clearly there wasn't much he could do here and worse still, this beautiful piece of engineering wasn't going anywhere without a, so far non-existent, main engine to power it. Absently he prodded at what appeared to be a piece of corrugated copper, watching glumly as it rocked back and forth on the bench. Kerm only knew what it had been before but the level of polish suggested that it was due to be installed somewhere in the capsule and wasn't just a piece of scrap.

A voice rose over the general hubbub. "Has anyone seen the primary heat exchanger baffle?"

"Should be on bench 4, Joemy, with the rest of the cooling system parts."

Joemy hurried over. "Ahh there it is. Could I just take that, Wernher? Thanks." He stopped as he saw the look on Wernher's face.

"Heat exchanger?"

Joemy was puzzled but happy to explain. "Sure - we braze a dual inlet manifold to each end of this. Primary coolant from the capsule systems runs through these channels here. We run secondary coolant in countercurrent through these channels here before sending it out to the evaporator plates."

"Heat exchanger..."

"Uh-huh. We put the whole thing in a casing of course," Joemy said nervously, "to close the channels over and keep them separate."

"Heat exchanger!" Wernher jumped to his feet, all despondency forgotten. "Joemy - you may just have saved this program! Do we have any more of this copper in stock?"

Now Joemy was completely baffled but pleased to have made such an impression on the chief engineer. "I'm not sure, Wernher. Geneney will know though, or if he's busy, Camrie could probably tell you."

"Ornie, ORNIE! Get over here and take a look at this!"

Ornie rushed over in alarm. "I'm here chief - what's the problem?"

"Take a look at this - you think you could stick this around the LV-T15 chamber?"

Ornie picked up the heat exchanger baffle and flexed it experimentally between his hands.

"Seems to have enough give. Yeah, should be able to. He peered along the corrugations.

"Nice and straight too." Then realisation dawned. "A double walled chamber - is that what you're thinking?"

Wernher nodded vigorously. "Yes - rather than one large tube, we use a whole array of them. Assuming we can do it, it should make for an even more efficient design!"

"De-orbit burn complete. Nice work, Jeb but watch that roll rate."

Jeb deftly countered the roll with a quick burst from his RCS thrusters. The capsule bumped and jerked around him as the air outside started to thicken.

"100km and dropping. Keep it steady."

There was a sudden lurch to one side. Jeb swore to himself as he fought to keep the little craft on course. Lodan's voice crackled over his headset in sudden alarm. "80 km and dropping. Nose up - nose up!"

Jeb gritted his teeth and bit back a pointed reply. The turbulence was smoothing out a little now as the capsule decelerated and his attitude rate indicators returned to something approaching normal.

"60km and dropping. Cabin temperature nominal, coming down 200km off target. 30 km and dropping... 15km and dropping - drogue chute deployed."

Bob watched as the Whirligig capsule gradually pitched upright.

"And you're on the mains. Welcome home, boss."

The capsule lowered itself to the floor and Jeb climbed out, shaking slightly, flight suit soaked in sweat.

"Well that was intense."

Bob gave Jeb a moment to catch his breath. "200 km off target - I guess the booth crew decided to break the automatics huh?"

"Yes they did," Jeb growled, "Right in the middle of the de-orbit burn." He ran his hands through his hair and looked wearily at Bob. "Still - that's why we built this thing. Better to have this all down cold before the big day." He raised his voice as he turned his head towards the booth. "OK you guys. Gimme five minutes to cool off and then we'll run through that again. And why don't you give me a *real* test this time!"

Bob looked him solemnly. Probably not the best time to mention this but when would be a good time.

"Just saw the news, Jeb. Looks like Rockomax have a satellite in orbit too. Pretty hefty one at that. The reporter at KBS was calling it the latest leap in the Space Race."

Jeb sighed. "Anything to make a story I guess. In actual fact I was kinda hoping to go visit Ademone at some point. I know Wernher is still puzzled by their launcher, keeps insisting that their last flight looked all wrong for a solid booster."

Bob was a little skeptical. "C'mon, Jeb. After all this effort, you're not trying to tell me that you'd be happy sitting on the launch pad in a few weeks time knowing that you were just about to play second kerbal to some Rockomax pilot."

"Well probably not." Jeb conceded. "After all the work we've put in, it would hurt not being the first - particularly as it was our own damn satellite that got Rockomax into the race in the first place." He shook his head. "Kerm's sake. It's *not* a race. We go when we're ready and that's that! Besides, we both know that there's a big difference between lobbing a satellite around Kerbin and putting together a piloted mission. No sense in hurrying things. Don't get me wrong - I'm all for being the first kerbal in space but I'd prefer not to stay there permanently."

He looked at his friend. "We'd best get used to not being the first at everything though, Bob. We've got a healthy start but Rockomax are good - and ambitious with it. Anyway - I'd best climb back into that machine over there and see what the booth crew have planned for me next."

"LV-T20 article 5. Beginning test."

Wernher gestured to Joemy to come and join him by the test console. "This one's all yours, Joemy. Start it up."

The engine rumbled into life behind the screens, the rumble rapidly building up into a howling fury. Light from the rocket fire blazed out around the test stand, which was shaking under the load. The screens began to rattle and then blew over with a resounding crash as they were overwhelmed by the sheer volume of incandescent exhaust pouring out of the engine bell.

For one shining moment before Wernher shut down the test, the Kerbin Interplanetary Society were treated to the sound and sight of an LV-T20 engine at full thrust. Jeb clenched his fists in triumph. He didn't need to inspect the test data. Finally they had what they needed. A successor to the LV15 and the next generation engine that could propel him and his fellow pilots out of Kerbin's atmosphere and into space.

Far away at Stratus headquarters, Thomplin put down the phone and turned to face Halnie.

"How do you feel about another trip out to Barkton?"

No need to answer that question, Thomplin thought to himself. "That was Jeb on the phone, as you probably guessed. It seems they're planning something, and I quote, 'rather special in three weeks time, assuming the all-up tests go to plan.' He also had the neck to let me know that he'd set aside six complimentary launch tickets for Stratus."

Halnie smiled. "Looks like you, me and a couple from management then. I should also see if anyone has any contacts at KBS - I have a feeling that they're going to want to see this too."

Chapter 11

The Seed

Jonton's boots squelched through the early morning dew as he walked up and down the rows of breadfruit vines, patiently inspecting them for ripeness. The sun had barely risen over the Kerm Grove at the far end of the field and his breath steamed in the cold dawn air.

The tips of the large green globes were just starting to blush purple and Jonton knew that harvest time was only a week or two away. The vines weren't looking quite as healthy as he would have liked though. There were definite signs of wilt on some of them, although admittedly the weather hadn't been particularly good for breadfruit lately.

Jonton stopped abruptly and bent over to peer at a cluster of leaves more closely. That wasn't right at all. The brown spotting looked like some kind of fungus and one or two of the leaves had actually died. Hard to blame that on the weather too - if anything, the unseasonable chill should have helped to kill off any odd pests that the Kerm trees couldn't handle. Jonton made a mental note to look up the brown spots in the Record Books once he got back to the village.

Gerselle hummed cheerfully to herself as she pulled on her climbing gear. Joenie watched her solemnly from the warm confines of her carry pack which Gerselle had carefully hung from a nearby branch. The tiny kerblet inspected her hands gravely and then batted at the brightly coloured plush bird suspended above her head. The bird made a playful cheeping noise as it bounced too and fro, much to her delight. Gerselle smiled as Joenie squeaked happily back at her new toy.

Gerselle dipped her gloves into the adhesive, carefully letting the excess liquid drip back into the bucket. Hopping awkwardly, she dipped one boot into the viscous mixture before pressing it firmly against the trunk of the sapwood tree. She took a good grip on the smooth bark before repeating the process with the other boot. Satisfied that everything seemed to be holding properly, she rapidly clambered up the trunk.

The long grooves running down the trunk looked shiny and blemish free and Gerselle was pleased to see translucent golden beads still forming in the channels despite the weather. Sap collecting wasn't her task for this morning though, so after a brief inspection, she climbed up further to the spray of huge green fronds at the top of the tree and the fleshy white flowers beneath them. Working with practised ease she wriggled her hand out of one glove, leaving it stuck to the leather patch on her leg. Carefully she dipped her hand into one of the pouches on her belt and sprinkled a pinch of bright yellow pollen into the centre of each flower.

By mid morning, Gerselle had settled into a steady rhythm of tree climbing and flower pollinating, taking the occasional break to rock Joenie back and forth in her carry pack. The novelty of being in a swing was rapidly wearing off however and Joenie was getting increasingly irritable as the morning wore on. Gerselle finally gave in to the inevitable and sat down against a particularly large sapwood trunk as she settled Joenie in to feed.

It was only then that she spotted the unusual looking gourd at her feet. Shuffling carefully around so as not to disturb her daughter she examined it curiously. Whatever it was, it was certainly no sapwood pod and Gerselle couldn't remember seeing anything quite like it before. The thing definitely looked like a seed pod of some kind but it was larger than usual and covered in a dense mat of mottled yellow and brown fibres. She picked it up and shook it tentatively, raising her eyebrows slightly as it made no noise. She shrugged and dropped the gourd into a belt pouch, making a note to look it up in the Records later.

As Gerselle walked up the path to the village archives she was surprised to find Jonton heading in the same direction and looking worried. "Is everything alright?" she asked, a note of concern creeping into her voice.

Jonton looked at her. "I'm not sure," he replied, "The breadfruit vines aren't looking too good - they seem to have caught some kind of fungus. I was just going to consult the Records."

Gerselle frowned. "It's been pretty cold for a fungus," she said, "and it's unusual for one to get past the Kerm trees. Are you sure?"

"Not really," said Jonton, "but it's the only thing I could think of that would explain the brown mottling on the leaves. Anyway - what takes you to the Records. Don't tell me the sapwoods have caught something too?"

Gerselle shook her head. "No, they're fine. They're even managing to trickle out some sap in this weather. I just found this gourd whilst I was out. I don't remember seeing anything like it before though, so I was just going to look it up." She drew the gourd out of its belt pouch and handed it to Jonton.

Jonton frowned. "Not sure I recognise it either. That fibrous coat is pretty distinctive though - should be easy enough to find in the Records." Absently he twisted the fibres around his fingers and then stopped in surprise, sniffing at the air.

"Odd. Do you smell cinnamon?"

Jonton twisted another handful of the fibrous coating, rubbing it vigorously against his fingers. There was definitely a scent of cinnamon in the air. Almost like the smell of...

"No, he whispered to himself, "no, it can't be." He hurried into the archive house and went over to the very oldest section of the shelving. Without hesitation he reached for the first book on the shelf and took it over to the table. By the time Gerselle joined him, he had found the section he wanted. Wordlessly he pointed at the faded but carefully rendered drawings on the page in front of him. Gerselle's eyes widened as she recognised the picture of the tree and the picture of her gourd right next to it.

"It can't be..." she said faintly,

Jonton gripped her hand. "I know, love," he said, "but the book even mentions the smell of that bruised fibre. I'm having a hard time believing it myself but think you might just have found the first Kerm seed on Kerbin for nearly five hundred years."

He kept his voice deliberately casual but a small worm of unease was beginning to gnaw at him. If Gerselle's gourd really was a Kerm seed then it would need a new Keeper and he had a sinking feeling that he knew exactly who that Keeper would be. "I'd better read up on this, Gerselle. There looks like quite a lot to get through and... well it's a *Kerm* seed. Most of this stuff is probably important and we don't exactly have anyone else we can turn to for help.

The Walkers stood in a loose group at the entrance to the village. Jonton and Gerselle stood slightly apart from the rest, both clothed in grey robes belted securely around them to ward off the pre-dawn air. Gerselle's robe was so new that the wool hadn't had a chance to soften and she shifted from foot to foot, scratching herself surreptitiously. The cowl of her robe was draped down her back, weighed down by the Kerm seed inside. Joenie was fast asleep in a makeshift sling strapped across her chest.

A group of six kerbals stood in a row, each with a heavy grey pack on his or her back. Each pack was full of damp earth, with six Kerm cuttings planted carefully inside. Another dozen kerbals were carrying similar packs, these dyed brown and filled with saplings of all the trees in the Grove, all carefully packed in damp sweetmoss. Others were equipped for camp, carrying bundles of food and waterskins for the whole group, along with bedding and rolls of fabric wrapped around light wooden poles. The rest of the village looked on with a mixture of sadness and joy. Most families were proud to have at least one son or daughter listed amongst the Walkers but that pride was tempered with the knowledge that they were finally leaving home.

Jonton squeezed Gerselle's hand reassuringly and then stepped into the middle of the group.

"My friends. We are setting out today on a journey of great joy. A journey that hasn't been seen on Kerbin for centuries." He paused. "By sundown today we will have founded a new village and planted the seeds of a new Grove. Each and every one of you has promised to help our new Keeper with her task and for that you have my deepest thanks."

Jonton smiled gently. "Of course, some of you will be making this journey many times in the days ahead. Even the stoutest group of kerbals cannot carry a whole new village on their backs and even with proper transport there will be much to carry and much work to do over the coming weeks. But for now, the seed kindles and our time grows short." He knelt before the Walkers, arms stretched towards them in the ancient gesture of benediction, then climbed to his feet. "Lets make a start my friends."

The sun rose over the treetops as the Walkers set out. The village stream wound it's away across the grasslands in front of them, running down from the hills on the distant horizon. As far as possible, Jonton kept them on a trail along the banks but where the stream's course was looping and erratic, the Walkers kept to a far straighter path. Everyone seemed reluctant to break the peace of the early morning with chatter, although the clinking of buckles and the occasional bird call stopped the silence from becoming oppressive. The grass underfoot was coarse and springy and the kerbals were able to keep up a good pace.

Towards mid morning, the last of the dawn mist finally burned away and the mood of the party became less contemplative. Murmured conversations could be heard up and down the trail and some of the younger kerbals kicked a ball back and forth between them as they walked. By the time they stopped for their midday meal, everyone was in good spirits, as they retrieved packets of food from their backpacks and sat down by the stream. The youngest kerbals splashed happily in the shallows but even the oldest could be seen dangling their feet in the water to cool off.

Lunch was a short affair though, as Jonton was keen to get moving. The afternoon walk was rather harder going, the springy grass giving way to coarse shrubland and outcrops of rock as they moved into the foothills. The group gradually spread further and further apart as some of the walkers found it increasingly difficult to keep up. Finally the shrubland petered out altogether and Jonton looked at the rocky slopes ahead of them with increasing dismay. The stream was still keeping them company as it bubbled and foamed over the stones beside them but this was no ground for planting. Worse still, as far as he could see, they wouldn't find anywhere better before sundown. He called a halt and waited for the stragglers to catch up.

"I don't know about you my friends but this doesn't look like good country for planting a new Grove."

There was a general murmur of agreement.

"The Records are clear - the new seed should be carried on foot from sunrise and it shall be planted at the last minute of the day. Unfortunately, it looks like the last minutes of this day will be spent climbing rocky slopes and stony scree." Jonton took a sip from his waterskin. "I need three volunteers to scout ahead, in case there is better ground before us. The rest of us will turn back. As soon as we find enough soil to plant our trees, we will stop and wait for news from the scouts." A fleeting look of worry passed across his face. "This was not an easy

choice my friends. However, I can't believe the Records would intend us to let a Kerm seed die by leaving it on bare rock. We shall turn back."

The sun was just dipping below the horizon when the three scouts appeared over the hilltop and made their way over to Jonton. They spoke to him briefly in lowered tones and Jonton nodded solemnly and called the rest of the Walkers to him.

"So be it. We plant the new Kerm here. "He knelt down and scooped out a shallow pit in the gritty soil. As the last rays of sunlight sank out of sight, Gerselle reached into the hood of her robes and took out the seed. As the others stood reverently around them, she placed it carefully into the pit and tamped the soil down over it. Finally she shook out the last drops of her waterskin out over the newly planted seed.

One of the sapling carriers raised his hand. "Keeper - where should we plant the other trees?"

Jonton scratched his head. "The Records don't tell us anything about the other trees," he replied. "but the Kerm cuttings should be planted no more than seventy paces from the seed and no less than forty paces apart. In the village Grove, all the Kerm trees are planted in a loose group with the rest of the trees planted outwards from there. That seems like as good a plan as anything."

As twilight crept over the hill, the air was full of the sound of spades scraping against soil. Gradually the bald hilltop became covered in a thin stubble of slender saplings as the kerbals planted the thirty-six kerm cuttings and then the dozens of other trees they had brought with them. As twilight faded into a deep starry darkness, the last of the tents was put up and all the Walkers fell into a deep and well earned sleep.

The next morning, the new villagers kept at a respectful distance from Jonton and Gerselle as they said goodbye. Jonton drew his wife into his arms and hugged her tightly as they stood wordlessly on the hillside, the new saplings dotted around them.

"It'll be alright, love. As soon as the four months are up, I'll be on my way to visit."

Gerselle fought to keep the bitterness out of her voice. "Four months, Jonton! Four months on my own with no father for Joenie." Joenie heard her name and made a happy chirruping noise.

Jonton swallowed a sudden lump in his throat. "I know," he said softly, "I know. The Books leave no doubt though - only one Keeper in a Grove until it has properly knitted." He took her by the shoulders and gazed tenderly into her eyes. "It's a wonderful feeling you know, to wear the grey cloak. To bond with a Grove, be its guardian and sometimes even share its dreams."

Jonton looked at her earnestly. "The village Grove is *old*, Gerselle, just like every other Grove on Kerbin. My family have been it's Keepers for generations. Even then, to be chosen as Keeper was a great privilege - and a great joy. But you get to be the mother of the first new

Grove for over five hundred years! Not even the village Records go back that far." His eyes misted over. "You'll get to feel it grow, to guide it on its path from a handful of saplings to a beautiful new Kerm."

Gerselle was silent. "It is only four months isn't it?"

Jonton nodded. "So the Books say. Four months until knitting and then other Keepers can visit. Trust me - I'll be here to see you and Joenie on the very first day I can. He smiled. "The village Grove will understand. After all, it has a child of its own now."

Chapter 12

Poyekhali

A van pulled up outside Jebediah Kerman's Junkyard and Spaceship Parts Company and three kerbals climbed out. Halnie stretched and yawned after the long drive whilst Thomplin looked around. Jeb's company seemed to be doing well judging by the fact that there were at least three warehouses sporting signboards with the familiar tilted rocket logo painted on them. It seemed that somebody had finally decided to give the place a lick of paint as well - it still didn't really look like the busy hub of Kerbin's first space program but at least it didn't look quite as dilapidated now.

Shervin looked around skeptically. It was busy but only with kerbals queuing to get into one of the warehouses. There was certainly a conspicuous lack of large rockets anywhere or signs that anyone was thinking about building them. Thomplin spotted the expression on his face. "Yes - that's about what I thought the first time as well Shervin. Believe me though, it's a lot more impressive from the inside. The main warehouse is that one over there isn't it Halnie?"

Halnie nodded happily. "It is. Two new warehouses though, Tom! Looks like there's going to be a lot more to see this time."

The Stratus team walked over to the main gates. Thomplin's eyebrows lifted as he saw the new doorway cut into the gates with a freshly painted Reception sign over it. He pushed the door open and stepped inside.

Halnie gaped in astonishment as she followed Thomplin. Inside, the previously dingy warehouse was now brightly lit. The piles of junk that she remembered from the last visit had been corralled down one side and much of it was now neatly organised on a huge set of storage racks. Sets of enormous metal tubes were suspended from the ceiling girders, presumably to be turned into fuel tanks at some point. In the middle of the floor, two partially completed capsules rested on wooden cradles with what looked like a small army of kerbals working on them. A row of workbenches were placed nearby, with various parts

neatly arrayed on them. Towards the back of the warehouse, other kerbals were busily assembling other parts of the spacecraft.

Shervin was starting to look more impressed, especially at the partially assembled capsules. Before he had time to go and inspect them in more detail, a bell jangled overhead and Jeb emerged from the Reception office.

"Hi, Halnie, Thomplin, good to see you again!" he said cheerfully. "And good to meet you too, sir."

Halnie made the introductions. "Shervin, this is Jebediah, owner, company manager and pilot. Jeb - this is Shervin, our director of engineering." The two kerbals sized each other up and both inclined their heads politely. Jeb turned to Halnie.

"I sure hope you guys brought some more tanks with you," he said. "We're just about as far through the assembly of Mohos Two and Three as we can get without them. We used most of them to build the Moho 1 of course, so we don't have many left."

Halnie grinned. "We've got them in the van, Jeb. That was quite some order you placed. I hope the last set worked out?"

"I hope they did as well," said Jeb, "I hope they did as well."

Shervin was looking politely confused. "You'll forgive me for asking," he said, "but I don't really see where our tanks fit in here. They do hold quite a lot for their size of course but I presume you're not using them as fuel tanks?"

Jeb glanced at him. "Actually we do," he said, "but only to power the maneuvering thrusters. They're a pretty important part of the booster as well but I can show you more of that in a moment if you'd like?" He cleared his throat. "Sorry, I haven't really explained the plan for the next couple of days. I thought we'd spend some time today touring the facilities here. Things have changed quite a bit around here since Thomplin and Halnie were here last and of course Shervin hasn't seen much of anything yet. This afternoon, we'll head out to the Space Centre and we can get you all set up with your stand. Some of the team here took the liberty of preparing some material for you which you might like to take a peek at. You're all very welcome to stay and meet the rest of the team this evening - Ornie is a pretty fair hand with a barbecue and the weather is about right for one tonight!"

Jeb looked at the Stratus team solemnly. "Tomorrow is launch day," he said, "so I'm going to be a bit busy I'm afraid but Ornie has volunteered to show you around and generally sort things out for you."

"That's fine, Jeb," said Thomplin, "It'll be good to see Ornie again. I guess you'll be busy with the flight?"

Jeb coughed modestly. "In a manner of speaking," he replied, "although as the pilot, I hope I'm not going to be *too* busy. Just an easy couple of orbits around Kerbin, re-entry and splashdown off the coast. If everything goes to plan we may try a couple of maneuvers too."

Thomplin looked startled. "You're the *pilot*, Jeb?" he said, "Isn't that a bit risky? What happens to the company if..." His voice trailed away in embarrassment.

Jeb looked him squarely in the eye. "If I don't come back?" he asked.

Thomplin nodded unhappily.

Jeb shrugged. "I've left instructions to cover that," he said. "The company will probably change its name but there are plenty of good people on the team who'll be able to carry it on without me. Seriously though, Thomplin, I've got a lot of good friends on this team. How can I possibly let any of them fly a spacecraft that I wouldn't be prepared to fly myself?"

Shervin glanced up sharply but only saw complete conviction on Jeb's face. He looked at the younger kerbal with increased respect.

At that moment, the door swung open and two kerbals stepped cautiously in to join them. Again Halnie introduced everyone.

"This is Leland from KBS news. Leland, you know Thomplin and me but this is Shervin, our director of engineering and this is Jebediah, owner of the Junkyard and Spaceship Parts company and pilot of tomorrow's flight."

Leland shook Jeb's hand enthusiastically. "Did I just hear that right?" he said. "You're flying into *orbit* tomorrow?" Jeb nodded slowly as Leland's eyes sparkled. "Thanks Halnie!" he said, "When you said this would be a chance to cover a big space story, I had no idea it would be 'First Kerbal in Space' big! Oh sorry everyone - this is my cameraman Donbart, or just Don for short."

Jeb rubbed his hands together briskly. "Right. Now that everybody is here, how about we take a little tour. Feel free to ask any questions along the way and Don - you're welcome to take any pictures you like."

Five enthusiastic kerbals squashed themselves around the table in Jeb's office. Leland and Don were practically bouncing up and down in delight with the film footage they'd managed to record. Halnie was looking forward to a ride in the Whirligig later and even Thomplin's normal reserve had started to crack. Privately, Shervin thought that the most impressive part of the tour had been the engine test stands, the obvious level of detail and attention paid to the testing and the willingness of the propulsion team to discuss the problems they'd faced. Their candid admission that they hadn't told him *everything* about the new engine was reassuring too in its way. A little competitiveness was good and he really couldn't blame them for not spilling out all their secrets in front of the KBS news team.

Jeb retrieved a long cardboard tube from the corner and gingerly pulled out two rolls of thick shiny paper. He unrolled the first one onto the table and carefully weighed down the corners with odds and ends from his desk.

Leland and Don looked decidedly puzzled but the Stratus team were fascinated. The poster showed a labelled cutaway drawing of a rocket booster, showing it's internal workings, including a spherical pressure tank which had been highlighted in red. The label for that part was prominently labelled with the Stratus company logo.

"Camrie, from our systems and logistics team, put these together," said Jeb, "We thought you might be able to use them on your stand tomorrow. The other one is a schematic of the Moho capsule reaction control system - another part of the spacecraft which depends on a Stratus tank. I think Bill has some photos of the Moho 1 on the launch pad too - complete with Stratus logo on the lateral boosters. Incidentally, if all goes well, Camrie is slated as our pilot for the Moho 2 flight."

"Reaction control system?" asked Shervin.

Halnie jumped in before Jeb could reply. "The steering system for the capsule once it's in space - right, Jeb?"

Jeb nodded. "The RCS also includes the retrorockets to bring the capsule out of orbit. Basically a slightly bigger version of the thrusters you and Thomplin saw, Halnie. Same idea though - and also powered by a Stratus tank."

Shervin kept his face carefully impassive. "So what happens if there's a problem with the RCS?" he asked.

For his part, Jeb kept his voice deliberately casual. "Depends what goes wrong and when, Shervin. Anything from leaving me stranded in orbit to burning up on re-entry. We're not just exaggerating for the sake of advertising - those tanks really are a vital part of the spacecraft." Jeb smiled faintly. "Anyway, lets move on. We've got time for a closer look at the Moho 1 and a tour of the Space Centre before Ornie fires up the barbecue!"

The next morning, Leland and Don were wide eyed as they watched the crowds pour through the gates. The launch was several hours away yet but the Space Centre was already getting crowded. Leland still thought that "Space Centre" was a slightly grandiose name for a pair of grandstands and a couple of, admittedly large, marquees. The commentary box was nice though, perched high above one of the stands to give him a good view of the launch and with a direct radio link to Mission Control so he could follow the details of the flight. *Then again*, thought Leland to himself, *Mission Control was fairly impressive with it's large display screens and control desks for the flight controllers*. Presumably Jeb had spent most of his money there rather than on the rest of the Centre facilities.

Not that anyone seemed to mind. The atmosphere was positively festive with young kerbals running helter-skelter over the grass - most of them wearing toy space helmets or clutching cardboard rockets. Leland grinned to himself - it looked like the Kerlington Model Rockets and Paper Products stand was doing some good business. He couldn't help noticing that some of the older kerbals were also carrying more sophisticated versions of the children's toys.

Over at the far corner of the field, a makeshift stage had been erected and the distant strains of musical instruments being tuned up drifted through the air. Leland shook his head. He figured that Jeb had been kidding about the preflight entertainment but apparently not. He tapped Don on the arm and pointed over at the stage.

"Ornie said he'd meet us by the stage. We should probably get over there."

Don nodded and packed up his cameras.

As the KBS team strolled towards the stage, they could see Ornie waving at them. At that moment a huge roar went up from the crowd as four kerbals walked out and picked up their instruments. The tallest one strode over to the microphone and waved to the crowd.

"Hello Barkton! It's Launch Day and we are... Fire in the Sky!"

"Alright - let's see your hands in the air Barkton! This one is called... Thunderbird!"

The band launched enthusiastically into their opening number. A huge smile spread across Don's face as he started swaying along to the music. Ornie grinned. "They're only a local band but they're good - and their music definitely puts you in the mood!"

"Good name too," commented Leland. "Fire in the Sky is about right for today."

Ornie chuckled. "Apparently they used to call themselves the Crash Test Dummies," he said. "Between you and me, most of the team thought that was pretty funny but we think Geneney had a little word with them and uhh persuaded them to change their name if they were going to play at the Space Centre."

Leland laughed. "Yes - not really the image you want for a rocket launch. C'mon Don, we've got some interviews to run."

Donbart looked wistfully back at the stage and then, rather reluctantly, followed Leland into the crowds.

Don held the camera steady and trained on Wilmy and Leland as the crowds flowed around them.

"So what does your brother do in the space program, Wilmy?"

There was a note of pride in the kerbal's voice as he answered Leland's question. "He started off as an engineer, working on the rocket boosters. Now he's training to be a kerbonaut and he's going to be commanding the Moho 3 flight!"

"Congratulations, Wilmy. That's a big career move though from engineer to pilot."

"Oh, he's still an engineer. That's how things work at the KIS - everyone helps to build the spaceships and everyone gets a chance to fly them! Wilford had only been working there for a few weeks but he got his chance just like everyone else."

"That sounds like quite a place to work, Wilmy - do you have any plans to follow your brother into space?"

"Oh not me. Wilford was always the engineer, even back in our village he would be the one to mend things that needed mending. I'm actually thinking of going kermol again, go back to the old Grove."

"Well good luck with that too, Wilmy. Thank you for talking to KBS."

Leland made a cutting gesture to Don. They shook hands with Wilmy and moved off into the crowd. Leland was fairly satisfied with their footage from the crowd and was considering going over to the marquee to visit the Kerlington Model Rockets stand when he nearly tripped over a diminutive kerbal in a grey cloak. He stumbled back in embarrassment and bowed respectfully.

"Good afternoon Keeper," he said and then caught sight of the green trim on the kerbal's collar and bowed even more deeply. "I beg your pardon. Good afternoon Ambassador. What brings you to the Space Centre?"

The ambassador's wrinkled face looked up at him impishly. "The same thing that brought you here I imagine," he said, "The excitement of a rocket launch and a chance to see a little bit of history being made."

Leland was momentarily lost for words. "I, I suppose so, Ambassador. Nevertheless I'm surprised..."

"To see a Keeper here." finished the old kerbal. He smiled gently. "Kerman or kermol, my son, we are all still kerbals and exploration is in our blood. The Books tell us so - for as long as we have recorded such things there have been kerbals and Kerm trees. And ever we have taken the Kerm trees with us to new lands."

Leland gathered himself with an effort. "So do you think we'll be taking Kerm trees with us into space, Ambassador?" he asked.

The ambassador laughed merrily. "Not for a while yet I don't think," he said cheerfully, "but I'm sure the good kermans at the KIS are working on it."

Once again, Leland was at a loss for words. "KIS, Ambassador?"

"The Kerbin Interplanetary Society of course." The ambassador looked at him shrewdly. "I know of a good few Groves around here, my son, where KIS hats are very much the thing to wear - for young and old kermols alike! And now, if you'll excuse me, I know a particular pair of young kermols who'll never forgive their old grandfather if he doesn't bring them back a hat! Go with the Kerm, sir."

Leland bowed again. "And you also, Ambassador. Thank you for talking to KBS."

He nodded to Don. "Back to the stage I think. We don't want to keep Ornie waiting too long."

"Alright! This is our last song today." The crowd booed obligingly as the drummer made his way to the front of the stage and whispered in the guitarist's ear.

"I'm sorry." The guitarist paused theatrically. "What I meant to say is - this is our last song before the launch today! So we'd like to dedicate this to Jebediah Kerman and all the crew back at the KIS. This one is called... Badass!"

Leland gazed into the distance as the music washed over him. Tears pricked at the corners of his eyes and for a moment he wished he could be sitting beside Jeb in the *Moho 1* capsule, ready to blaze across the sky on a great plume of rocket fire. Reluctantly he tore his gaze away from the stage. "I should get to the commentary box." he said.

Don looked even more reluctant but picked up his spare camera. "Yup," he said, "I'd better go with Ornie and get those last shots of the rocket before they clear the pad for launch."

"T minus fifteen minutes and counting. The last of the KIS engineers have left the launch pad and the *Moho 1* is fueled up and ready for launch. The last message from pilot Jebediah Kerman, now strapped securely into his capsule, was "I'm feeling fine and looking forward to the flight."

"T minus ten minutes and counting. Mission Control have run the final pre-launch checks on the spacecraft and all systems are Go as we approach the five minute mark."

Leland was unable to hide his excitement as the clock ticked down towards zero. "T minus five minutes and counting. From Mission Control, 'we have transferred power to the booster and the transfer is satisfactory.'"

Now Leland was racing to keep up as the final moments of the countdown unfolded in quick succession. "T minus two minutes and counting. Guidance control and launch sequencing transferred. Tank pressures nominal. Mission Control reports we are Go for engine start."

"T minus one minute, umbilicals have detached, all gantry systems to launch positions. T minus forty seconds - we have launch commit. T minus twenty T minus twelve, eleven, ten, nine..." Leland gabbled, "Five, four, three..."

"Ignition!... and lift off - we have lift off! All engines running!"

Leland's voice soared joyfully over the PA system. "*Moho 1* has cleared the tower and what a fantastic sight that is! Listen - just listen to those engines - five enormous rocket motors propelling Jebediah Kerman into history!"

"*Moho 1* - you have cleared the tower." Geneney's voice was rather more restrained than Leland's but it still held a note of triumph. "How do you read me, Jeb?"

"Reading you loud and clear, Genie. Man this is a smooth ride compared to the old *Kerbal 1*!"

"Copy that, Jeb. You're flying the best one we can find."

There were more than a few grins around the bunker as Jeb's cheerful whistling echoed tinnily out of the speaker, although it soon began to sound a little strangled and then expired with a sudden grunt as the *Moho 1* continued to accelerate. Lucan, Wernher, Joemy and Neling kept a wary eye on their consoles as the ship climbed through the atmosphere.

"Two minutes to LV9 separation," Wernher said quietly.

Geneney nodded, "OK, Jeb, standby for LV9 shutdown and detach."

The tension in the bunker went up a notch as everyone turned to watch the familiar four lights on top of Wernher's console. On board the *Moho 1*, Jeb was watching the status indicator lamps on his control panel just as intently. Geneney's voice came over his headset, counting down the last few seconds.

"Three...two...one...decouple."

Four status lamps glowed steadily back at Jeb. Automatically, he flipped back the guard over the LV9-JETT button, waited three seconds for the automatic systems to cycle again and then mashed the button into its socket as hard as he could. The lamps didn't even flicker. Jeb keyed his microphone.

"OK, Gene, I've got a problem up here."

"We see it too, Jeb. Stand by."

Geneney broke his radio link with the *Moho 1*. "Lets go people," he said urgently, "What have we got? Propulsion?"

Wernher rattled off the key details. "LV9s have shut down. LV-T20 is Go. Spacecraft still accelerating."

"Got it. Guidance?"

Neling fought to keep the nervousness out of her voice. "Trajectory is stable. SAS is compensating for the additional mass."

"Thank you. Flight Dynamics - what are our options?"

To everyone's surprise, Lucan's response was quick and confident. "We're still Go, Flight."

Geneney blinked but he wasn't about to argue. He knew one thing though - if the first stage also failed to detach, the flight was over. He reached out and clicked the radio on. "OK, Jeb, we're working this but for now you are still Go."

"Understood, Gene."

Geneney toggled his radio off again. "OK, Lucan, what have you got in mind?"

Lucan swivelled round in his chair. "Staging will be lower than planned but we can still get to orbit with the second stage and final insertion from the RCS. If we don't get first stage separation then we shut everything down and go for a mode one abort."

Geneney thought it through rapidly. "That's going to be a long burn with the RCS and the guidance system is only designed to hold orientation for retrofire. That means that Jeb is going to need to keeping the capsule oriented manually for the whole burn. Guidance?"

Neling turned to face them both. "We can do better than that, Flight. SAS is set to hold capsule attitude along the flight vector minus twenty degrees of pitch. If Jeb can execute a manual offset on the gyros, the SAS should hold attitude correctly for the burn." Out of the corner of her eye she could see Lucan nodding in agreement.

"How much margin will that leave us for the deorbit burn?"

Wernher spoke up from his console. "Enough, Gene. We'll have to scrub most if not all of the planned maneuvers but we'll have enough propellant to get Jeb home without cutting into the reserve."

Geneney made his decision. "Let's do it. Lucan, Neling - we're going to need a procedure for that gyro offset and quickly."

"On it, Flight." Lucan scrambled out of his chair and hurried over to Neling's console. The two kerbals bent their heads over Neling's flight logbook and started roughing out a set of instructions.

"OK, Jeb, stand by for staging. Once you lose the first stage we'll take things from there. If you don't get separation I want you to punch out immediately. Mode One abort - just get that capsule out of there!"

Jeb's voice was calm. "Got it . Go / NoGo at staging."

The fifth light flickered off and seconds later, Wernher sighed with relief as his console lit up with telemetry from the second stage engine. "Second stage ignition confirmed!" he called out across the bunker.

"Thank you, Wernher." Geneney replied tersely, "Lucan, Neling - how's that procedure coming along?"

"Got it right here, Flight." Neling tore the page out of her logbook and took it over to the flight director's chair. Geneney scanned the checklist quickly and nodded as he keyed his microphone.

"OK, Jeb. We've got some additions to your flight plan here. You ready to take them down?"

"Ready and waiting, Gene."

"I've got Neling on the loop to pick up any transmission errors from here. This procedure starts as soon as we have a confirmed booster separation;"

SAS override - ON.

RCS to MAN.

Gyros to LOCK.

Confirm roll orientation head up.

Pitch plus 20 degrees.

Gyros to FREE

SAS override - OFF

RCS translate plus zee for 3 minutes 17 seconds, then;

SAS override - ON.

Gyros to LOCK

RCS to AUTO.

Gyros to FREE

SAS override - OFF.

Neling listened intently as Geneney read out the checklist and Jeb repeated it back line by line. She nodded quickly and hurried back to her console.

"Understood, Gene. Gyro offset, burn one-nine-seven seconds with the RCS, reset gyros for orbital attitude. How much monopropellant will this leave me?"

"You won't be doing much flying up there, Jeb but you'll have enough to get you home without tapping into the reserve tank."

"That's good to know. The view should be pretty good from up here anyway, so I'll just take it easy for an orbit or two and do a little sightseeing!"

"Just remember to take some holiday pictures too. Second stage shutdown in three minutes."

The atmosphere in the bunker was tense as the second stage engine continued its long burn, pushing Jeb and the *Moho 1* higher and higher out of Kerbin's atmosphere. Everyone watched as the ship velocity climbed rapidly upwards, knowing that each metre per second on the board could be vital. There was complete silence, every kerbal in the room mentally counting off the seconds until shutdown. Suddenly there was a familiar and very welcome muffled bang from the speaker and the last light flickered out on Wernher's console. The capsule system displays next to Neling and Joemy shifted rapidly, as Jeb raced through the improvised checklist.

"...and SAS override off. Capsule attitude holding steady. Firing RCS."

"Attitude hold confirmed, Jeb." Geneney's voice caught in his throat. "One minute to loss of signal - good luck."

"It's all looking good up here, Genie. Go take a break - I'll be back in an hour or so."

Up in the commentary box, Leland's voice was sober. "Mission Control has just reported the expected loss of communication with the Moho 1 during the final moments of the ascent. If all goes well they should re-establish contact with the capsule in exactly one hour and twenty-two minutes. If something goes wrong and the thrusters don't fire for long enough, Jebediah Kerman will be faced with the daunting prospect of a difficult and dangerous re-entry, alone on the far side of Kerbin. Even if he survives re-entry, Mission Control will have no way of finding the capsule once it lands."

All around the Space Centre, the festival atmosphere was long gone as thousands of kerbals waited anxiously for more news. The control bunker was packed with members of the Kerbin Interplanetary Society, eyes fixed on the screens. Those few that couldn't fit in paced up and down outside, occasionally craning their heads around the door to try and catch a glimpse themselves.

"Control to Moho 1. Come in Moho 1."

Static hissed balefully out of the speaker as Geneney tried to raise Jeb on the radio. He gripped the arms of his chair to steady his trembling hands. *Dammit Jeb, where are you*, he muttered under his breath.

"Control to Moho 1. Come in Moho 1."

Joemy gave a startled exclamation as his console began to light up with data. "Flight - I have telemetry. Repeat - I have telemetry!"

And then a familiar cheerful voice filled the room.

"Looks like I *am* flying the best one you could find, Genie!"

The bunker erupted with cheering. Geneney's voice shook as he tried to make himself heard over the noise. "Copy that, Jeb. You've got a whole roomful of people down here that are glad you could join us again." He jabbed a finger at the Guidance and Flight Dynamics stations.

"And you my friends, are a pair of steely eyed rocketeers."

Chapter 13

All the Proof They Needed

A small rational corner of his mind was telling him that KBS probably wouldn't have broadcast the documentary if the flight had ended in tragedy. The rest of him was paying this comforting thought no attention at all and Obrick was on the edge of his seat as the urgent message went out from Mission Control;

"Control to Moho 1. Come in Moho 1."

Obrick flopped back into his seat and mopped his brow as the pilot's voice came over the air.

"Looks like I *am* flying the best one you could find, Genie!"

For a moment there was complete pandemonium as every kerbal in Mission Control jumped up and down, cheering themselves hoarse. Gradually the applause died away and the commentary turned to technical details of burn timings and re-entry interfaces as the camera panned around the surprisingly small looking room. The picture zoomed in on a map of Kerbin, with the flight path of the *Moho 1* superimposed on it and then faded to black as the voices of the flight director and the pilot faded out with it.

The screen brightened again as the scene from Mission Control was replaced by a view over the rail of a large boat. Either the sea was rather choppy or the cameraman hadn't quite got his sea legs because the picture was rocking erratically. A clock was counting down in one corner of the screen and the KBS commentator was busily explaining that if all had gone to plan, the flight control team should have established contact with the capsule by the time the clock reached zero.

Only two minutes were left as the camera tilted towards the sky and began to pan back and forth as the cameraman hunted for any signs of the descending capsule. The voice of the flight director could be heard in the background calling out to the pilot, although all that

could be heard in reply was the hiss and crackle of static. Obrick gnawed on one knuckle as he waited ;

"....to Control. My compliments to the heat shield team - the capsule didn't even get warm enough for me to break a sweat!"

Underneath the pilot's light hearted banter, Obrick could sense a very relieved kerbal. *And no wonder*, he thought. The tension was bad enough watching a documentary of the flight - Kerm only knew what it was like in the actual capsule, plummeting towards the ground and knowing that the only thing keeping you safe from the inferno outside was a few centimetres of ablative resin.

The view from the boat was still just empty skies and bobbing waves though, as the voiceover from Mission Control rattled through details of course headings and splashdown checklists.

"Fifteen kilometres and dropping, Genie. Standing by for drogues."

A great cry went up from the boat and the view from the camera tilted and blurred as the cameraman tried to find the capsule. There was brief flash of orange and the camera darted sharply back and zoomed in to the sight of two large orange parachutes unfurling against the clear blue sky.

"We read you on the mains Jeb - welcome home!"

Obrick felt as drained as the flight director sounded as the boat pulled up alongside the bobbing capsule, its scorched sides a mute testimony to the fury of its plunge from orbit. He watched as a team of kerbals jumped over the side and inflated a large collar around the base of the craft, before undogging the capsule hatch and swinging it open. Obrick caught a glimpse of a cramped space with the pilot strapped into his couch in the midst of control panels and other paraphernalia. As the credits rolled up the screen, the camera followed one of the recovery team as they climbed in through the hatch and helped the pilot out. The last image of the documentary was a close up of the grinning pilot, minus his helmet, sitting on a life raft in a bright orange spacesuit.

A flight attendant came up the aisle as Obrick flicked off the television screen. He leaned over and checked Obrick's seat belt.

"We're on our final approach now, Mr President. Twenty minutes till landing."

As the plane banked low over the city, Obrick was struck once again by the simplicity of the skyline. After the drama of Jebediah Kerman's journey into space, it was curiously jarring to be reminded that for all their technological progress and forward looking optimism, kerbals were a rather traditional people at heart. Even in their capital city, most of the residential and administrative buildings were still based around the ages old Kermol hut. Where a larger building was required, kerbals tended to simply build a cluster of smaller buildings side by side, or even into each other, which gave the city architecture a pleasantly scalloped, almost organic look from the air. Indeed, many of the smaller buildings, were built around a central tree in the Kermol fashion but even where this was clearly not possible, there was an

obvious fondness for building next to greenery, with the largest buildings nestling within leafy parks.

The plane levelled out as it swooped over the city descending rapidly towards the airport. There was a rumble and then a solid thump from underneath the fuselage as the undercarriage lowered and locked into place. Even now, the view from Obrick's window was predominantly of trees and fields, although he knew that if he turned his head and looked out of the other side of the plane, he would see grey concrete and airport buildings.

With the briefest squeal of tyres, the plane dipped gracefully onto the runway and rolled towards a small private hangar. Obrick was pushed gently forward as the plane slowed to a walking pace. His mind was still very much on the KBS documentary and he found himself wondering what it must have been like in the *Moho 1*, thrown forward in your seat as the rocket engines shut down and the capsule flew on towards space.

As the plane came to a standstill, a set of steps was quickly rolled up to the cabin door. Obrick got to his feet, picked up his bag and reflexively checked his seat, in the manner of air travellers everywhere, to make sure that he hadn't left anything behind. Satisfied, he walked down the aisle of the small passenger cabin, thanked the pilots and flight attendant and marched briskly down the steps towards the waiting car.

The scalloped architecture was rather less apparent from the ground but the capital was still a very leafy, pleasant place to drive through. The buildings to either side managed to be quite colourful despite being constructed largely of dressed stone, wood and glass. All manner of building stone had been used somewhere in their construction, from clean creamy limestone to grey speckled granites and yellowy sandstones, all set off with the deep gleam of polished timbers.

Here and there a balcony garden or a brightly dyed drape of kaya wool added a splash of vibrant colour to the more muted natural tones of the walls. Taller buildings marked the offices of various companies. These tended towards the sober, with those of the larger companies striving bravely for grandiosity. Obrick noted that the current fashion for revolving billboards was in full swing, with each office proudly displaying a spinning corporate logo on its roof.

The pavements running along the sides of the road were generously wide and bustled with kerbals of all sizes hurrying here and there about their business. Much of the traffic of course consisted of the ubiquitous tik-tiks and a steady stream of the small four wheeled buggies trundled past, their drivers reclining in the typical deep set chair and pedalling furiously along. There were other cars around too but they were comparatively rare and much of the roadway was given over to the buggies. As Obrick whisked quietly past, the soft hum of the car's electric motors could barely be heard over the constant tik-tik-ticking of buggy chains.

The car turned a corner onto City Avenue, a wide tree lined thoroughfare that split the city into two. Halfway along the Avenue and right in the very centre of the city, surrounded by it's own park, was the Capital building. A masterpiece of kerbal architecture, Obrick knew

that this was perhaps the largest building in the city and certainly one of the largest enclosed spaces. It was still built along the traditional Kerbol hut shape but cunningly designed braced arches managed to support a very much larger structure than even the most optimistic office building. Twelve smaller buildings were symmetrically arranged around the centre, each building the foot of one of six graceful arches that soared into the air and crossed far above the exact centre point of the main building. A tall flag pole jutted into the sky from the confluence of the six arches and the flag of all Kerbin fluttered proudly in the morning breeze. Picked out in white and green on a blue background, the flag was a stylised plan view of the Capital building itself. The twelve smaller circles around the centre green circle formed a flower motif symbolising Kerbin and each of the six white bars crossing at the centre of the flower, represented the people of one of its six major regionalities.

The car drove up to the park gates which silently swung open to let it through. As Obrick glided past he could see the kerbal guarding the gate lift a radio to his mouth. Obrick tucked his papers back into his briefcase and gathered his thoughts as the car purred up the road and stopped outside the Capital building. The driver hopped down and held the door open for him as he climbed out.

Normally, Obrick would have taken the time to appreciate his surroundings and perhaps take a stroll along the outer gallery that encircled the Council chambers, the better to admire the many works of art on display from across Kerbin. Today though was not a normal day and he hurried across the outer gallery and onwards towards the centre of the building. Pale sunlight gleamed through the skylights, throwing the wood panelling into sharp relief as he strode down the corridor towards a set of ornately carved doors, guarded by two kerbals. Neither guard was openly carrying a weapon but they both looked lean and alert. The ceremonial uniform of the Capital Guards also tended towards the practical rather than the excessively ornate and did not appear to be significantly impeding either kerbal as they pulled the doors open.

The eleven kerbals seated around the large round Council table all turned towards him as Obrick stepped into the room. He nodded briefly to the guards and the doors swung shut behind him with a very definite sounding thud. He bowed formally towards the table.

"Misters President, mesdames President, honoured chief Ambassadors. This session of the Council of Twelve Pillars is now open."

At that, Obrick took his seat at the table.

"As I'm sure you'll all be aware," he said, "the first item on the agenda today, is spaceflight and more particularly, the recent orbital flight by Jebediah Kerman." He paused, trying to judge the reaction from around the table. "As I'm sure you'll also be aware, this is not the first kerbal made object to be successfully flown into space but it is certainly the most significant one and I believe the time is right for this Council to consider its response."

The kerbal opposite Obrick cleared her throat. "Do we know who this Jebediah Kerman is?" she asked.

Obrick nodded. "So far as we're aware, he's a small businessman and noted aerospace enthusiast. He founded the so-called Kerbin Interplanetary Society - with your indulgence, the KIS for short - some time ago with a group of fellow enthusiasts, presumably with the intent of doing precisely what they have just done. Until recently, the KIS was a small informal organisation - I understand that it was somewhat larger to begin with but membership declined as it became clear that they were taking on a rather more ambitious project than they first imagined."

All eyes were on Obrick as he continued. "However, one of my staff has recently visited the KIS headquarters in Barkton and reports that they are now a much larger concern. Indeed they have recently expanded their operation into additional premises in order to support their piloted flights. They are quite admirably open about the whole business and my aide was able to take a tour of their factory floor and crew training facilities, as well as meeting several up and coming pilots in person."

Obrick coughed. "I think its fair to say that my aide was quite overwhelmed by the experience, or at least I've never seen him quite as excited about anything else during my time in office." He reached into his briefcase and drew out eleven grey folders which he passed around the table. "I've taken the liberty of preparing a short briefing on the KIS for you to peruse at your leisure. For now, I think the questions we need to address are quite clear. Where do we envisage this going and what, if anything, do we do about it?"

President Enemone looked unconvinced. "I'm still not quite sure what business this Council has with a group of amateur spacekerbals, no matter how enthusiastic. Unless you seriously believe that there's going to be some enormous demand for joyrides around Kerbin?"

At that point one of the chief Ambassadors spoke up. "Madam President. I have the honour to represent the kermol in President Obrick's Regionality. As fortune would have it, my Grove is not too distant from Barkton and I have also visited the Kerbin Interplanetary Society. With all due respect, I believe that a great many kerbals *will* want to 'take a joyride around Kerbin.'".

Donman reached under his chair for a large envelope and shook out a number of glossy prints across the Council table. There were several sharp intakes of breath around the table as Donman pointed at one of the prints. "That one I believe was taken on their first flight. I understand it was only taken from thirty-five kilometres up - not nearly high enough to reach space but still rather a spectacular Münrise, as I'm sure you'll agree. These others were taken from an orbiting satellite, which they were able to bring safely back to Kerbin. I find this one of sunrise from space to be particularly inspiring."

Enemone frowned. "Where did you get these prints from?"

"Why, they are available for sale at the KIS museum, Madam President, along with many more." Donman chuckled, "Whatever else you may say about them, the KIS certainly have a flair for the dramatic and an eye for an opportunity. All the prints were selling very well indeed when I was there."

Enemone looked resigned. "Well that's that gronnek out of the bag then." She made a half bow towards Donman. "I agree, Ambassador. If nothing else, those pictures are going to stir up demand." She looked around the table. "So what do we do about this?"

President Chadlin chose that moment to speak up. "It seems to me," he said, "that space travel should be a matter for all of Kerbin. I put it to this Council that such travel should be under the auspices of a single Kerbin-wide organisation. It need not report directly to this Council of course but I believe that a centralised agency is the best approach."

Obrick could see a number of heads nodding around the table, although some were looking more doubtful. He had to give Chadlin credit as well - the old kerbal had clearly prepared his position well and was handling the resulting heated debate with aplomb. The chief ambassadors though, was looking increasingly unhappy and Obrick decided to step in.

"Ambassador Aldwell - I take it you have some concerns with President Chadlin's proposal?"

The Ambassador looked mildly startled. "Thank you, Mr President but I don't have any particular problems with President Chadlin's proposal. I do however, have a great many concerns about the possible impact of a sudden explosion, if you'll excuse the word, of rocket launches. Even if the rockets themselves are relatively benign - which has yet to be proved - the industrial expansion needed to build all the rockets could have a very serious environmental impact on Kerbin."

The other Ambassadors nodded in agreement as Chadlin spoke up again. "A pertinent point Ambassador Aldwell and another excellent reason why space travel should be centrally regulated."

Enemone tapped on the table. "With all respect to President Chadlin, I think he might be being just a little hasty. Despite these extremely persuasive pictures, I think it will be quite some time before swarms of kerbals are flying rockets into space. After all, there has been a total of one kerbal in space so far and that took a great deal of time and effort. I would be inclined to wait and see how matters develop before pressing for a new agency." Enemone cleared her throat. "I also note in passing that only one other company so far has taken up the challenge of spaceflight and begun building their own rockets. This is not a vast industrial expansion to my mind."

"Actually, Madam President," said Obrick, "I believe the Ambassadors have raised an excellent point - and it occurs to me that President Chadlin's proposal would have some serious merit in countering it." He paused for a moment, mentally checking over his next words. "Council members, may I suggest that our response to this issue is to embrace it wholeheartedly and without reservation. We've all seen Ambassador Donman's pictures and if nothing else, we all know our fellow kerbal." A polite ripple of amusement spread round the table. "Throughout our history, the urge to explore and seek new lands has driven much of kerbal society - and I believe that the promise of spaceflight will only feed that urge."

Obrick took a sip of water. "Without wishing to disparage the Kerbal Interplanetary Society, I believe that the long term exploration of space will not be possible in any meaningful sense if we are restricted to launching tiny cargos on large, single shot rockets. And I agree with

the Ambassadors that any attempts to do so will pose a grave threat to Kerbin's environment. I would therefore like to propose a two step plan for consideration by this Council."

"In the short term, we should allow our fellow kerbals to guide us. Let the new companies spring up if they so wish. Let them build, let them fly, let them dream - and let them fail. Let them compete and in so competing, let them drive forward the development of new spacecraft and new ambitions!"

"In the meantime, I propose that we *do* set up a central space agency and task it with developing the longer term answers to the problems of space exploration. If I may give some examples, if it should prove possible to harvest resources from the moons of Kerbin, it would save us the trouble of launching them from Kerbin. How do we set about such a task? I have no idea - but the Kerbin Space Agency will find a way! Are there alternatives to rockets that could be used to get into space. Again, I personally have no idea but the Kerbin Space Agency should be tasked with finding out."

"The KSA will not be a large agency to begin with of course. Barely more than a committee charged with finding the right questions to ask, let alone finding out the answers. If President Enemone's skepticism proves to be correct then it need grow no further. But if spaceflight really does take off, then the KSA will be ready."

There were murmurs of support from around the table. Donman tapped the table in front of him. "An excellent plan President Obrick and one that I believe this Council should earnestly consider. If I may make one small suggestion it would be this. Rather than be *wholly* guided by the endeavours of our fellow kerbals, why not let the fledgling KSA guide their early ventures? If I may use your example of resource gathering, then surely the first step along that path is to identify what resources are available and where they might be found? Therefore might we not set our space companies the challenge of mapping the Mün from space? Although," he added dryly, "It may well be that simply reaching the Mün will be sufficient challenge to begin with."

The Council started to look more enthusiastic as it debated the merits and the details of the Obrick-Donman proposal. Then President Chadwick spoke up again.

"What about crew safety?"

Obrick looked him in the eye. "Without wishing to be callous, I suggest that this Council does not concern itself with such matters beyond setting certain basic requirements. We should certainly ensure that rockets are not being flown recklessly over inhabited areas - ideally they should launch over the sea. As far as crew safety is concerned, I would venture to suggest that any crew, or indeed passenger in a spacecraft will be well aware of the risks and will have chosen to go regardless."

Aldwell nodded in agreement. "We could of course expand the remit of the Kerbin Air Accident Board to cover investigations into similar incidents with space vehicles but beyond that, I agree with President Obrick. Besides," he went on wryly, "if I may borrow President Enemone's expression, the gronnek is already out of the bag. I suspect that other groups of

enthusiasts will attempt to launch themselves into space regardless of any decision handed down by this Council."

Obrick got to his feet. "Let us put the proposal to the vote then. Let all those against, mark their disagreement with no fear of coercion nor fear of censure nor fear of reproach."

He looked round the table at the silent figures before him. "Speak now or forever abide by the lawful decision of this Council."

The council room was quite still.

"Very well. As it has been spoken by the Twelve Pillars, let it be written by the Twelve Pillars. And may the Kerm give us wisdom to follow our course."

Part Two

Secrets of the Kerm

Chapter 14

Decisions

Jeb knocked three times on the door, waited and then knocked twice more. He could hear muffled shouting from inside accompanied by the clanging of pots and pans. When it became clear that nobody had heard him, he banged more vigorously on the door in the same pattern and was rewarded by a sudden drop in the culinary noise level followed by the sound of hasty footsteps.

The door swung open and Jorfurt poked his head out slightly breathlessly. "'Ahh, there you are, Jeb. And the rest of the boys too I see. Good, good, come on in."

The others quickly followed Jeb into the hallway, sniffing appreciatively as the smells from the kitchen drifted towards them. Jorfurt closed the door behind them. "The usual room then, boys?"

Jeb nodded. "If you don't mind, Jorfurt. It's been a busy day - I don't think any of us are ready for the main bar tonight."

"You know the way. Make yourselves at home - I'll be up in a minute or two." Jorfurt hurried off back to his kitchen. Jeb led the way up a narrow staircase and along a gently curving passageway, his boots thudding on the heavy wooden floorboards. The door at the end of the passage had been left ajar and a flickering light spilled out around it. Inside was a snug room with a low beamed ceiling and a fire crackling in the grate set into the far wall. The familiar low wooden table sat in the middle of the floor, with the usual scattering of scuffed and patched sack chairs around it. The kerbals left their boots at the door before sinking gratefully into the comfortably baggy old chairs.

The six friends sat in companionable silence, each of them content to sit with his own thoughts for a while and just sit and look into the fire. They barely moved as Jorfurt whisked into the room and set a clean blue cloth, napkins and six steaming finger bowls down on the table.

"Right then, boys. What will it be to drink?"

Wernher stirred in his chair. "Nothing too strong for me, Jorfurt. Do you have any of that prickleberry cider left?"

"Certainly. Iced?"

"Yes please."

Bob sat up a little straighter. "Iced prickleberry cider sounds good. Make that two please, Jorfurt."

"Two it is. How about you, Mr Bill. We don't have your usual in tonight I'm afraid but we do have a new citrus wine in, which I'd value your opinion of. Whatever you did to the television in the bar worked a treat by the way, I've not had a bit of trouble with it since."

Bill smiled. "I'm glad to hear it, Jorfurt and the citrus wine sounds delicious."

Jeb sat forward in his chair, the pellets inside rustling against the sack lining. "I'm in the mood for something a little more malty I think. What have you got brewing this week, Jorfurt?"

"A couple of new experiments, Jeb but the RT5 looks particularly promising if I do say so myself."

Jeb blinked. "RT5?" he asked.

Jorfurt kept his face carefully deadpan. "A good solid brew with plenty of kick to it. One will make you wobbly, four will probably put you into orbit."

Geneney burst out laughing. "I like it!" he said, "but I don't fancy getting mashed into my chair tonight. What else have you got, Jorfurt?"

"Well there's always the 905, Geneney. So called because it's slower, smoother and not as punchy as the RT5."

"Perfect. I'll try a mug of that."

Lucan and Jeb were nodding. Jorfurt glanced around. "Three mugs of 905 it is then."

The room was rather more lively as Jorfurt bustled back in with a large tray. He put everyone's drink within easy reaching distance before setting out a large platter of *djan* chips, hot smoked kaya jerky and crisp luffa-eye peppers on the table. He poked the fire, threw another log onto the embers and then bustled back out again.

Jeb took a deep swig of beer and smacked his lips happily. "That's not bad at all. Although if this is the less punchy one, it's probably just as well that we're not on the RT5 tonight." He chuckled. "You know a town has got a good case of space fever, when the local bars start naming drinks after rocket engines."

Wernher raised his eyebrows. "If they're naming the *beers* after rocket engines, remind me not to try any of the spirits for a while!"

Bob was carefully piling squares of jerky on top of a particularly large djan chip. He popped the assembled snack into his mouth and a look of bliss spread over his face. "I don't know what old Jorfurt *puts* in that spice dusting he uses but he still does the best *djans* around."

Beside him Lucan was happily crunching away on a handful of peppers. "Yup - and you should give these a try too, Bob. Sweet as any I've tasted for a long time."

Bill sighed as he stretched luxuriantly and took another sip of citrus wine. The liquid fizzed slightly as it washed against the chilled rim of the glass. Intrigued he canted the glass towards the fire and swirled it round, watching as the bubbles sparkled and scattered soft orange firelight through his drink.

Once everyone had had a chance to fortify themselves, Jeb tapped his mug on the table for attention. "Right, guys, I think we all know what this meeting is about, so lets make a start."

Geneney swallowed a mouthful of chips. "The Probodyne Prizes?"

"Exactly. Whoever they are and whatever they are, the Probodyne Foundation appear to be spaceflight enthusiasts. So much so in fact that they are putting up some substantial prize money for two rather challenging flights. No apparent restrictions on who can compete but it's winner takes all. The first person or organisation to carry out the flight gets the money." Jeb took another sip of beer. "Flight 1 is a long duration orbital mission. Four kerbals in orbit for four weeks in one contiguous vessel."

He cocked an eyebrow at the others. "The rules don't say anything about bringing those lucky kerbals home again but speaking personally, I think we should see that as part of the challenge. Flight 2 is 'simply' to send pictures of the far side of the Mün back to Kerbin. Probodyne didn't say anything about how this was meant to be done but KBS have announced that competitors can use their facilities to receive the images from the spacecraft and re-broadcast them."

Wernher crunched thoughtfully on a pepper. "That's an easy decision really, Jeb. Mün first and then we maybe have a go at the orbital mission later, if nobody else has claimed that prize by then. At a pinch we could do two kerbals in orbit for four weeks by extending the Moho 5 / Moho 6 flight from rendezvous and station keeping to rendezvous and docking. I wouldn't much fancy sitting in a Moho capsule for four weeks - or being on the ground crew that *opened* that capsule after four weeks - but it could be done. Four kerbals though is not something we can realistically pull off with Moho hardware."

Geneney nodded. "Camrie and I have some very preliminary plans for a three kerbal orbital capsule that *would* do the job but it's not something that we're going to have the resources to build for quite a while. Plus, the capsule alone is a lot heavier than a Moho, let alone the service and propulsion module that we were thinking of. It's going to take something a lot bigger than a Moho booster to get the whole ship into orbit."

Jeb looked intrigued. "I'd like to see those plans when you have a spare moment, Genie. In the meantime - I'm thinking that the Mün is looking like our best bet too. Anyone else have anything to add?" He glanced around the table but nobody else spoke up. "Right then - the

Mün it is. So the next questions are how do we get there and what hardware do we need to do it?"

Lucan reached for another piece of jerky. "Once we get to Kerbin orbit we basically need two burns to get to the Mün. One long one to put the probe - at least I assume we're going for a probe - into a transfer orbit with a high enough apoapsis for a Munar encounter and then one shorter one to decelerate into Munar orbit. We should leave enough fuel for correction burns along the way but I don't think we should worry about our orbital inclination at the Mün. Unless we somehow manage to wind up in a polar orbit, we should get some good pictures of the far side whatever we do. If we're broadcasting the data rather than using film return like we did with the Kerbin 2, we don't have to worry about getting the probe back again either. Lucan looked at Wernher. "Leaving the probe in Munar orbit saves a lot of fuel and gives us much more margin for error with the trajectory calculations."

"Agreed," said Wernher. "As far as hardware goes, I think we have most of what we need already. We can use the same probe chassis that we used for the Kerbin 2, although we'll need to figure out a proper guidance system for it this time. We don't need the heatshield so that will save us some weight but we're going to need a proper electricity supply."

Geneney sat up. "I think we've got an old solar charger somewhere on the shelves, Wernher," he said, "we could probably strip the panels out of that and fit them to the probe."

"Perfect." Wernher said. "We should include one battery to smooth out the current supply a bit but solar panels should be a lot lighter than an entire flights worth of batteries. Then, if the propulsion module we built for the Kerbin 2 will do for braking into Munar orbit, the only other thing we need is a third stage for the Moho booster, to launch the probe out of Kerbin orbit. If two stages plus lateral boosters are enough to put a capsule into orbit, they should be enough to put a small probe plus boost stage there too."

"I'll have to check the delta-v budget," Lucan said, "but off the top of my head, I think we might need to build a stretched version of the Moho booster to give us more fuel in the second stage. I'm fairly sure the Kerbin 2 propulsion module has enough delta-v for Munar capture, although I can't guarantee there'll be much left for fiddling around with whatever orbit the probe ends up in."

At that moment, there was a knock on the door and Jorfurt came in with a tray to gather up all the empty glasses.

"Can I get you boys anything else?"

"No more cider thanks, Jorfurt," said Wernher, "but a sapwood would go down nicely. Water not milk please."

Jeb stifled a belch. "Sapwood for me too please, Jorfurt. Big day of testing tomorrow, so I'd better have a reasonably clear head in the morning. Which is a pity because otherwise I'd be asking to try the RT5 about now! That reminds me though - when would be a good time to bring those souvenirs over for the main bar?"

"Oh any time you like Jeb," said Jorfurt comfortably. "Couple of hours before opening time would be good, so I can get them installed before the evening starts but other than that, whenever works for you."

"I'll see what I can do. Milk in my sapwood please."

Bob, Lucan and Geneney all ordered sapwood juice too. Bill gave one forlorn look at his empty citrus wine glass, sighed and ordered a glass of water. Jorfurt chuckled. "I'll take that as a good opinion of my citrus wine then, Mr Bill?"

Bill smiled. "Very much so, Jorfurt. I know what I'll be ordering next time but I'll need a clear head tomorrow as well."

Jorfurt bustled out and returned a few minutes later with fresh glasses, a half bottle of sapwood syrup and pitchers of milk and water. He discreetly handed Jeb a small slip of paper before nodding to everyone and backing out of the room.

Geneney looked at Jeb curiously. "Souvenirs?" he asked.

Jeb grinned. "You remember those Trashcan casings we fished out of the sea?" he said. "I've cleaned them up a bit, stenciled our logo on the side and welded some legs onto them so they're not just balancing on the the exhaust nozzle. Left enough rust on them to make them look genuine though - I thought they'd make a nice set of bar tables for Jorfurt."

Geneney looked slightly relieved. "Oh those. Good idea, Jeb - they weren't any good for re-purposing anyway." He poured a splash of syrup into his glass and topped it up with milk. "Back to the Mün probe then. If we have a plan for the hardware, I guess the last question is when? When do we try the first launch?"

Jeb looked thoughtful. "Mohos 2 and 3 are about finished," he said, "and the Booth Crew reckon that Camrie is almost ready to fly. Wilford is about checked out on the capsule systems and starting to pick up on simulator time when Camrie isn't in there. There's certainly no point in keeping her waiting and I'd prefer not to disrupt Wilford's flight either if we can help it."

Geneney nodded. "We should also get some good data on the RCS system and 905 engine performance from their flights, which may help Lucan when he's planning for the Mün flight. If nothing else we could use some good delta-v checks to see if the probe propulsion module will actually work for Munar capture."

"The Moho 4 is only half finished," said Wernher. "We could easily reschedule construction to build a stretched upper stage if Lucan thinks we'll need it and repurpose the current upper stage as the Munar boost stage. Plus Bill, Neling and Edsen will need some time to build and test the probe, not to mention its guidance system. That's going to be the tricky part and we can't launch without it."

"Adelan is going to be disappointed," said Bob quietly, "She'll understand why we're postponing her flight but she won't like it."

"I know," said Jeb unhappily, "but we can't really afford to wait until the Moho flights are finished. I think we've got a lead at the moment but Rockomax will be working hard on the Probodone Prizes too and they could be working on their own Munar probe as we speak."

Lucan took a sip of watered sapwood. "Actually, it might take them longer than you think to put that together," he said. "I think I've finally worked out what their launch pad systems are all about."

Everyone put down their glasses and gave Lucan their full attention as he continued. "It took some time - and a *lot* of replaying that video of their last launch but if you look very carefully, those gantry arms are holding the booster down at a slight angle. You can see it dip slightly at lift off too before it builds up enough speed. Last but not least, that thing went straight off the pad. Nice ballistic trajectory - *with no obvious deviations after launch!*"

Wernher got there first. "So the booster is just aimed off the pad, with no active guidance system in flight?"

"Exactly!" said Lucan. "It has fins on the bottom of course for stabilisation but as far as I could see those were fixed. I didn't see any steering capability to speak of. They managed to put that satellite of theirs into a pretty circular orbit, so they're either doing something very clever with the thrust from their solid motors, or they've got some small liquid fueled engines as well to neaten up their orbital insertion. But I'd be surprised if their guidance and control systems are good enough to get to the Mün yet."

Jeb nodded firmly. "I think that decides it then, guys. It's still a bit of a gamble but we launch Mohos 2 and 3 and then put Moho 4 on hold and use the next couple of boosters to try for the Mün! I'll speak to Adelan myself - and I'll have a think about pepping up her flight a bit. What was the original plan for Moho 4?"

Geneney frowned. "Basically just a progression flight from Moho 3. Moho 2 is going to be a simple up, round and down flight to test the updated systems. Moho 3 was going to be a test run of the RCS for orbital maneuvers and Moho 4 was going to be a longer duration Moho 3, with some Kerbin observation experiments thrown in."

Jeb tapped his fingers on the table. "Hmmm OK. I'll have a think about that and see what I can come up with."

Chapter 15

New Homes

The Kerm seed lay buried in the gritty soil. The ceremonial sprinkling of water bestowed at its planting was nowhere near enough but the rainfall two days later soaked through the ground, bathing the seed and swelling the fibrous matting that encased it. In response, the fibres unwound, sliding past each other as they snaked through the soil and transforming the seed from a fibre wrapped gourd into the nucleus of an expanding cloud of wispy hairs.

Some of the hairs were the beginnings of roots. They wove around pebble and grit, delving through the coarse soil in search of water. Water was not hard to come by with the nearby spring leaping down from the hills and the roots swiftly found it and channeled it back to the seed.

Other hairs were sense organs. They crept more slowly through the soil, dividing and subdividing, searching and tasting. Here they found pockets of mineral salts dissolved in the soil. Here they found the tell tale pheromone trails of insects. Elsewhere they found the distinctive traces of other roots. Of other plants.

Still others lay dormant. These were the effectors and their time had not yet come.

Slowly the seed swelled. The hard casing dissolved, releasing the embryonic Kerm within. A shoot formed, pushing upwards through the ground in search of light and air. The roots thickened where they joined it, anchoring the shoot within the soil. At the junction between them, more fibres spun out, interwoven and tangled, touching at a myriad of invisibly thin tips.

Messages began to flow back along the sense fibres. Of all the many many compounds they had evolved to detect, one group was conspicuously lacking. The soil was rich in minerals, clays and water but held the barest minimum of old vegetation, the remains of past generations locked underground and providing sustenance to their descendants.

This would have to change.

Instinct took over. As the shoot broached the surface and tasted the air, subtle signals rippled upwards. Leaves sprouted and unfurled. Other signals spread through the new leaves, setting off delicate biochemical cascades. Pigment cells within the leaves responded to the cascades as they always had. As dawn broke over the hill, a tiny shoot stood proudly next to the crude wooden post that marked its planting site, its blue dappled leaves turned gladly towards the sun.

Gerselle screwed her eyes shut as the early morning sun found its way through a gap in the curtains. Joenie was already awake and chirruped happily as she saw her mother stir. Resignedly Gerselle pushed the covers to one side and swung her feet onto the floor. Yawning, she retrieved Joenie from her sleep pen and dropped her into her pouch.

"Ooof - you're getting too heavy for this my little one."

She pulled on a poncho, deftly working Joenie's head through the slit in the front and ignoring the kerblet's indignant squeaking as the fabric pulled over her ears.

"Yes, yes, I know. Clothes are all just a terrible imposition. Shhh, now, it's all finished."

Patting Joenie's head soothingly, Gerselle made her way out of her hut and crossed the green to the communal sweetmoss pool. Pulling the door shut behind her, she flipped over the privacy sign to 'Occupied' and reluctantly stepped into the chilly pool. Without solar heating for the water, bathing was definitely a task to be endured rather than a pleasure to be lingered over but the cold water did at least wake her up. Joenie dipped one foot into the water and squeaked at the cold. She gave Gerselle a baleful look before crawling as far away from the pool as possible.

After bathing, it was time for the next task of the day. Gerselle retrieved her daughter and walked back to the centre of the green to check the Planting site. Other early risers - mainly those with young children of their own - were just starting to emerge from their huts and they waved to their Keeper as she walked past. Snug in her pouch, Joemie chirped a welcome to the other kerblets. For her part, Gerselle was lost in thought. She wasn't sure how long Kerm seeds took to sprout and made a mental note to visit the Archives later that day to go and find out. So far though, there had been nothing to see.

Then all thoughts of going to the Archives vanished as she saw the new seedling by the marker post, its leaves already unfurled and facing the sun.

Gerselle knelt down and hesitantly brushed her fingertips over the leaves. According to Jonton, the young Kerm would make contact through its leaves but she couldn't feel, or sense anything out of the ordinary. Perhaps, she thought, it's just too young - it's barely more than a sprout after all. The blue spots on the leaves were curious though - she couldn't recall seeing any blue marks on any type of plant before. The leaves looked healthy too, so hopefully the spots weren't a sign of some exotic parasite or fungus that fed on Kerm trees. But now that the seed had sprouted, there was something that she needed to do urgently. Gerselle hurried back to her hut and hunted through the bits and pieces on her shelves.

Where was the wretched thing? *Oh right - hiding behind this other pile of odds and ends.* She scowled. Now that the Archives were finished, it was high time for the woodcrafters to put some proper furniture together so that the villagers could *organise* things properly. *Never mind that for now* she told herself - *just get back to the seedling.*

Gerselle unfolded the wickerwork screen and carefully pegged it out around the seedling. Not that anyone in the village would deliberately harm it, but it *was* rather small and easily overlooked. She brushed her fingers over the leaves again, curiously tracing out the blue marks, which had the same soft, slightly furry texture of the rest of the leaf. She frowned. The marks were clearly a part of the leaf but what were they? She shook her head. *Never mind all this wondering Gerselle,* she thought to herself, *just go and look the wretched things up in the Archives.*

The Archivist smiled. "Certainly Keeper." Gently he took Joenie and snuggled her into his shoulder. "You just stay here with me, little lady, while your mum goes to read the big boring books." Joenie squirmed, trying her best to climb over his shoulder and chirping frantically as Gerselle walked over to the shelves.

"Hey, little wriggly - you don't want to do that. Tell you what." The archivist picked up a booklet of index cards and riffled through them. Joemie stopped squirming and cocked her head towards the strange sound. The frantic chirping was replaced by an inquisitive squeaking as she grabbed the booklet and promptly started chewing on one corner.

Meanwhile, Jerselle was staring at her own book with incredulous delight. Jonton was right after a fashion - the Kerm *was* speaking to her through its leaves, although not in the way that he had always talked about. She had found several pages of carefully coloured diagrams, all showing Kerm leaves with different patterns of coloured spots. As she read the annotations alongside each diagram, Jerselle realised that each pattern was a sign evolved to alert the kermol that something was missing. Some of them were obvious - it would have to be a very young or foolish Kermol indeed who failed to recognise a plant in need of water. Others were more obscure. She puzzled over the notes beside the picture of the blue spotted leaf for several long minutes before understanding dawned. *Of course! Not as quick as adding compost but much more efficient and better in the long run.* She would have to send a carrier back to the Grove to fetch the necessary seeds though.

Now the thin stubble of saplings covering the hilltop was intermingled with a green carpet of hundreds and hundreds of low growing flat leaved clover. The roots and shoots of the little plants were studded with tiny intricately folded nodules, giving them a rather misshapen lumpy appearance. As they grew, gases in the surrounding air diffused into the nodules where they were transformed into nutrients and a myriad of other compounds by the specialised cells just under the surface. Most of the nutrients were absorbed by the growing plants but some were allowed to escape out through the roots into the soil.

As the nutrients spread out through the soil, new messages fired along the growing network of fibres around the Kerm seedling. Dormant effectors came to life, growing rapidly and extending far beyond the reach of the sensory fibres that controlled them. As they raced outwards, they released a cascade of complicated chemical signals into the earth.

The signals spread out from the hilltop, drawing all manner of other creatures to it. Worms wriggled through the dark, blindly following the chemical trails and slowly churning up the soil as they went. Beetles and other insects crawled up the hillside, finding new homes and plentiful food amongst the low growing clover plants covering the hilltop. Other soil dwelling insects burrowed amongst the roots of those same plants. With the insects came a host of bacteria and other single celled organisms that rapidly colonised the surrounding soil, feeding on the nutrients around the plant roots and being fed on in turn by other creatures.

The kermol villagers watched in horror as their green and verdant hillside wilted and began to die under the ecological onslaught. The more observant amongst them noted that all the saplings remained unaffected and told the others not to interfere but to trust in the Kerm and the wisdom of the Keeper. Others noticed that the dying plants released clouds of tiny wispy seeds which dispersed on the wind and settled far and wide over the hillside. And even as the plants died, their substance became bound up in the soil, whether by decomposition or through the bodies - dead or alive - of the creatures that had fed on them.

From the Archives, Gerselle knew that the Kerm could push the already rapidly growing clover to flower and die many times over a season. Each cycle of greening and dieback would lock more precious nutrients into the soil but even so it would be at least a year before it had improved enough to be suitable for planting anything other than clover and probably longer still before it would support any useful crop plants. Nevertheless, this was a start.

Meanwhile, out of sight beneath the surface, the Kerm fibres continued to spread. Here they slipped in between the clover roots, sensing the nutrients flowing out around them. There they sniffed out the criss-crossing trails of a vital species of beetle. In still other places they sped through patches of worm cast, quivering under a trickle of displaced soil particles as the worms tunneled blindly past. And now, in their ceaseless wandering, they began to detect *self* as they encountered the other fibres spinning out from beneath the stems of the nearby Kerm cuttings. Flurries of signals raced up and down the hairlike threads as they met and touched, causing other fibres to grow along the trails marked out by the pioneers. The fibres twisted together forming more robust, almost root like structures.

Slowly but surely, the food webs being spun through the soil by the effectors were matched by a physical web of sensory fibres strung from the seedling to all the thirty six cuttings, then from each cutting to its nearest neighbours and finally from each cutting to every other cutting planted on the hilltop. Gradually the delicate networks at the base of each became more and more interconnected; knitting together into the grand symbiosis of a new Kerm.

Chapter 16

Mün Or Bust?

Danfen shuffled his notes and checked the projector one final time. Everything seemed to be working, his slides were in the right order and the carousel clicked round obediently when he pressed the button on the remote control. He wiped his sweating palms on the back of his trousers, took a hasty swallow of water and did his best to look relaxed and confident as the rest of the management team filed into the room. He waited until everyone had poured themselves a drink and taken their places around the table. Then he began.

"G-good afternoon everybody. As you all know, we've called this meeting today to discuss the um announcement by the Probodyne Foundation and um what we, I mean we the company should do about.. what our response should be."

Hanbal, the chief of propulsion, had deliberately chosen the seat nearest the front. He flashed a quick supportive smile at Danfen and made a surreptitious 'calm down' gesture at him from under the table. Danfen dipped his head by a fraction of a centimetre and picked up the remote control to buy a moment to breathe.

"We don't know who the Probodyne Foundation are but if their, their announcement is anything to go by then they have an interest in Munar exploration." He clicked the remote and brought up his first slide. "This is obvious from their um *second* challenge where they are offering a substantial prize for the first person, or more likely, team to fly a spacecraft to the Mün and photograph its far side."

Click.

"I believe that their um *first* challenge confirms this. Again, they are offering a substantial sum of money for the first team to put four kerbals into orbit, in a single contiguous vessel and keep them there for four weeks." He paused. "This would be an excellent um proof of ability to put enough crew and materiel into space for a flight to the Mün."

Danfen glanced across the table. "Which leads us to some obvious questions," he said, "Do we compete for these prizes? And if so, uh which?"

Ademone tapped her pen on the table in front of her. "How much are Probodyne offering?" she asked. Danfen brought up the next slide and gestured at the numbers on the screen. Ademone looked thoughtful. "Clever. Not enough that we're going to make any profit from them. In fact, we could make a substantial loss, depending on how many launches we need. But enough to cover some of the costs and a nice incentive to at least give those missions a try."

Danfen nodded in agreement. "Yes," he said, "so I decided to draw up a rough flight profile for each challenge, based on existing Rockomax hardware. The umm Kerbin orbital flight is conceptually simpler so I started there." He clicked the remote.

"The R2 orbital craft is based on our sub-orbital R1 capsule but obviously includes enhanced life support systems and thermal protection for re-entry. Like the R1 it holds two pilots. It's designed to fly with a separate, with a separate service module for power and on orbit maneuvering, although this is jettisoned before re-entry."

Danfen's voice began to grow more confident as the presentation became more technical.

"We also have our current launch vehicle based on a BA-C solid booster with a smaller B1 solid second stage. Finally we have our liquid fueled orbital insertion stage based on our single chamber 48-7D engine."

Hanbal shuffled uncomfortably in his seat. Danfen nodded at him. "I suspect Hanbal - and um probably everyone else - has identified the problem here. The R2 is considerably heavier than our K1 satellite and the BA-C/B1 stack will not be enough to lift it to orbit. I'll come to that in a minute."

"In the meantime, on my next slide, I have an overview flight profile for a Munar mission. There are three parts to the flight; achieving low Kerbin orbit, the transfer orbit to the Mün and the braking burn into Munar orbit."

"The mission will use our existing K1 satellite, which happily has the necessary cameras and communication equipment. We also have the 48-7D insertion stage, which should be sufficient for the final braking burn. Finally, we already know that the BA-C / B1 stack is sufficient to lift both into low Kerbin orbit. However, what we don't have, is a boost stage for putting the K1 into a Munar transfer orbit. That's probably the most serious problem we would need to overcome, since we would need to design and build the boost stage and also modify the launch vehicle to lift the extra weight."

Danfen took a gulp of water. "To summarise, we do not have the hardware to accomplish either of the Probodyne challenges at present. So the next question is - what *new* hardware would we need for either mission?" He nodded towards Hanbal. "As everyone will be aware, the propulsion team is developing our first substantial liquid fueled engine. I believe that the current prototype, the SK1-F is currently being tested, although there is some way to go before the SK1 series will be flight ready."

The next slide clicked into place, showing an outline design for a spacecraft and its booster.

"My team have put together some outline designs for a launch vehicle based on the new engines. The main stage - here - is powered by a single SK1 engine, with multiple BA-C solid boosters on lateral mounts to provide additional thrust for liftoff. The upper stage is smaller but again, powered by an SK1 engine. From the preliminary test fire data, I believe this configuration will be powerful enough to launch quite um, quite a *substantial* payload to low Kerbin orbit."

Danfen tapped the projector screen. "One possibility would be to launch an R2 orbital capsule, together with an expanded service module. As well as providing power and maneuver capabilities it would also provide crew quarters and life support for up to four kerbals. Crucially, the module would also include a docking port at either end."

Nelton snorted. "Docking port? I rather think that we're attempting to fly before we can jump here."

Danfen inclined his head politely. "The R2 capsule would launch in a nose forward configuration. Once on orbit, it would be released from the service module, rotate and dock. The two vessels will never be more than a few tens of metres apart, so this should not present a significant challenge. Docking a second, separately launched R2 onto the other end of the module, will of course be a different matter. Once both capsules are attached, we will be in a position to complete the first Probodyne Prize challenge."

Danfen took another drink of water.

"We have also given some thought to the second challenge. This would also require a new launch vehicle but one that I believe that we already have the capacity to build without too much extra effort. Conceptually, the new vehicle would be similar to the SK1 design from my previous slide. The BA-C /B1 booster would be augmented with additional, laterally mounted B1 boosters, allowing it to lift a larger payload to orbit. That payload would consist of the K1, the 48-7D stage and a Kerbin departure stage built around a cluster of four 48-7D engines. As you'll understand from the name, the Kerbin departure stage is the missing part from my previous slide which will boost the K1 into its transfer orbit."

Danfen took a deep breath. "In short, I believe that we can realistically challenge for both of the Probodyne prizes given time. Both are within the capability of our existing hardware or current hardware development plans. The question of which we prioritise, I throw open to the meeting."

There was a polite patter of applause as Danfen stepped down from the podium and joined the rest of the management team around the table.

Nelton was the first to speak. "It seems quite obvious to me. MÜN first, with existing hardware then we focus our attention on the Kerbin orbital mission. We need a new booster for the R2 in any case, so we may as well get someone to pay some of the development costs."

Joebal tapped the table. "With respect, I disagree. We may have the engines to possibly get to the Mün but I can tell you for a fact that we don't have the rest of the systems in place. No - I say we leave the Mün for now and focus on Kerbin orbit operations. If we aim at both prizes together we risk walking away with neither."

"And I say that if we focus on an overly complicated Kerbin orbit mission, then we also run the risk of walking away with nothing. Nelton rolled her eyes. "*Docking* looks lovely on a presentation slide but have you any idea how difficult it will be practice? My mission control team are only just getting to grips with the details of orbital flight with a single capsule."

Ademone cut across the rapidly developing argument. "Danfen, Hanbal. What are your opinions of the current KIS systems?" Nelton and Joebal fell silent.

Hanbal cleared his throat. "More suited for the Mün challenge than the Kerbin orbit challenge Ademone. We already know that their booster can put a capsule into orbit and like us, they already have a suitable satellite. They also have the advantage of excellent guidance systems and a better selection of engines for the different phases of the flight. I would say that they already have all the elements of a Munar mission in place."

Danfen nodded. "I agree. On the other hand, their current systems aren't remotely powerful enough to lift anything much heavier than their single kerbal capsule into orbit. They would be extremely hard pressed to complete the Kerbin orbit challenge with their Moho hardware, not least because it would involve docking four capsules to a common vehicle." Beside him he could hear Nelton snort in agreement.

"Thank you," said Ademone quietly, "Do we have any indications of their likely future plans?"

"No," said Danfen frankly, "although we can make some guesses from that KBS documentary. From what I could see of their assembly facilities, they appeared to be building two more of their capsules. That suggests they plan to run at least two more single pilot flights, which I suspect will tie up their available resources for quite a while. Even if they decide to focus on a Munar flight afterwards, we may have still have enough time to put our own mission together."

"Thank you. Joebal - do you agree with Hanbal's assessment of the KIS guidance systems?"

"Unfortunately I do Ademone," said Joebal reluctantly. "We know from the KBS documentary that their thrust vector control is based on gimballed engines. We don't have any details of their actual guidance systems of course but we've analysed all their launch footage as best we can and that, coupled with our tracking data, tells us that they're impressively accurate. We also have no idea how they're managing their roll control but it certainly seems to work."

Ademone drummed her fingers on the table. "What about our guidance systems. They may not be as good as the KIS versions but would they get us to the Mün?"

Joebal grimaced. "Possibly. As you know, our current guidance control relies on vernier engines in the 48-7D module and liquid injection for vectoring the thrust from the solid

boosters. Liquid injection is not an ideal system - which is why we try to aim our boosters off the pad as far as possible. We could probably add verniers to Danfen's clustered 48-7D stage too but I wouldn't want to make any promises about attitude control for the whole transfer orbit burn. Monitoring and compensating for off axis or uneven thrust over the whole duration would be a cast iron... umm it would be challenging."

Joebal rubbed his eyes. "Plus, the guidance control unit is quite large. Fitting it to the 48-7D cluster would be interesting."

"I have a question," said Nelton, "Why not just go with a single 48-7D? Wouldn't that get rid of the uneven thrust."

"Probably," Joebal acknowledged, "but then we'd need a much longer burn to compensate for the reduced thrust, which just moves the problem around."

"Hmmm," said Ademone, "I presume that it would take too long to develop a gimballed 48-7D ourselves?"

"Yes," said Hanbal, "it would. Or at least it would be one more thing for us to do and one more thing that the KIS *don't* have to do. Not to mention the fact that Joebal's team would need to completely re-work the control logic. We tried gimbals on the B1 boosters - they're not easy."

Ademone nodded to herself. "Thank you everyone. In which case we will continue our piloted program as planned and devote most of our efforts to completing the SK1 and developing a launch vehicle for the R2. We will then consider how best to use the R2 to win the first Probodyne prize."

Ademone smiled faintly, "However, I'm still enough of a Mün watcher, that I don't want to abandon the second Probodyne prize altogether. And in the long term our satellite business will benefit from a cheap, mostly solid fueled booster capable of lifting payloads beyond low Kerbin orbit. Therefore I will release funding for two of Danfen's modified BA-C / B1 boosters. Please make them count."

"Three, two, one and shutdown!"

Outside, the roar of the engine died away and was replaced by blessed silence. The last wisps of fire chased themselves around the edges of the flame pit and were quickly extinguished by the torrents of water still spraying out of the sound suppression system. Then the spray jets switched off as well and all that could be heard around test stand 1a was the faint gurgle of water swirling away down the drains and the plinking of cooling metal.

In the control room, Hanbal turned to the propulsion team. "Nice work people. I think we can call that a success." He made a note in the test log; SK1-G - full duration test completed. "Next up - is everything ready on stand two?"

One of the engineers stepped forward. "All set up and good to go Hanbal."

Every kerbal in the room gathered round the control console for test stand two. On the monitor they could see the BA-C booster securely suspended above the flame pit. Stray drops of water splattered across the camera lens as the sound suppression system started up. The counter ticked down to zero and light flared across the monitor as the BA-C ignited. The noise was still fairly impressive despite the sound suppression system and the thick control room walls and even at this distance everyone could feel the vibration. There was a clattering in the background as an empty paper coffee cup fell off the edge of a table and rolled across the floor.

Hanbal braced himself. Any second now.

The muted roar increased to a full throated bellow. Flames licked over the top of the pit and twin clouds of smoke billowed out on either side of the test stand. In the control room the windows started to rattle and for a moment Hanbal feared that the booster was burning out of control. Much to his relief, the vibrations didn't get any worse although he kept a wary eye on the console telltales. For several long minutes the propulsion team watched the monitor tensely.

Right on cue, the twenty second light on the console glowed orange. There was no real reason for a countdown, as every kerbal in the room was perfectly capable of keeping time themselves but some things were just traditional. Hanbal forced a note of nonchalance into his voice.

"Burnout in three, two, one... and shutdown."

Everything went quiet. The smoke from the booster gradually dissipated in the breeze. The sound suppression system switched off.

Hanbal leaned forward to inspect the chart paper. Slowly he turned the dial on the console, scrolling the chart back to the start point. After his initial panic, the readouts during the test seemed to have been fine, but the chart was better than he had dared to hope. Steady thrust at 25% rated power, a smooth ramp-up and then a good controlled burn at 100%.

"OK, seems that the new propellant configuration is a keeper. Looks like Danfen's crazy lateral boosters might work after all."

His casual tone did nothing to fool the rest of the team and the control room rapidly filled with exuberant chatter. Hanbal stood back and let everyone celebrate. *A small triumph but a very welcome one*, he thought to himself, *particularly after the news of Camrie Kerman's successful flight aboard the Moho 2. A few more milestones like this and maybe, just maybe, Rockomax would be first to the Mün.*

Chapter 17

We all build them - We all fly them

The master alarm warbled in Wilford's ear as he stared in sudden horror at the constellation of warning lights on his instrument panel. Multiple failures across different unconnected systems, no obvious cause that he could see or feel - it just didn't make sense. *C'mon Wilford*, he told himself, *you know this capsule. Figure it out*. He toggled his microphone.

"Control, Moho 3. I've got a serious problem here. Check that - serious problems."

The radio hissed in his ear. Wilford went pale as yet more warning lights flickered on, indicating failures within the communication systems. Frantically he scanned the control panel, trying to find somewhere - anywhere - to start. He could feel the G forces wrenching him *sideways* against his seat and he knew the *Moho 3* was tumbling out of control.

"Control - I hope to Kerm you can hear me. I'm dropping the main stage to restore command authority."

Unbelievably the radio crackled into life. "Negative, negative, Moho 3. Mode 1 abort! Mode 1..."

It was too late. Auxiliary engines ripped off the sides of the booster, pinwheeling away into the sky and leaving ruptured fuel lines and torn mountings behind them. The main fuel tank creased and then crumpled under the offset forces, setting off a catastrophic series of explosions that raced up the booster towards the capsule. Wilford just had time to feel the flames licking against his legs before everything went mercifully black.

Wilford sat bolt upright in bed, heart pounding and sweat pouring off him. For a moment he just sat there, shaking as the last minutes of the nightmare flashed before his eyes. He glanced over at the clock and groaned. Too early to be awake, too late to get back to sleep. Resignedly, he climbed out of bed. *Might as well grab a cup of something hot* he thought to himself. *Hope nobody finished off the djeng sachets because this really is not the time for caffeine*. He pulled on his clothes and padded down to the canteen.

"Morning, Wilford"

Startled, Wilford spun around to find Jeb regarding him knowingly from the corner of the room. "Jeb?" he exclaimed in bewilderment.

"Worrying about the flight?"

Wilford decided that this wasn't exactly the best moment to admit to having *nightmares* about the flight. "Yes," he admitted reluctantly. He opened the cupboard to look for a mug, glad that the cupboard door was hiding his face. "You want a cup of *djeng* too, Jeb?"

"Just a black coffee for me if you don't mind." Jeb yawned. "Better make it a strong one too."

The spoon clinked against the side of the mug as Wilford stirred his drink. He cautiously sipped it and added a dash more water, before topping off the coffee and carrying both mugs over to Jeb's table. Jeb swept his papers together and dumped them unceremoniously onto the chair next to him. Wilford caught a quick glimpse of an eclectic mix of pages from the flight plan, engineering notes and diagrams of various components of the *Moho* booster.

Wilford took a long slow drink of *djeng* as Jeb watched him sympathetically. "It's going to be fine," he said firmly. "You're an excellent pilot, Wilford - heck I *saw* your simulation scores for manual re-entry and they were better than mine." Wilford blinked as he looked up from his mug. "Plus you'll have the entire team watching your back during the flight." Jeb smiled wryly. "Speaking from personal experience, there's nothing quite as reassuring as Genie's voice in your ear telling you 'we're working this but you're still Go', when you've got a panel full of lights telling you the exact opposite."

Wilford still looked troubled. "I know, Jeb - I saw the flight control team in action and they were great. There's just not much they can do about..."

Jeb interrupted him gently, "an exploding booster, cracked heatshield or stuck parachute?"

Wilford nodded dumbly.

Jeb took a swig of coffee. "All I can say is that everyone building the *Moho 3* is sweating the details at least as much as the flight control team." He looked at Wilford thoughtfully. "I was watching Ribory and Seanan building the heat shield for Camrie's flight. Everything looked fine to me but Ribory had obviously spotted something. She drilled out the entire section of shield that she'd spent the last two hours on, picked up that caulking gun and just set to work again." Jeb swirled his mug absently as he went on. "I saw Ordun machining the mounts for the wiring looms for the *Moho 3* and they were a work of art. Then he polished them just to make sure. I was curious because these were loom mounts for Kerm's sake - there was no need to make them to those tolerances, never mind shine them up to the point where you could use them as a mirror. Ordun just looked at me. 'There's a bunch of things that could go wrong with this machine, Jeb' he said 'but I can tell you that none of them are going to happen because of parts that I've made.'"

Jeb looked intently at Wilford. "You *know* this already," he said "because you're no different. Everyone building these ships has that same attitude and it's a big reason why I - and probably Camrie too - climbed into that capsule."

"We all build them, we all fly them," murmured Wilford.

"Exactly," said Jeb. For a moment there was a faraway look in his eyes. "And it's because of that that I honestly believe that we'll get out there one day."

Wilford saw the expression on Jeb's face. "To the stars?" he asked quietly.

Jeb snorted gently. "Not unless somebody re-wrote the laws of physics whilst I wasn't looking," he said. "No, I was just talking about the planets. Duna, Jool, even Eeloo - we'll get to them all eventually. He grinned. "Just the planets? Trust me - there's plenty to keep us busy in the Kerbol system for now, without needing to find other stars to explore!"

Wilford twisted his fingers together anxiously. "I want to see them too, Jeb, I really do. That's why I dropped my name into that basket. It's just that closer we get to launch day, the more the reality of how to get there has been weighing on me."

Jeb nodded. "I'm not going to lie to you," he said, "At the moment, it's still a risky business. But when the recovery team fish you out of that capsule tomorrow and haul you up onto the boat, I'm going to be there asking you just one question; *were the risks worth it?* He looked at Wilford reflectively. "I think I already know the answer to that but right now, it might surprise you."

Wilford was silent for a moment. "Jeb," he said tentatively, "Suppose we do manage to re-write the laws of physics one day. Would you climb on board that first starship?"

"In a heartbeat, Wilford, in a heartbeat."

Wilford pushed his chair back and got to his feet. "Thanks, Jeb. I'm going to take a shower and think things over." As he walked over to the door, a thought struck him. "By the way - how come you were down here this early too?" As he pushed the door open, Jeb's voice floated quietly across the room.

"Why, for the same reason that you were, Wilford - for the same reason that you were."

Wilford barely noticed the rapping on his helmet but managed a determined thumbs up as Bob squeezed his way out of the *Moho 3* and sealed the hatch. He took a deep breath as he glanced round, making particularly sure that the abort handle was well within reach. Actually, after the hours spent he'd spent in the simulator, the entire capsule was remarkably familiar and Wilford was confident that he could pick out any control on any panel with his eyes shut. He steeled himself and flicked on the radio.

"Moho 3 to Control. Hatch sealed, requesting primary comms check, over."

Geneney's reply came back promptly. "Receiving you loud and clear, Moho 3. Please switch to backup antenna and repeat, over."

As they worked through the pre-flight checklist, Geneney was reassured to hear the clipped radio messages from the *Moho 3* become gradually less and less tense. *That's it, Wilford*, he thought, *Just treat it like another sim and you'll be fine.*

For his part, Wilford was thinking the same thing. The interior of the *Moho 3* really was almost like the inside of the Whirligig, the cool air blowing over this face from the environmental systems was at the perfect temperature and he knew from the relaxed tones of the flight control team that the countdown was going well. He could almost persuade himself that this was just another simulation.

Almost.

Then Geneney's report over the public address loop broke the spell.

"T minus five minutes and counting. We have transferred power to the booster and the transfer is satisfactory."

A shiver ran down Wilford's spine and he could feel his pulse begin to climb. Reflexively he checked the position of the abort handle again. *C'mon Wilford*, he told himself, *"if you were going to duck out of this, you had your chance when you were talking to the boss this morning.*

"T minus two minutes and counting. Guidance control and launch sequencing transferred. Tank pressures nominal. *Moho 3* - all systems are Go."

He could hear the thumps and rattling outside as the umbilicals disconnected from the booster. He braced himself as the final moments of the countdown raced past in a flurry of systems reports.

"T minus 40 seconds - we have launch commit. T minus 20. T minus twelve, eleven, ten, nine..."

Wilford braced himself against his acceleration couch.

"Ignition!... and lift off!"

"Tower clear!" He could barely hear Geneney's voice over the noise of the engines but the instrument panel was reassuringly free of warning lights and the booster didn't seem to have bumped into anything. Wilford checked the readouts for the LV 905s but everything looked nominal. The familiar thunder of the LV-T20 filled his ears and the g-meter swung upwards as the pressure on his chest built up.

Forty seconds into the flight, the *Moho 3* went supersonic. Everything went suddenly quiet as the spacecraft raced ahead of the noise from its own engines. Wilford could hear the status reports from Mission Control, although he could barely manage a grunt in reply as the rocket tore through the atmosphere.

"*Moho 3*, your trajectory and guidance are Go."

Inwardly, Wilford agreed. The booster was performing beautifully. The pitch and roll program had started right on schedule and according to the 'navball' attitude and direction

indicator, he was right on course. Even the acceleration wasn't all that bad. In fact, compared to Tomcas's centrifuge, the real thing was positively benign. Slowly but surely, the tight knot in the pit of Wilford's stomach began to unwind, although he made a mental note to thank Geneney later for keeping everything businesslike and not filling the comms loop with excess chatter.

"Moho 3, standby for LV9 shutdown and detach."

Wilford tensed. This was where Jeb's flight had gone wrong, although he knew that Bill and Richlin had been working hard on redesigning the decoupler systems, particularly the synchronising trigger circuit that had failed during Jeb's flight. Everything had worked for Camrie's flight aboard the *Moho 2* but even so, he was relieved when the sudden jolt and four sharp explosions from outside signalled the departure of the four lateral boosters.

"Control, this is Moho 3. Clean shutdown and detach."

Wilford was certain he could also hear a note of relief in Geneney's voice. "Copy that, Moho 3. We read all four boosters gone."

Several long minutes after the lateral boosters fell away, there was another sharp crack from above, as the protective shroud over the capsule was jettisoned. Sunlight poured in through the window and Wilford got his first glimpse outside.

"Hey it's getting *dark* out there!"

Geneney chuckled. "Yep - you're starting to run out of atmosphere Wilford. Stand by for staging."

Despite himself, the knot of tension inside Wilford was slowly turning into a knot of excitement. Only two other kerbals in history had even had a chance to see what he was about to see. He was suddenly very glad indeed that he hadn't ducked out of the flight and more than a little humbled at the thought of all of his friends and colleagues on the ground who had devoted themselves to giving him that chance. Especially when he hadn't done anything special to deserve it other than having his name drawn out of Jeb's old waste paper basket. As the last litres of fuel drained out of the main tank, he glanced over at the abort handle, silently praying that he wouldn't need to use it after all.

The vibration from the LV-T20 disappeared as the first stage shut down. Wilford mentally crossed his fingers, as he watched the indicator panel. Then, suddenly, he sensed the explosion far below him as the main decoupler fired and the last but one light on the panel winked out. He jerked forward against his harness, only to be shoved firmly back into his couch as the second stage engine lit."

"Control, Moho 3. Second stage ignition confirmed."

The *Moho 3* soared out of the atmosphere, now flying almost along the curve of the horizon as it climbed up to orbit. Inside the capsule Wilford barely noticed the long push from the LV-905. His attention was wholly focused on his instruments and the mission clock as the engine roared silently in the almost vacuum. Sunlight washed through the capsule window,

throwing distracting, jagged shadows over the interior surfaces. For a moment Wilford was almost tempted to take manual control and roll the *Moho 3* to one side. *Something to bring up with the flight control team when I land*, he thought to himself.

"30 seconds to loss of signal, Wilford. Good luck."

"Thanks, Gene. Everything's looking good up here. Better than good in..."

Static buzzed from the radio as the *Moho 3* flew over Barkton's radio horizon. Wilford switched it off and turned back to his instruments. Velocity was right on the calculated flight profile, fuel reserves were looking good, capsule attitude was holding steady. Then, with one final crack of pyrotechnic bolts, the second stage shut down and separated from the capsule. The final light on the indicator panel winked off as the automatic systems fired a burst from the RCS thrusters to pull the capsule safely away from the spent booster. Wilford blew out his cheeks in a great gusty sigh.

He was in space.

For a moment, he couldn't see a thing. Then the guidance system pitched the *Moho 3* into its nose-down orbital attitude and Wilford's breath caught in his throat as he got his first glimpse of his homeworld from orbit. Not even the pictures that Jeb and Camrie had brought back from their flights could compare to the real thing. The thin glowing line of the atmosphere around the edge of the planet seemed like a terribly frail barrier between his home and the harsh vacuum of space. And no cartographer's map or kerbonaut's camera could ever hope to capture the sheer iridescent colours of Kerbin so vividly.

Looking back on his flight, Wilford would ruefully admit that it was just as well there were no flight plan objectives for that first orbit. He turned off the cabin lights and just sat transfixed as the familiar oceans and continents sailed past *underneath* him. As the *Moho 3* sped towards the terminator, the colours of the landscape shifted subtly as the sky faded into twilight. Wilford watched in awe as the lights came on across Kerbin, from the faint but regular glow of the Kerm groves to the brilliant but scattered jewels of the larger kerman towns. Then, as his eyes adjusted to the darkness, he realised that the stars were coming out around him, first in their thousands and then in their hundreds of thousands.

For an all too brief time, Wilford floated serenely above the world as the *Moho 3* raced around the night side of Kerbin. Then the stars began to fade and the first tentative fingers of dawn reached out across the sea. Moments later, a brilliant flare of light heralded Kerbol's emergence over the horizon and the ethereal beauty of an orbital sunrise shone through the capsule window. Wilford could just make out The Crater drifting past beneath him, the dawn light casting mountain sized shadows over the sea. He shook himself. If that was The Crater then he should be coming back into radio contact with the Space Centre any moment now. He clicked the radio on and Geneney's voice filled the capsule.

"Control to Moho 3. Come in Moho 3."

"Moho 3 to Control. Receiving you loud and clear, Control."

"Good to hear you, Wilford. How's the ship?"

"Perfect, Gene, just perfect." Wilford was silent for a moment. "Umm, I don't know if Jeb is in the bunker at the moment but you might want to tell him that the answer is a definite yes."

"Ahh copy that, Wilford. Whatever that meant it sure put a big smile on Jeb's face. You might also want to keep your eyes peeled for a large thumbs up heading up to orbit."

Geneney blinked in surprise as Wilford's laughter echoed over the radio. "Sounds like the perfect time to try out the RCS then, Gene, if I'm going to be making evasive maneuvers any time soon. Right - I've got the flight plan and checklists here. Rotation and attitude holding tests first. Switching to manual control."

Neling keyed her microphone. "Looking good, Flight. SAS override is in, RCS on manual, point two clockwise roll initiated."

"Wheeeee! Hey, Control this is *super!*"

Geneney frowned and quickly flicked through to a separate channel on his console. "Flight to Capsule Systems. I need an atmosphere check Ribory."

The reply was prompt. "My thoughts exactly, Flight but oxygen partial pressure is normal. I think we just have a very happy kerbal up there."

"Thank you." Geneney switched back to the air to ground loop in time to catch the end of Wilford's comment. He still sounded elated, although thankfully, the slightly manic tone had disappeared.

"Say again, Moho 3. We're getting some transmission noise here."

"Copy, Gene. Roll thrusters performing nominally and I'm seeing zero offset rates on pitch and yaw. Cancelling roll now!"

Wilford fired the anticlockwise roll thrusters, watching the navball and rate indicators closely. As the direction indicator showed him returning to level flight he deftly applied a tiny burst of additional thrust and released the controls.

"Roll cancelled, Flight. Residuals are damping nicely. SAS to HOLD."

"Understood. Proceed with pitch and yaw tests."

The *Moho 3* spun slowly through space, first about one axis then the other, before returning to its original orientation. On board, Wilford was jubilant. The RCS was performing far better than he had expected and his little craft was crisp and responsive to the controls.

"Flight, this is Moho 3. Rotation and attitude hold tests complete. No problems moving between SAS modes either - whatever Bill did to the guidance system seems to have worked. Pass on my thanks to the Booth Crew too - this is a breeze after flying the Whirligig!" There was a pause. "My panel is clear, Control. Ready for orbit raising burn at next periapsis?"

"Confirmed, Moho 3 and good luck. We're seeing all systems Go and forty seconds to loss of signal."

The *Moho 3* flew into darkness again but Wilford was too busy to look out of the window on this orbit. Deftly he worked the RCS controls, swivelling the capsule around with delicate bursts of monopropellant. Satisfied at last, he let the automated systems hold the spacecraft in its new orientation and waited for the clock to tick down.

"Three, two, one and burning!"

He pushed the handgrip firmly forwards, settling gently into his seat as all four RCS thrusters fired. The velocity indicator started to climb, as the *Moho 3* pushed itself out onto a new orbit. Wilford kept the translation control pushed forward, one eye watching the velocity indicator, the other scanning the attitude rate indicators for any sign of trouble.

"And shut down. RCS to auto. SAS override off."

For a minute, Wilford wondered what he was doing, talking to himself over the far side of the world. Then he shrugged. Nobody was going to hear him after all and if it helped with the checklists then so be it. He checked the controls again. Everything looked fine but he would need to wait another forty minutes for the proof. As the *Moho 3* raced into daylight once more, Mission Control were ready with the good news.

"Nice burn, Wilford. We're tracking you in a 180 by 350km orbit, no change in inclination."

"Not precisely what we had in mind, Gene," Wilford replied cheerfully, "but what's a couple of kilometres of apoapsis between friends."

"Either way you've just set a new altitude record."

Wilford laughed. "I suppose I have at that, although hopefully it won't be a record for very long. Oh wow - it's high enough to make a difference though! I'm seeing way more of Kerbin from up here. I hope the camera is working because this is spectacular!"

"Well the good news is that you can enjoy the view for an orbit or two. Given that the RCS seems to be working so well, we've got a small experiment that we'd like to try. The flight dynamics teams are just running the numbers now."

"OK, Wilford, we've got an unscheduled change for the flight plan. Ready to take this down?"

"Ready and waiting, Gene."

Wilford's mind raced as he jotted down the numbers. It was a straightforward attitude change but it would leave the *Moho 3* in a slightly odd orientation in space. Shrugging slightly, he switched the spacecraft back to manual control and set to work.

"And attitude hold. Not sure what I'm supposed to be doing here, Gene. Hang on a minute though - that's a pretty bright star..."

Wilford blinked hard and peered intently at the blue-green speck floating in the middle of the capsule window. Then everyone in Mission Control heard the dawning realisation in his voice.

"Ohhhh. That's no star, Gene! Minmus, repeat - I have Minmus!"

In the background he heard the cheering from Mission Control and even over the radio he could sense the grin in Geneney's voice.

"That was the plan. You've just made the flight dynamics team very happy indeed! So what does it look like from up there?"

"Just a small greeny-blue dot to be honest, Gene. But dammit - Minmus. I can't believe I'm seeing it with my own two eyes!"

Many hours and many orbits later, Wilford stretched, rolled his shoulders as best he could in the confines of his harness and pushed himself back into his couch. The flight had gone better than he had dared to hope, the capsule systems were holding up well and every objective on the flight plan had been neatly ticked off. Inclination changes, altitude changes at different orientations to test the RCS translation along different axes and best of all that naked eye observation of Minmus. There was just one task left to do.

Working with practised ease, Wilford brought the *Moho 3* into position for the final burn. He glanced at the navball one last time and carefully checked the periscope display, nodding in satisfaction to see Kerbin lined up neatly along the manual orientation reticle. Then once again, it was just a matter of waiting for the right moment.

As the retrofire sequence began, Wilford smiled peacefully up at the window, taking in one last glimpse of the stars before they faded out behind a lambent curtain of ionised gas. He had just been where only two kerbals had ever gone before, he had seen things that no kerbal had ever seen before and now, he knew, he was going home.

But he would be back.

Several minutes later Jeb watched from the deck of the recovery boat as the familiar orange parachutes blossomed into the sky. "Good flight, Wilford," he murmured to himself, "good flight."

Chapter 18

Reunion

Gerselle bent down and kissed the top of Joenie's head. The kerblet rolled over sleepily, still clutching a stone in one small pudgy green fist.

"Ummy, 'one."

Gerselle smiled, "Yes, beautiful girl, I can see you've still got your stone. Just you hold on to it and you'll still have it in the morning."

She pulled the cover back over Joenie and watched as her daughter's eyelids drooped, struggled fitfully to stay open for just one last minute and then closed. She waited quietly for a moment, until the slowing pace of Joenie's breathing told her that she really was asleep, then turned away and tiptoed out of the sleep room.

Meleny was waiting for her on the porch. "Both asleep?" she asked.

Gerselle nodded. "Both absolutely out for the night, touch wood."

Meleny chuckled softly. "And so they should be. I've never seen such a pair for getting into places that they shouldn't. Give them another month or two and we'll both be hard pressed to keep up with them."

Gerselle sank into a chair. "Another month or two? I'm hard pressed to keep up with her now and she's only barely walking! Although your Adbas seems to manage just fine."

Meleny grinned. "The trick with Adbas is to keep him distracted. If he's busy enough playing with something new then he tends to keep still. For half a minute at least."

Gerselle groaned. "I should probably have married a geologist then rather than a Keeper. At least a geologist would be able to provide a steady stream of new and interesting stones to play with." She sighed. "Speaking of Keepers... I should probably go. Joenie should sleep through the night but the quicker I get back the better."

Meleny shook her head in mock seriousness. "Well I'm just as happy that you married a Keeper. I don't want to even *think* about the chaos that either of our two would cause if they got their inquisitive little hands on Daddy's rock hammer!"

Both kerbals got to their feet. Gerselle gave Meleny a brief but heartfelt hug. "Thank you so much for looking after her tonight. I'm afraid I might be imposing on you quite a bit more over the next few months as well."

Meleny looked at her curiously. "How much time does a growing Kerm actually need?"

"I have no idea," Gerselle confessed, "and the Records aren't much help either. They do give plenty of advice about *how* to talk to your Kerm but not very much at all about when, how often, or how much care they actually need."

Meleny quirked an eyebrow at her. "So, much like parenting books then? Lots of detail but none of it ever seems to apply to your own little bundle of joy."

Gerselle nodded wryly. "Probably. Although I'm also hoping that Kerms are at least a little bit like kerblets, and need less attention the older they get. As far as I know they can feed themselves too and don't need cleaning - or at least I devoutly hope they don't!"

Meleny laughed. "Feeding and bathing a Kerm! I wouldn't know where to start."

"Me neither but I think I'm about to find out. Peaceful night, Meleny."

"Peaceful night, Gerselle."

Meleny watched as Gerselle set off down the path towards the rest of the village without even pausing to wave goodbye. Not that she blamed her. The care and feeding of kerblets was one thing, the care - and feeding, of Kerm was quite another. "Good luck, Gerselle," she whispered, "Good luck."

As she trotted across the village green towards her makeshift shelter, Gerselle reflected that whatever was about to happen, it was at least a good night for it. The young Kerm was far too small to build a hut around of course, so the best she had been able to do was a rough lean-to to keep the worst of any rain off her sleeping pallet. Not that that was going to be terribly comfortable either but it would have been far worse if it had actually been raining.

She reached the entrance to the lean-to and ducked under it, being especially careful not to brush up against the Kerm sapling in her way. Munlight glowed softly through the chinks in the roof as she dragged her pallet over to the sapling and crawled into bed, carefully working her head under the newly unfurled cluster of leaves midway up its slender trunk. She lifted her head until it brushed against the leaves, slipping her pillow under her neck as she did so. Then, not really knowing what else to do, she waited.

The leaves were cool and felt slightly prickly as they rested against her forehead. They also didn't seem to be doing very much. Gerselle tried to remember if the Records had mentioned anything about this but to the best of her recollection, most of the advice revolved around what to do once the Kerm had made contact. The concept of a shy Kerm

didn't really seem to have been a consideration. She frowned and reached around behind her to massage her neck, lifting her head up as she did so.

The prickly feeling against her skin was abruptly replaced by an unpleasant crawling sensation as the leaf hairs began to wriggle against her scalp. Startled, Gerselle's head thumped against her pillow as she reflexively flinched away. That... crawling feeling, wasn't at all like the mild tickling that Jonton had described but perhaps he was just used to it. Or maybe his Kerm was just older and a little more practised at making contact. Still, there was no avoiding it.

Gerselle rolled up her poncho into a bundle and wedged it under her pillow to provide a little more height. Then, gritting her teeth, she shuffled up the pallet until her head was in place back under the Kerm leaves. Instantly, the crawling sensation started up again and Gerselle clenched her calves as she tried to remain still. Fortunately, the feeling did subside into more of a tickling feeling as the leaf hairs burrowed underneath the more sensitive outer layers of her skin. Then they stopped.

There was a pregnant pause. Gerselle breathed deeply, trying to still her racing pulse and calm her thoughts. If she tried hard, she could almost believe that she felt a faint tendril of *other* thought brushing against her mind but it was extremely tentative, darting away as soon as she tried to reach out to it. Remembering the advice from the Records, Gerselle stopped trying to focus on the fleeting glimpses of thought and instead did her best to project broader feelings of welcome and reassurance. It seemed to work. The tendril still felt very cautious as it approached but this time there was a definite moment of contact. A brief wash of *aroma* swept against Gerselle's mind and then withdrew. Emboldened by her lack of response, the tendril came forward again, brushing more confidently against her. Gerselle's nose twitched at the scent. Other tendrils circled round and then settled delicately against her mind. More scents swept through her brain and then more and yet more, as the Kerm opened itself up to her.

Gerselle's nostrils fluttered wildly as the flood of aromas cascaded through her. Overloaded, her brain began to interpret them as bursts of colour and even snatches of sound. A distant, rational part of her realised that the Kerm must perceive almost *everything* through smell - it's world was in the minutia of the soil and the creatures within it. Creatures that had no need of light and had only the crudest sense of sound.

The rest of her struggled to hold itself together against the torrent.

The Kerm seemed to realise that she was struggling and the flood of information slowed. The lean-to around her had been replaced by a surreal landscape of coloured blotches. Fragments of sound fluttered across it, snatches of birdsong, the wind in the trees, a babble of voices, the tap tap tap of footprints across the porch. A furious melange of scents still bombarded her, some pleasant, some... very pleasant indeed. Gerselle cheeks flamed in the darkness and she devoutly hoped that the Kerm was not aware of the significance of *that* particular smell. Other scents were less enjoyable and occasionally she felt a very strong urge to gag.

As Gerselle relaxed, the landscape began to shift. Slowly at first and then jumping randomly from scene to scene. None of it made the slightest bit of sense but at the back of her mind she could sense happiness, excitement and an almost childlike enthusiasm. The phrase "Ummy, 'one!" drifted through her head and she fought down an urge to burst out laughing. The Kerm really wasn't so very different from a kerblet after all and it had the same infectious joy and desire to share its world with her. She couldn't really make out very much of what it was trying to tell her - and indeed she had a sense that the Kerm itself didn't really *understand* very much of it either, it was simply repeating what it had sensed.

Gerselle had no idea how long she had been in communion with the Kerm but the colours around her were starting to blur and melt into one another. The scents were also becoming more muted and she had the distinct feeling that the Kerm was tiring. In response, she did her best to project thoughts of sleep and rest. A thought struck her and she focused firmly on an image of the Kerm leaves lifting away from her head.

<disappointment>

Gerselle was stymied. How could she explain that she would be back soon? Did the Kerm even have a sense of the passing of time? Then another idea struck her. She did her best to recall the aroma of damp earth in the morning and the scent of Kerm leaves in the early morning mist. She let the memory fade out and be replaced by the feeling of cold on a starry night and the crisp clean scents of the evening air. Finally she focused on herself, lying under the Kerm sapling and lifting her head up to brush against its leaves.

<happiness>...<more more more>...<not now>

The colours around her faded away. Gerselle was only vaguely aware of the leaf hairs withdrawing from her scalp as she slumped down in her bed, utterly drained. Blinking, she stared at the clock hanging from a nearby branch. Only an hour to cram all that sensation into? Small wonder she was so spent. Still - at least she hadn't kept Meleny waiting too long.

The next morning, Gerselle wasn't feeling a great deal less tired. She had made the mistake of telling Joenie that Daddy was coming back tomorrow, which had led to a tearful bedtime when Daddy failed to appear. Gerselle had eventually soothed her by promising that she would see him in 'one sleep'. One very short sleep as it happened. Joenie of course had been up at first light, whereupon she had promptly toddled across to Gerselle's bed, squeaking in excitement. Gerselle still had no idea how she had managed to climb up onto the covers but not only had she managed it but she then proceeded to bounce cheerfully up and down on Gerselle's stomach babbling 'Dadadadadadada' to herself. Groaning, Gerselle had bowed to the inevitable and climbed out of bed for a very early breakfast.

It had been a trying morning, with a very excited kerblet but now they were standing by the side of the road at the edge of the village, watching a small figure walk towards them. As the figure drew closer, Gerselle smiled to see Jonton's familiar ambling walk. She put Joenie down and waved to him.

"There you go, beautiful. Why don't you go and say hello to Daddy?"

Joenie perked up. "Dadada? DADADADA!" She scampered off down the road. Jonton dropped to one knee and flung his arms open in welcome. As Joenie crashed pell-mell into him, he swept his arms around her in a great bear hug and kissed her.

"Hey hey, big girl! Where did you learn to run so fast?"

Joenie clung to him for a moment and then squirmed around and pointed back to Gerselle.

"Ummmy!"

"That's right - mummy. Shall we go and give her a hug?" Jonton settled Joenie onto one arm, dropped his backpack and sprinted up the road. Tears prickled his eyes as he saw Gerselle's face and put his arms around her and Joenie both, in a long wordless embrace. "It's been far too long," he murmured into her ear. Gerselle didn't reply but just drew him closer until Joenie squeaked in protest.

"Oh - sorry. Are we squashing you, little lady?" Jonton gently disentangled himself and put Joenie down on the ground. Gerselle squeezed his arm briefly before retrieving a large pack at her feet.

"So what now, love. Do I get to see the new village?"

"In a while. I thought it would be good to get a little time to ourselves first." She shook the pack. "How about some lunch in the new Grove?"

The three kerbals made their way up the hill. Gerselle smiled to herself as Joenie grabbed hold of Jonton's hand, forcing him to alternately shuffle and skip along behind her, almost bent over double. As the path got steeper, he stopped, scooped a delighted Joenie up and settled her on his shoulders.

"That's better." Jonton's back popped as he took a good look around him for the first time. "This looks a bit different than I remember." Wonderingly, he walked up to one of the Kerm saplings and stared at it in delight. "This is looking remarkably healthy - in fact the whole hill is looking remarkably healthy given what I remember of the soil."

Gerselle nodded. "The clover is doing well. This is our second crop now, after ploughing the first lot back into the ground." She laughed, "You always did tell me that the Kerm would speak to me through it's leaves."

Jonton looked puzzled. "It does," he said slowly, "but not until the knitting is complete. How did you know it wanted you to plant the clover?"

Gerselle's eyes widened. "Through the spots on the leaves of course. It's all written down in the Records." She walked up behind him and pointed over his shoulder. "They're fading a bit now - I guess the soil has improved slightly - but you can still see the blue dapples. Different colours and patterns mean different things but apparently blue means 'plant clover'. It took quite a while to work out since the oldest Records aren't very clear but it certainly seems to be working."

Jonton shook his head in disbelief. "Messages in dappled leaves. I had no idea! I guess my old Kerm is settled enough now that it doesn't need those sort of messages any more. Anyway - this looks like the perfect spot for lunch."

The three kerbals settled down onto the clover. Jonton kept half an eye on Joenie as Gerselle opened her pack and set out a simple meal of greenleaf rolls, cold sapwood cordial with milk, baked tubers and plump orange sunfruit. As he bit appreciatively into a tuber, he was mildly surprised to see Joenie grabbing pieces of roll and stuffing them into her mouth.

Gerselle caught his surprised look. "I've had to stop making them with luffa eye peppers," she said ruefully. "Those didn't go down too well but yes, she loves greenleaf." She paused as Joenie grabbed another morsel from her plate. "And baked tuber too apparently. At least they're probably a bit better for her digestion. Too much greenleaf tends to have unfortunate effects."

After lunch, the two adult kerbals sprawled out companiably on the clover, watching Joenie scamper over the hilltop.

"She really can move on those little legs," Jonton said in wonder. Gerselle smiled proudly, "You should see her with her friends. Always the first into everything, although Meleny's Adbas is usually a close second!"

An excited voice drifted over to them, "Urm 'ummy, Urm!"

Jonton raised his eyebrows, "Kerm?" he said.

"Worm, I expect," said Gerselle. "Worms, leaves and especially stones - it's all new and exciting."

As if to prove her mother right, Joenie hurtled towards them, clutching something in her hand. She dropped it proudly on the ground in front of Jonton. "'One, dada, 'one!"

Gravely, Jonton picked up the stone for inspection. Oh - that's a good stone, sweetheart. Look, can you see the fossil?"

"Ossil!"

"That's right. Fossil." He offered the chunk of rock back to his daughter. "Joenie want stone?"

Joenie shook her head firmly. "Dada ossil."

Jonton was oddly touched. "That's very kind - thank you, Joenie," he said solemnly. He dropped the fossil into one of the pockets of his poncho. "Daddy is going to keep the ossil... I mean fossil, in his pocket."

Gerselle got to her feet. "Come on, beautiful. We'd better take Daddy back to the village. Would you like to go on Mummy's shoulders or Daddy's?"

"Ummy!"

Jonton chuckled. "That sounded pretty definite," he said. "You take Joenie, love, I'll carry the bags."

Chapter 19

Beached

The launch bunker was warm, stuffy and smelled of the sharp ozone tang of overheated electronics and the earthier scent of overheated kerbal. Geneney stifled a yawn as he listened to the background hum of the bunker equipment and the clicking of buttons as the flight control team worked their consoles. He idly watched as one of the overhead display monitors switched from a view of the departing rocket to a view over the grandstands and was gratified to see that they were still full to bursting, with a great throng of kerbals sitting on the grass between the stands and the safety fence. Even after half a dozen launches from the Barkton Space Centre, it seemed that the local appetite for spaceflight was unabated.

"Starting pitch and roll program," Bill called out, jolting Geneney's attention back to the launch. He swiftly checked the repeater displays on his console. "Pitch and roll is in. Booster is looking good. Systems report please, Wernher."

Wernher scanned his readouts. "905s are running a little hot," he said, "but within expected parameters. LV-T20 is nominal."

"Understood, Wernher. Keep an eye on the 905s - we may need to throttle back the second stage a little as a precaution. Flight Dynamics - how will that affect our transfer window?"

Lucan looked up from his console. "Shouldn't make any difference, Flight," he said, "We've figured in three orbits for systems checkout and platform alignment. Even if we're a bit late getting to our parking orbit, we should still have plenty of time to get set up for the burn."

"Thank you, Lucan. How's the trajectory looking, Bill?"

"We're, Go Flight. Booster is through point of maximum pressure."

The telemetry screens flickered briefly and then fuzzed into static. Geneney frowned. "Looks like the main data cable has come loose. That shouldn't be able to happen at this stage in the ascent."

Lucan tapped at his console. "Something could have jolted it at max Q, Gene," he said, "Switching to auxiliary channel."

Bill cleared his throat. "I don't think that's going to help much," he said quietly, "Gene - take a look at the crowd."

Geneney glanced over at the monitor and stiffened in surprise. Hundreds of kerbals were on their feet, staring out to sea with a slack jawed expression. With a sinking feeling in the pit of his stomach, he patched in the audio loop from the commentary box.

"There is still no official word from Mission Control but that's an awfully bright light out there. If that *was* a problem with the first stage then hopefully it happened close enough to staging that Mission Control can salvage the flight."

Lucan's forlorn voice sounded loudly in the sudden silence. "No signal from the auxiliary channels either, Flight. I think we just lost the spacecraft."

Geneney buried his head in his hands. Across the room, Wernher worked furiously at his console before giving up and throwing himself back into his seat. Lucan and Bill just stared blankly at the static filling their displays. After a moment, Lucan broke the strained silence. "So what do we do now, Flight?" he said tentatively.

Geneney blearily lifted his head and peered across the room, blinking hard to bring everything back into focus. Before he could say anything, a voice spoke up from the doorway.

"Well I don't know about you, Lucan but I'm going to borrow Ornie's truck and head over to Jorfurt's to pick up a couple of casks." Everyone turned to stare at Jeb who was leaning casually against the bunker door. Geneney shot him an angry glare.

"Dammit, Jeb - this is hardly the time for a party!"

"Actually," said Jeb, "I think this is exactly the time for a party." He cocked an eyebrow at Geneney. "Or have you forgotten how we ended up solving most of the problems with the Kerbal 1?"

There was a squeaking of wheels on concrete as Wernher rolled his chair around the corner of his console. "Jeb does have a point," he said, "After all - we're not exactly in a hurry to retrieve the rocket. Whatever's left of it is probably in little tiny pieces scattered over a square kilometre or two of the Great Tranquil Sea. We might be able to work something out from the telemetry but speaking personally, that telemetry is going to make a lot more sense after a couple of mugs of Jorfurt's latest and a good long sleep."

Geneney stared at him and then dismissively shrugged his shoulders. "Whatever you say, Jeb. I doubt that anyone else will go for it though."

There was a rare hint of steel in Jeb's voice. "Not my problem, Genie," he replied, "I'm leaving it to you to persuade them. And if all else fails, I'll chase every last one of them out of the warehouse and lock the door." The steel disappeared as Jeb sagged against the doorframe, massaging his temples. "Besides," he said, "I know *I'm* bushed, so I hate to think

how everyone else is feeling right now. If we start putting another rocket together in this state, we're more likely to burn the place down than anything else."

Geneney threw up his hands. "You're probably right," he said grudgingly.

Jeb looked at him wearily. "Thanks, Genie. I'd better go speak to Leland and let him know what happened - and what we plan to do about it. He's bound to ask anyway." He glanced around the bunker. "I'll meet everyone back at the warehouse in an hour or so."

Jeb's shoulders were slumped as he walked towards the main warehouse and vehicle assembly building. The press interview had gone fairly well all things considered and he thought that he had been reasonably optimistic without sounding too forced. However, no amount of quietly confident replies to Leland's questions could disguise the fact that their first attempt at a Munar flight hadn't even made it into low Kerbin orbit.

Time to put on the public face, Jeb, he thought to himself, as he squared his shoulders, forced the scowl off his face and opened the warehouse door. Inside, the atmosphere was unsurprisingly gloomy, with despondent kerbals standing around in small groups. He spotted Geneney in one corner and dipped his head briefly. Geneney caught his eye and nodded back, before stepping out into the middle of the warehouse floor.

"There's no good way of saying this, people, so I'll get right to the point. Today was a setback."

Jeb shut the door quietly behind him and went over to sit down beside Bill and Bob.

"But it's a setback we can overcome. We know the Moho booster works, we know it will be enough for what we have in mind and I have absolutely no doubt that we can work out what went wrong, fix it and then put today behind us."

The babble of voices died away. Geneney bowed his head in acknowledgement and then straightened up with a determined expression on his face.

"I can tell you right now that this is not going to be a finger pointing exercise. We all build them, we all fly them and when they go wrong - well we all share that too. I've seen what comes out of our workshops - each and every kerbal here does good work and I know that nobody but *nobody* wanted that flight to fail."

"And I can also tell you right now that I am *proud* to be standing here today!"

Geneney noticed the confused looks from around the room and the corner of his mouth briefly twitched upwards as he continued.

"I am proud to be working with a team that has overcome impossible obstacles and a shoestring budget to do things that have *never* been done before. A team that can build an honest-to-Kerm rocket ship, by hand, from the raw metal upwards - and then put the son-of-a-gronnek into *orbit!*" Geneney jabbed himself in the chest for emphasis. "Forget what I said about doing good work - you people are doing awesome work!"

Geneney was startled to realise that his fists were clenched and his voice was cracking. He paused, striving for a lighter tone.

"For now though, I think we all deserve a break. I know I've been putting the hours in over the last couple of weeks but I've never yet managed to be the first in or the last out of this warehouse. I'm not going to name any names but I'm pretty sure that at least two of you have been spending your nights sleeping under a workbench for most of the last week! Jeb's still looking for his spare toothbrush by the way so if someone could put it back that would be good."

There was a patter of rather forced laughter. Most of the kerbals standing around Geneney began to look more enthusiastic, although some were muttering worriedly to their neighbours. Geneney raised a hand as the muttered comments began to swell into a general grumble.

"I know that taking a break isn't what some of you want to hear but trust me on this one. I can't tell you how often we ended up banging our heads against some problem with the Kerbal 1 and just getting nowhere. We usually found that the best way to solve that problem was to take a couple of days off, maybe work on some other part for a bit and then come back to it with a clear head."

"So I tell you what we're going to do. We're going to kick back, spend some time on the beach, maybe have a few drinks. I'd promise you a fireworks display but Jeb gets... excitable around fireworks so I think we'll give those a miss. Then we're going to come back in here tomorrow afternoon, we're going to work through this little problem and then we're going to put the next rocket right smack into orbit around the Mün!"

Jeb nodded in satisfaction as the sullen muttering faded into cheerful chatter. He sprang to his feet.

"Sounds good to me, Genie! Ornie - I'm going to need a lift down to Jorfurt's to pick up a couple of casks and other suitable refreshment. You're our resident barbecue expert, so grab a couple of volunteers and figure out what you need for the catering. Bob - you're in charge of music. Everyone else - we're gonna need plenty of firewood, something to sit on and a table or two to put the food on. And if anyone has any games they want to bring along, then feel free!"

The junkyard gates swung open and a motley array of vehicles trundled out. Ornie's truck led the way, indicators flashing as it turned right on its way to Barkton town centre. It was followed by a handful of cars, each crammed full of eager kerbals. Finally, with a rumbling of engines, two motorcycles rolled through the gates, ridden by Wilford and Camrie with Seelan and Lodan sitting bolt upright behind them. Lodan hopped off to close the gates, before leaping back on behind Wilford. With a roar, the two bikes raced away, heeling over sharply as they swung round the corner and rode away down towards the beach.

By the time Ornie's truck pulled up on the edge of the sand, a firepit had already been dug out and a large heap of driftwood piled up inside. A semicircle of stones were carefully laid out on one side of the pit to form the beginnings of a makeshift barbecue grill. Two tables stood ready by the firepit and assorted chairs, old tyres and large rocks were scattered in a loose circle around the heap of wood. Ornie noticed Bob's guitar resting jauntily against one of the chairs. Half a dozen kerbals stood around chatting, watching the others marking out a large circle in the damp sand further down the beach.

Jeb scrambled out of the front seat, slamming the door closed behind him. No sooner had he made his way round to the back of the truck than all six kerbals were running up to help unload it. Ornie retrieved his trolley from the back seat and was busy setting it up, when he heard a loud clunk.

"Hey!" shouted Jeb, "This isn't a keg of Wakira Special you two are thumping about! If you can't take better care of one of Jorfurt's brews you're not going to be drinking any of it later."

Ornie appeared round the side of the truck, carrying his trolley in one hand. Calzer and Tomcas had propped up two planks against the back and were cheerfully rolling a keg down them. He raised his eyebrows at the impromptu ramp and then very pointedly, pressed a button on the tailgate. With a wheeze of hydraulics, the tail lift slowly unfolded and lowered itself to the ground. Calzer and Tomcas looked appropriately sheepish as Jeb scowled at them. "You two can carry this down to the beach - and just be happy that Genie didn't catch you mistreating the beer."

As Jeb stood by the heap of driftwood, he could hear the swishing of knives and other assorted cooking implements as Roncott and Lowise busied themselves making vegetable skewers, spiced meatcakes and other delicacies for the barbecue. Wilford and Camrie were helping after a fashion but as far as he could tell, were actually spending more time regaling the others with tales of their flights into space. Calzer and Tomcas were setting up the trestles for the beer kegs and Jeb was inwardly amused to see the extreme care with which they lifted the first keg into place.

Across the beach, the rest of the team appeared to playing some kind of game. From what Jeb could see, it appeared to involve standing in front of a stick whilst someone threw a ball at you and then clouting the ball away as hard as you could using a wooden bat. Beyond that it was all vaguely confusing, although judging from the level of noise and general excitement, everyone seemed to be having fun.

"Ornie," he asked plaintively, "could you please tell me what on Kerbin they are doing down there?"

Ornie grinned. "Looks like Richlin is teaching them shepherdball," he said. "Or the simple version of it anyway."

"Shepherdball?"

"Sure. Very popular on the Wakira coast. Me and Richlin used to spend a fair amount of time on the air show circuit around there and learning to play shepherdball was practically mandatory. A good hard packed runway makes a surprisingly good batting surface at a pinch." Ornie gazed reflectively at the players in the distance. "I never was much good at it myself but Richlin was a fair old spin bowler back in the day."

"You do realise that I don't have the slightest idea what you're talking about don't you?" said Jeb. Across the beach, he heard a distant thwack and a roar went up as the ball sailed high over the heads of the hapless kerbals attempting to catch it.

Beside him, Ornie launched into an enthusiastic lecture on the basics of shepherdball. By the time he reached the finer points of the different bowling styles, Jeb had a rather glazed expression on his face. "Anyway, spin, seam, swing - it's all about getting the ball to move around in mid-air. Quite a nice exercise in applied aerodynamics actually - I reckon Bill would get the idea pretty quickly!"

Jeb looked bemused. "Well once Bill's got the idea, you can both try explaining it all to me again," he said. Then he brightened up. "Anyway, forget aerodynamics - it's time for a quick exercise in pyrodynamics! Time to get the fire going before those shepherders, shepherds - what the Kerm do you call a shepherdball player anyway - get back here."

Ornie laughed. "Plenty of time yet," he said. "By my count they're only about half way through the second innings."

The driftwood was bone dry and presently Jeb had built up the fire into a cheerful roaring blaze. By the time the first shepherdball players started making their way up the beach, Ornie had raked out a bed of embers into the barbecue pit and was squatting by the grill, sauce bottle close at hand and intently watching the first few sizzling meatcakes as they started to brown. As he trickled a generous portion of sticky brown sauce over them, noses began to twitch all around the fire as the sweetly spicy aroma rose into the evening air. On the other side of the fire, Jeb was standing behind the kegs, cheerfully serving drinks and taking the occasional healthy swig from his own mug.

For a long while there was nothing to hear but the crackling of the fire, the sizzling of the coals under the barbecue and the contented sounds of hungry kerbals steadily working their way through Roncott, Lowise and Ornie's cooking. As everyone began to put their plates to one side, Jeb topped up everyone's drink and then turned to Bob with a grin.

"You weren't planning to just sit and look at that guitar all evening were you, Bobcat?"

Bob popped the last fragment of chargrilled mushroom into his mouth and stifled a belch. "Now that you mention it, Jeb," he said solemnly, "I have been working on a song or two for just such an occasion."

He rubbed his fingers in the sand to scrub off the grease and then picked up the guitar leaning against his seat. He strummed it briskly, head tipped to one side as he listened for any out of tune strings and then satisfied, climbed unsteadily to his feet. "My friends," he said, "I give you - the Ballad of the Kerbal 1."

Bob slowly began to pick out a familiar melody and as the conversations around the fire gradually petered out, he began to sing along;

"At first I was afraid. I was petrified...

Thought we would never make it back, if we let Jebediah drive."

There was a roar of laughter as Jeb leapt to his feet and sketched a bow.

"And so I spent oh so many nights, thinking what could all go wrong.

But I got onboard - and I brought parachutes along..."

The tempo of the music began to speed up. Everyone around the fire began to clap along in time as Bob's fingers danced over the strings.

"And now we're back! From the edge of space.

I rode shotgun on the launch with my friend Bill in the far left place.

We saw the Müun. We saw the stars.

And we even made it home without too many scars!"

By now Bob had one foot up on his seat as he enthusiastically strummed away.

"Oh yeah we're back. From the edge of space!

We soared across the sky - and you should have seen Jeb's face.

We saw the Mün. We saw the stars.

Even if the capsule seat, got imprinted on my..."

At that point, Bob's chair collapsed and he tumbled over onto the sand, guitar waving in the air. Jeb darted forward to help his friend and did his best to keep a straight face as he saw Geneney surreptitiously moving his foot back out of the way.

As kerbal after kerbal called out with requests for their favourite songs, Ornie was surprised to see Jeb looking rather misty eyed. "Are you OK there, Jeb?" he asked quietly.

"I'm fine, Ornie. Bob's song just brought it all back is all. Blame it on the beer." Jeb stared into the dwindling flames of the bonfire. "But yeah - that's pretty much what it was like. We climbed into that capsule, knowing that it was our last shot and hoping to Kerm that we hadn't forgotten anything vital." Jeb gave him a wry look. "Almost everyone had written off those 'crazy interplanetary characters' by then and we really were down to the bottom of the parts bin."

Ornie had the grace to look embarrassed but Jeb waved away his half formed apologies. "No need to apologise," he said gruffly, "You were far from the last - and we'd been called far worse by then anyway. Besides, even after the Kerbal 1, I'm not sure what we'd have done without you and Richlin on the team. We wouldn't be planning our fourth orbital flight, that's for certain." Jeb smiled grimly, "Fourth orbital flight... that'll be sticking in the craw of

those fardling 'experts' at the Institute." He snorted. "Except that most of them will just be telling everyone how they knew it was a good idea all along."

Jeb looked down at his mug and shook his head. "Think I'm going to warn Jorfurt to stop serving this one at least an hour before closing time. Never known one of his brews to hit me like this." He winced as Bob tried for a top note and didn't quite make it. "Anyway, no need to eat that old soup again. What Genie said this afternoon back at the warehouse - I couldn't have put it better myself." Ornie glanced over at Jeb and saw the familiar determined look back on his face. "And I still haven't forgotten what I said to Genie about scouting for landing sites either. We're going to the Mün with the next flight, Ornie - but going there with probes is just the start!"

With thanks to Jake for introducing me to shepherdball and Sir Nahme for letting me borrow his signature file for the Ballad of the Kerbal 1.

Chapter 20

Beyond Kerbin

A single shaft of sunlight peeped through a gap in the shutters, illuminating the chin of a kerbal sprawled out fast asleep on his bed. As Kerbol rose into the clear morning sky, the shaft crept upwards until it brushed silently over one large green eyelid, suffusing it with a soft green glow and revealing a faint tracery of blood vessels beneath the skin. The eyelid twitched and then suddenly it snapped open.

Jeb blinked and sat bolt upright, automatically checking the time on his alarm clock. His eyes widened and he jumped out of bed, frantically scrabbling around for his clothes. Half past ten! Everyone would have been waiting in the yard for hours! Then, as he reached for his shirt, it occurred to him that it was oddly quiet outside. No mutter of voices, no banging on the warehouse door. Nothing at all in fact, to suggest that a crowd of impatient kerbals was milling around outside.

Then it all came back. The failed Mün flight, the beach party... and Genie's parting words reminding everyone not to come into work until the afternoon. Jeb winced as he also remembered his last mug of beer and conversation with Ornie. *Going to have to apologise for that, Jeb,* he thought to himself, as he swung the shutters open, letting the crisp autumn sunlight flood into the room. Across the road could see the first dusting of frost on the ground. A brittle skim of ice sparkled on the puddles in the road, dazzling him with reflections.

Jeb grinned as he took in a deep lungful of chilly air. Plenty of time for a long shower, a good hot breakfast and then maybe a quick stroll to clear the last of the beer fog from his wits before everyone else turned up for work.

Jeb scraped the mud off his boots and sauntered across the warehouse towards the canteen, whistling the tune from the *Ballad of the Kerbal 1* and chuckling as he remembered

Bob's lyrics from the night before. There was a clattering of mugs and then the rattling of a stuck drawer, followed by a crash and a muttered oath as the drawer popped open, spilling its contents over the floor. Presently though, there was a cheerful burbling noise and the scent of fresh coffee filled the air. Jeb emerged from the canteen clutching a large steaming mug and made his way over to his office.

Swiftly he sorted through the pile of rolled up strip charts covering his desk, setting the recordings from the LV-T20 to one side and unrolling the charts for the four LV905s. A quick look was enough to convince him that the 905s were not responsible for the loss of the *Muna 1* but they *had* been running slightly hot before the explosion, which was a problem all by itself. Jeb sipped his coffee as he pored over the charts, rapidly becoming engrossed in the thin squiggles of ink from the telemetry recorders.

The last of his coffee had long since gone cold when Jeb straightened up from the strip charts and pushed his notebook to one side. He dug his fists into the small of his back and stretched, grimacing as his spine popped in protest. He rolled his shoulders, mentally reviewing his analysis of the telemetry data and then nodded in satisfaction. He would need to talk things over with the propulsion team but he was reasonably confident that the overheating could be traced back to a problem with the pressurisation valve calibration. The overheating was obviously down to excess propellant flow into the engines and the excess was sufficiently similar for all four engines that a mechanical error seemed unlikely. Jeb made a note to get one of the spare 905s up onto the test stand after lunch and then glanced up at the clock. *Perfect*, he thought happily. *Time to open up for the day and then grab a quick bite to eat before everyone else arrives.*

As Jeb walked over to the warehouse doors, he thought he *could* hear voices outside. He smiled to himself. *Not even friendly threats from Genie could deter everyone from turning up to work early*, he thought. The bolts on the side door were sticking slightly and squealed in protest as he worked them back and forth. Finally, he forced them back with a sudden metallic clack and swung the door open.

Jeb's jaw dropped, as the entire Kerbin Interplanetary Society poured around him into the warehouse.

"Thought this place was never going to open," somebody called out cheerfully.

"Yeah," came the good-natured reply, "Some of us have got a rocket to build today!"

"At least the boss has been up long enough to get the coffee on!" called out a third voice, as everyone hurried over to their benches.

Jeb closed the door behind him and then fell into step beside Geneney and Ornie.

Geneney sniffed the air appreciatively and then looked at Jeb apologetically. "Looks like you were right about taking some time out," he said. "It's been a while since I've seen the gang this eager to get to work."

Ornie nodded. "Something we should do more often," he agreed, "and it wouldn't hurt to do a little more to celebrate our *successful* launches too."

Jeb grinned at him. "The *launch* was perfectly successful," he said, "It was just the flying into space part that didn't go quite to plan. Speaking of which, I think I've figured out the overheating we saw with the 905s. I'd appreciate a second opinion on the numbers though, if you've got a minute?"

"Sure," said Ornie, "Gene - could I have a word later? I need to see what our inventory is like for the 905 gimbals."

"Whenever you're ready, Ornie, although I think we've got everything you need in stock for the rest of the 905s. I'll be over with the payload team when you need me."

As Jeb walked back to his office with Ornie, he flicked a quick sideways glance at his friend. "I think I owe you an apology too, Ornie," he said quietly.

Ornie's forehead crinkled. "What on Kerbin for, Jeb?" he asked.

Jeb didn't reply for a moment. "For last night," he said eventually, "I have to confess that the details are a touch hazy but I definitely remember the conversation turning more than a little bitter towards the end."

Ornie's face cleared. "Oh that," he said, "Don't worry about it, Jeb. Sounded like you'd needed to get that off your chest for quite a while."

Jeb nodded gratefully. "I think I did, Ornie - thanks." He pushed open his office door. "Anyway - about those 905s. I'm thinking that we've got a little problem with our test stand is all..." The two kerbals bent their heads over the strip charts littered over Jeb's desk, Ornie tapping his fingers thoughtfully as Jeb flipped open his notebook and started pointing out various underlined numbers.

Later that afternoon, Jeb finally made his way back to the canteen for a long overdue lunch. As he rummaged around in the fridge, he could hear the the propulsion team arguing over the LV-T20 telemetry. The canteen television was deliberately placed to be visible from behind the kitchen counter and Jeb was able to keep half an eye on the KBS news bulletin as he chopped up left over potatoes and meatcakes and tossed them into a pan.

"Meatcake hash and ketchup!" he announced, taking a seat beside Bob. "The recommended lunch of rocket scientists everywhere." The rest of the table were too caught up in conversation to notice.

"There's no way it was the bearings!" said Malmy. "No matter which way you look at the turbopump strips, there's just no sign of any wobble at all. I'm telling you - something fell into the fuel manifold and chewed up the blades."

Wernher scowled. "Which doesn't explain why everything was working perfectly right up until the loss of vehicle. Besides - there's nothing to 'fall into the fuel manifold'. I suppose one of the slosh baffles might have fallen off but they're far too big to do any harm."

Malmy shrugged, "Maybe it got caught on one of the baffles and didn't come loose until the booster pitched over past a certain point. I don't know. All I know is what I'm seeing from the flight recorders and they're just not consistent with impeller flutter."

Ornie raised his hands in a placating gesture. "Easy, guys. Wernher - assume for the sake of argument that it was debris in the fuel line that broke the turbopump. What can we do about that? Can we fit a filter over the manifold inlet or something?"

Wernher took a bite of his sandwich. "We already do put a filter there. I could redesign it but it's not as easy as you might think. A coarse filter is next to useless but I don't really want to fit anything too fine in case it causes too much of a pressure drop across the inlet. At best that gives us poorer performance...", he swallowed a mouthful of cheese, "and at worst it gives us turbulence and possibly cavitation."

All four kerbals winced. "Good safety tip, Wernher," remarked Hando, "lets try not to do that if possible."

Ornie nodded. "I'm not sure we have time to redesign the filters for the next launch anyway," he said reluctantly. "We'll need to take a long hard look at the tank design for the Moho 4 but for the Muna 2, I think we'll have to go with what we've got and just make sure to triple check everything."

At that moment, the picture on the television screen changed from that of a group of kerbals sitting around a table to a view over a launch site. A news ticker down the left hand side of the screen announced that this was the maiden launch of the Rockomax BA-CA solid rocket booster. Malmy scrambled to his feet and turned up the volume.

"... latest generation of solid rocket booster, augmented by additional laterally mounted B1 boosters. For those just joining us now, the second stage is a single B1 solid rocket and the final stage uses clustered 48-7D liquid fueled engines for a precision insertion into kerbostationary orbit."

Hando turned back to his lunch. "Kerbostationary orbit huh? Impressive but there's a long way between Kerbin orbit and the Mün."

Ornie wasn't so sure. He casually looked around the canteen and, as he expected, Jeb, Lucan and Edsen were all staring intently at the Rockomax spacecraft. Jeb caught his eye and surreptitiously beckoned him over.

"Are you thinking what I'm thinking, Ornie?"

"I think I probably am, Jeb. And if I'm not, our flight dynamics team almost certainly are."

Danfen and Hanbal stood behind the flight director's chair, eyes flicking between the status indicators on her control board and the orbital tracking screen on the far wall. Nelton briefly considered exercising flight director's privilege and ejecting them both from Mission Control, or at least putting them somewhere where they couldn't breath down her ear. Then she shrugged. She could hardly blame them for wanting to be here, she thought and besides - they might just be useful. Provided that they kept their mouths shut until asked and kept out from under the feet of the rest of the team.

"Approaching max Q. B1 thrust profile nominal."

Nelton put the two engineers out of her mind. "Thank you, Booster," she said, "Flight Dynamics - status please."

"Airframe stresses acceptable, Flight. Ascent trajectory is good. Launch vehicle has passed max Q."

Behind her she could sense Danfen relaxing slightly. Hanbal's head was still restlessly swivelling from side to side as he tried to follow all the readouts for the B1s. Nelton rolled her chair to one side to give him a better view over her shoulder.

"Thirty seconds to burnout. Decouplers one through four armed."

"Copy that, Booster. All systems Go for staging."

The pattern of indicator lights on Nelton's control board abruptly shifted and one panel flickered and went out. She leaned forward in her seat.

"Lateral booster detach confirmed. Backer status please, Booster?"

"BA-CA thrust on profile, Flight."

"Thank you, Booster. Guidance?"

"We're go, Flight."

"Flight Dynamics?"

"Altitude 24 kilometres and climbing, Flight. Vehicle attitude is nominal."

Hanbal let his breath out explosively. "It worked," he murmured under his breath, "it actually worked." Danfen nudged his arm. "Keep the analysis out of earshot would you," he whispered. Hanbal ducked his head and then turned his attention back to the tracking screen. The stylised rocket depicting Satellite 4 had barely moved, although the altitude and velocity readouts were clicking upwards on schedule. He watched as the projected altitude climbed past 75 kilometres and continued to rise. "Any moment now," he thought.

"Approaching MECO, Flight. Decoupler five armed and ready."

"Backer shutdown in three...two...one. Decoupler firing." There was a long pause. "Second stage ignition confirmed!"

"Thank you, Flight Dynamics. Payload?"

Melvey hands shook as he worked his console. "Fairing jettisoned on schedule, Flight. Instrumentation looks good. Bringing propulsion and guidance systems online."

Nelton nodded. "Thank you, Payload." A green light lit up on her console. "Flight Dynamics, I have a projected periapsis - please confirm."

"Copy that, Flight. Twenty seconds to shutdown. Projected orbit two-forty by one-sixty by plus twelve. Altitude raising burn in thirty-one minutes."

Danfen squeezed Hanbal's shoulder. "Time for us to take a break and pass on the good news," he murmured. The two engineers nodded politely to Nelton and made their way quietly out of the room.

As soon as the door to Mission Control closed behind them, Hanbal punched the air in triumph. "It worked - it really worked! Tapered propellant loading on the B1s, lateral decouplers - it all went off without a hitch!"

Danfen beamed at him. "It really did! Gotta hand it to you - I never actually thought you could throttle down the B1s that far in *flight* and bring them back up to stable thrust. That was fine work!"

Hanbal grinned "Truthfully?" he asked.

"I know, I know," laughed Danfen, "neither did you."

"Well it all worked on the test stand so I *shouldn't* have been surprised."

Danfen chuckled at the old joke. "True, true. Anyway, we've got a little over an hour before the big test. Just got time to go thank the troops before we point our baby at the Mün!

The glowing green trace on the tracking screen showed Satellite 4 in an almost perfectly circular orbit around Kerbin, although Nelton knew that was more due to the scale of the display than anything else. A small red circle blinked slowly against the orbital track with a timer display beside it slowly unwinding down to zero.

Nelton rubbed her suddenly sweaty palms on the arms of her chair. She leaned forward and tapped her microphone for attention.

"All controllers report in for trans-Munar injection. Payload?"

Melvey swallowed the lump in his throat. "Go, Flight."

"Guidance?"

"We're Go, Flight."

"Electrics?"

"Looking good, Flight."

"Flight Dynamics?"

"Go for TMI, Flight."

Above their heads, the Satellite 4 marker inched its way round the screen. As it passed over the edge of the blinking circle, the red colour shifted to orange and a flashing '22' symbol appeared on Melvey's console. He scanned the propulsion and guidance readouts on his console one last time, crossed his fingers and punched the 'Proceed' button.

"Ullage motors are go. 48-7D ignition confirmed." Melvey watched as the readings on his console settled down. "All engines burning," he reported, "vernier firing pattern looks good."

"Thank you, Payload. Status report please, Guidance?"

"I'm with Payload, Flight. Verniers looking good, spacecraft attitude holding steady and tracking."

Everyone in the control room tilted their heads up to watch the flight tracking screen. A dotted elliptical tongue began to protrude out from the solid green line marking the known Satellite 4 orbit. Slowly at first and then faster and faster, the tongue stretched away from Kerbin towards the white circle depicting the Mün. Melvey watched his readouts, finger hovering over the manual shutdown.

It wasn't needed. The dotted line flickered as the flight computer updated its trajectory prediction and then snapped into an extremely lopsided figure-eight configuration with the Mün sitting squarely in the smaller of the two loops.

"48-7D shutdown confirmed, Flight," said Melvey quietly. "Deploying cameras and orienting vehicle for Kerbin observation programme."

"Understood, Payload," said Nelton. "Flight Dynamics - do we have a trajectory confirmation."

"One moment, Flight." Lemgan spoke quickly into his microphone, cocking his head as the answer came back through his headset. "Our tracking team report that they have the vehicle. Jerdo's team are having some problems with their antenna which is slowing things down a little. We estimate 5-6 hours for initial fix, another two to three hours after that for confirmation."

Nelton grimaced. "Six hundred miles is *not* enough of a baseline. If we're going to be doing this on a regular basis, Ademone needs to see about getting us another tracking station. Will nine hours give us enough time to work through the midorbit correction?"

"Not a problem, Flight. First correction burn was scheduled for ground elapsed time +eighteen hours but we have a reasonable window with our remaining propellant levels. Suggest we delay the burn to GET +twenty-two to give Tracking and Guidance a little more time."

"Noted and accepted, Flight Dynamics. Thank you."

"OK, thanks, Sigbin. Can you send through the next lot of frequency shifts in thirty minutes or so? Yeah I know - chasing down Rockomax isn't the trial run I was expecting either. Huh - I guess. Might as well get the bugs ironed out before we give it another go ourselves. OK, speak to you in thirty. Thanks, Sigbin."

Lucan put the phone down and ground the heels of his hands into his eyes. Beside him, Edsen threw his pen down on the table and turned to face Ornie, Jeb and Geneney

"Kerbostationary orbit, my cheeks!"

Jeb sighed. "You're sure then?"

"Positive." Edsen shook his head. "Tracking data isn't good enough to give us a trajectory yet but that spacecraft is going way beyond a stationary orbit. Look."

Edsen reached for a sheet of paper and quickly sketched out a diagram. "We've still got a large error space here but I figure their trajectory is somewhere in between this... and this."

Jeb scratched his cheek as he looked at the roughed out orbits. "What's the centreline estimate?" he asked.

Edsen drew a third line on the diagram. "Munar flyby, 1000 km periapsis. Give or take."

"Would that work? For the Prize I mean."

Geneney was picking at a piece of loose insulation poking out of the top of Lucan's console. "I'd want to check with Bill first but my best guess is no. Not reliably. The picture quality would be pretty bad from that altitude - hard to prove anything." He studied Edsen's diagram. "And if this is anywhere near to scale, they'd have problems transmitting the data back too."

"Well then," said Jeb, "It sounds like they're planning a midcourse correction of some kind. I think we just wait for the next lot of data from Sigbin and Doodlie, try and sharpen up that tracking and see if we can work out what they're up to from there."

Ornie looked at him, "So what do we tell everyone in the meantime, Jeb?" he said. Jeb frowned. "We tell them what we know," he said at last, "Better that they get the bad news from us than KBS."

Melvey was hunched over his console, paging back and forth through the first images from Satellite 4, when he heard the door open and the rest of the team file back into the control room. Nelton took her seat and checked the flight tracking screen. The dotted figure 8 had gone, replaced by a sinuous line that snaked out from Kerbin and curved gently around the Mün before disappearing off the edge of the screen. She tapped her microphone.

"A good try for a first attempt," she said, "but not quite what we need. Lemgan - do we have a burn solution for the midcourse correction?"

"We do, Flight. Guidance and trajectory teams concur." Lemgan pressed a button on his console. "An eight metre per second burn here..." he pressed another button, "along this vector, should put us back on the nominal flight plan." On the screen, another red circle appeared, with an arrow pointing away along the burn vector. A dotted line curved away from the circle and into the predicted figure-eight path around the Mün.

"Very good. Payload - what is the spacecraft status please?"

Melvey twisted his chair round to face her. "All instruments deployed, Flight," he said, "and I have the first images from the Kerbin observation sequence. I think you'll find them interesting." He flicked a switch and one of the large monitors next to the flight tracking screen lit up. There was a clatter as one of the other flight controllers dropped his pen. Not a single one of the other controllers so much as twitched at the noise. Even Nelton sank back into her chair and gazed at the glowing blue and green sphere neatly filling the screen.

"It's *round*!" she whispered.

"The colour filters are working well," said Melvey. "but that's not the most interesting part." He brought up another image.

"This one was taken just a couple of hours ago. We're a lot further from Kerbin now of course but as you'll note, the image is also a lot noisier."

Lemgan peered at the screen. "Is there a problem with the camera?" he asked, "a loose feed causing static or something?"

Melvey shook his head. "The camera systems are fine. It's the environment the camera is flying through that's the problem."

"Radiation," said Nelton.

Melvey blinked. "Yes. We expected some background radiation of course, mainly charged particles ejected from Kerbol. We also did our best to shield the cameras but there's a limit to the amount of shielding we could use, given the payload mass requirements. As it turns out, this may have been a happy accident." He tapped a key on his console and the images on the monitor began to cycle past in a crude and rather jerky film clip.

It took Lemgan a while to work out what he was seeing. "Hang on," he said slowly, "the noise is fluctuating." He jabbed a finger towards the screen. "There! Stop the film there." He swivelled his chair to face Nelton. "Look. Just as noisy as that last still shot but a lot closer to Kerbin too. Melvey - could you move the film on a few frames?"

Melvey smiled faintly and tapped at his console.

"There!" said Lemgan. "Further out from Kerbin but the noise has dropped away again!"

"Like rings," said Nelton wonderingly, "rings of invisible particles wrapped around Kerbin."

Melvey coughed. "I imagined them more like belts, myself," he said, "but obviously we don't have enough data to tell."

Nelton smiled. "Then that's what we'll call them in our research paper," she said, "The Melvey Radiation Belts!"

Chapter 21

Far Side

"Looks like they're aiming for a free return trajectory." Edsen shook his head. "Makes perfect sense I guess. Why bother with a tricky Munar orbit insertion when you can just swing past, grab your far side pictures and be done with it."

Lucan squinted at the screen. "Depends how well you can point your camera I guess," he said, "They're not quite there for a free return but it shouldn't take much of a burn to get them on track. I'll ask Sigbin and Doodlie to keep sending that frequency data - as Sigbin says, we may as well use this as practice for the real thing."

"You really think we'll get another shot, Lucan?"

"Damn right we will. Jeb's been busting to send something to the Mün ever since the Kerbal 1. We might not win any money for doing it but sure as luffas sit by the sea we'll get another shot." Lucan paused. "And once we're finished with Project Moho, the Mün is probably all we'll be doing for a while, assuming we can find the money. I wouldn't take any bets on going there in a capsule but we'll get all the photos that we can handle."

"Thanks, Lucan. That's... comforting."

"Oh - and if we really need to pull off another 'first', there's always Minmus."

"Hey come off it," said Edsen, "I appreciate the positive attitude but there's positive and then there's crazy."

"Run the numbers sometime," said Lucan, "you'd be surprised. It doesn't take that much more delta-v than getting to the Mün - the big problem is getting to the right place at the right time. Anyway - one of us had better head back to the warehouse and let the gang know what's happening."

Edsen sighed. "We can talk to an orbiting Moho capsule from here but I can't pick up the phone and call the junkyard? We really need to do something about that." He picked up his notebook. "I'll go - too many hours in this place drives me nuts. Bring you anything back?"

"A bag of *djan* chips would be good. Spicy if you can find them but nothing sweet. A can of smoky sapwood would go down well too."

Edsen made a face. "How can you stand that stuff? It tastes like wet ashes to me."

Lucan laughed. "It *is* a bit of an acquired taste. Used to be a speciality of our Grove, so I guess I just grew up with it. Now scoot before I decide to go instead."

Edsen shot him a look of mock horror, grabbed his coat and ran for it. It was dark and blustery outside the bunker and he was glad he'd parked so close to the door. By the time he drove up to the warehouse, it was raining hard, the wind driven droplets racing towards him out of the dark and lashing against the windscreen.

There were only one or two lights on at the windows but then, Edsen reflected, it was getting pretty late. As he let himself in, he was relieved to see the light still on in Jeb's office, even if it didn't do much more than highlight the looming shadows in the darker corners of the assembly area. His footsteps echoed as he strode across the warehouse floor and Edsen had to remind himself rather forcefully that the half-seen shapes hanging from the ceiling were just the old familiar sections of fuel tank and not anything more sinister.

He knocked on the office door and poked his head round the doorframe. Geneney and Jeb looked startled as he came in but then Jeb leapt to his feet to greet him.

"Edsen! What news from the bunker?"

Edsen blinked in the sudden warmth and sneezed violently. As he shrugged out of his soaking raincoat, Geneney pressed a large mug of hot *djeng* into his hands, which Edsen sipped at gratefully.

"Thanks, Gene. It's not pleasant out there."

"Come and take a seat. Is Lucan still out at the bunker?"

Edsen nodded. "Still working away. I'll take him some food when I head back over. I don't suppose you have any smoky sapwood do you, Jeb?"

Jeb raised his eyebrows. "Now why on Kerbin would I keep that muck around my office. Tastes like wet firework ashes - and trust me, I should know."

"I'm sure there's a fascinating story right there," said Geneney dryly. "There's a couple of cans left in the canteen, Edsen. I think Lucan is about the only one that drinks it."

Edsen took a gulp of his *djeng*, greedily inhaling its fragrant steam. He patted his lips dry and carefully put the mug down on the edge of Jeb's desk. Geneney and Jeb looked at him expectantly.

"We've got a trajectory plotted for the Rockomax probe. We think they're trying for a free return trajectory but if they are, they'll need to make a midcourse correction burn sometime tomorrow morning."

Jeb's eyelids drooped as he worked through the implications. "That makes sense," he said, "one less burn to worry about, although they'd better be sure where they're pointing their cameras if they're only getting one chance to get what they need."

"Or they could do what we did and put the probe into a slow spin," said Geneney, "It wouldn't give them as much useful data but it would be something."

"True. It won't help them much if their attitude is really cockeyed but if they pull off that course correction that'll be a solved problem anyway. Thanks Edsen - that's good to know." Jeb reached for his own mug. "Looks like the Probodyne Prize has gone then but at least the Muna 2 will be the first probe to *orbit* the Mün rather than just trundling round it and back to Kerbin."

"It's not going to be much of a consolation prize for the team though," said Geneney.

Jeb stared down at the floor. "Yeah, I know, Genie - I know. The money would have come in handy too, no doubt about it."

Edsen couldn't help himself. "It would have paid for a phone line between here and the bunker if nothing else."

Jeb's head jerked upright. "There *is* a phone line, or at least there used to be. That explains why you came all the way out here in person then - I did wonder." He frowned. "I'll take a look at that tomorrow. What sort of launch control bunker can talk to an orbiting spacecraft but can't make a simple phone call."

Edsen yawned. "Thanks, Jeb. I'd better be heading back there now - Lucan will be getting hungry."

Geneney stood up. "I'll go, Edsen - you look dead on your feet. It'll be pointless trying to persuade Lucan to go home but I should at least remind him that there's a folding bed and a heater in the corner of the bunker. That probe isn't going anywhere else tonight."

"The couch in here makes a pretty good bed too," said Jeb cheerfully, "and somebody even replaced the spare toothbrush."

Edsen's head was drooping on his shoulders. "...know..." he said, "...put it back myself."

Lemgan peered through the glass door into the Mission Control room. Most of the flight controllers were already at their stations, a semicircle of green heads poking out above the high backed chairs, headsets clamped firmly over their ears. The viewing area around the edges of the room was packed with kerbals, all leaning against the balcony rail and staring up at the orbital tracking screen. Just inside the doorway, a prominently placed signboard read 'Quiet Please - Mission in Progress'.

Outside in the corridor, a shuffling crowd of Rockomax workers were pressed up against the long curved windows, all trying to get the best view they could of the screens. Lemgan squared his shoulders and pushed the door open. Everyone in the viewing area turned to watch as he walked down the steps towards the consoles, took his seat and plugged in his own headset.

After satisfying himself that the Satellite 4 position and trajectory were still within expected values, Lemgan set to work, occasionally calling up one of his colleagues on a private loop to consult them on a particular detail of the guidance or propulsion systems. Just as he flipped over the next page of his checklist there was a crackle from the comms system as Nelton's voice cut in on all loops.

"Good morning everyone. All controllers report in please."

Lemgan listened to the systems reports as they came in one by one. Above his head, the timer on the orbital tracking screen rolled over from 1:00:00 to 0:59:59.

"Flight Dynamics?"

"We're Go at fifty-eight minutes Flight. Spacecraft is in stellar inertial. Orienting for burn at MC minus forty."

Ademone gripped the balcony rail tightly as the clock ticked down. The monitor still showed Kerbin floating in space, although the cloud cover made it difficult to pick out surface details. Sheer distance from Satellite 4 had reduced the atmosphere to nothing more than a thin glowing line, wrapped around the edges of a diminishing disc.

Nelton glanced down at her console and gave a guilty start at the comm system settings. As she clicked one of the dials round a notch, there was a soft hissing noise out in the corridor as the public address loop came to life.

Lemgan took a deep breath and switched his console to conference mode.

"MC minus six. How do you read, Melvey?"

"All s..systems go Lemgan. RCS tank pressure is high but acceptable, steady current to all propellant line heaters."

"Looks good, Melvey. Orbald?"

"RCS controller is Go. Attitude deltas uploaded to guidance system."

"Good work, Orbald. Guess we're as ready as we'll ever be."

Lemgan put his console back to public mode. "Flight, this is Flight Dynamics. We're Go for reorientation."

"Understood, Flight Dynamics. Thank you."

"RCS firing in 3...2...1..."

Kerbin began a stately drift across the monitor and slowly disappeared off screen. For a long moment, there was nothing to see as Satellite 4 revolved silently against the backdrop of space. Then, along one edge of the screen, a thin grey crescent appeared and slowly spun into view. Without an atmosphere to wrap it in a diffuse halo of light, the Mün stood out starkly against the blackness.

"That's about what we're seeing too Sigbin. Looks like they had a pretty clean burn. Has Doodlie had any luck decoding their transmissions? No? Pity - it would be nice to get a look at whatever pictures they're sending back. KBS - oh Kerm yes. They'll be all over this. Yeah, don't blame you. We're going to sign off here as well. Thanks Sigbin."

Edsen slumped into his chair. "Well that's that then." He looked at Lucan's crumpled clothing and stubbled chin. "At least we were right about the free-return."

Lucan stared at him and then flopped down on his bed. "Yep."

"I'm going to shut everything down."

"Fine."

One by one, the displays on Edsen's console flickered and went out. He walked over and switched off Lucan's console at the wall.

"C'mon Lucan."

The clean salty sea air smelt remarkably good after the enclosed fug of the launch bunker as Edsen switched off the lights and locked the door behind him. The two kerbals climbed into Edsen's car and drove away.

Conversation on the assembly floor was muted and for the most part, limited to strictly technical matters. Even the noise of the engine tests out in the yard didn't seem as loud as usual although, Adelan thought, that was more to do with the thicker blast shields around the test stand than anything else.

The lathe beeped, as the turret returned to its index position and the motor switched itself off. Adelan picked up a micrometer and began to check over the newly machined pusher rod. Satisfied that the part was within tolerance, she put it down on the bench with the others and loaded a new billet onto the lathe.

Richlin and Ordun walked past pushing a half assembled LV-T20 on it's trolley. "You got those valve heads ready, Adelan?" Ordun called out.

"Couple more rods to turn yet," said Adelan, "but valve heads are next on the list."

"Cheers, Adelan. Good to see someone looking halfway happy with their work too. I've never seen such a miserable bunch as the tankage team this morning."

Richlin swung the trolley round. "Having your Mün rocket go boom will do that," he said equably, "specially when somebody else's Mün rocket is about to make it there in one piece."

"Pfff. I'm with Gene. We gave it our best shot - and we got a damn fine party out of it if nothing else. If we'd just come back here, started plugging away at the next rocket - and *then* got the news about Rockomax today... well I might have been a bit grumpy then. And Kerm's sake, Richlin - it was only a box of electronics that went boom. It could have been Adelan sitting on top of that booster."

Adelan rolled her eyes. "Thanks, Ordun."

Ordun grinned. "Don't mention it. Besides that's why we have abort systems right?" He pulled out a radio from his pocket. "I don't know about you two but I *want* to find out what's happening out at the Mün."

"...rollers are preparing to put Satellite 4 into a controlled spin before it passes around the far side of the Mün. According to Flight Dynamics officer Lemgan, this will ensure that Satellite 4 can photograph as much of the Mün as possible on its single pass."

"This is Leland Kerman at Rockomax Mission Control. The atmosphere here is tense but controlled as Satellite 4 plunges towards the Mün. Payload officer Melvey reports that everything is Go for the spin up maneuver."

"And 3..2..1... ignition. Well not ignition precisely as this maneuver will only be using the spacecraft reaction control system. The propellant for the main engines was of course used up nearly three days ago for trans-Munar injection. One of the main screens at Mission Control is showing the view from the onboard cameras and I'm watching the Mün start to spin."

"That's odd. Two of the flight controllers are crossing the room to speak to Flight Director Nelton..."

"Oh and this doesn't look good. The Mün is spinning faster now and it's starting to slide off the screen. I think we may have a problem here..."

"JEB!"

Jeb came skidding up to Adelan's workbench. "What...!"

Ordun raised a finger to his lips and then pointed at the radio.

"This is Leland Kerman at Rockomax Mission Control. The spacecraft is off course in an uncontrolled tumble. We're waiting for an update from the flight control team but at this time it appears that one of the reaction control thrusters is stuck on..."

"Above my head, I can see the main orbital tracking screen. The picture has just changed from showing the Mün and Kerbin to showing the Mün only. I think those two dotted lines are possible new trajectories. One of them gets very close to the surface indeed. It looks like

the spacecraft will stay in orbit but it may not stay in a high enough orbit to make it safely round..."

"And we've just lost contact with the probe. Loss of signal happened a few seconds later than expected and the guidance team are now using that information to measure the spacecraft trajectory more accurately..."

"The dotted lines have gone.... and they've been replaced by a single unbroken line. Wait, wait one moment. Flight Dynamics reports that the periapsis, that is the lowest point of approach to the Mün, will be no more than 4 kilometres. If all goes well, Mission Control will re-acquire contact with Satellite 4 in approximately 19 minutes..."

The assembly floor was silent as every kerbal in the building gathered round Ordun's radio.

"Reacquisition in 2 minutes... This is Leland Kerman at Rockomax, reporting on Satellite 4's flight around the Mün. Earliest reacquisition expected in forty five seconds. Thirty seconds... twenty... acquisition in ten seconds..."

"We are now at reacquisition plus two minutes and there is nothing but static on the monitors. The flight controllers have confirmed that there is a sizeable error margin on the reacquisition time but at two minutes and thirty seconds we are running out of margin..."

"Reacquisition plus five minutes. Flight Director Nelton is crossing the floor to speak to Ademone Kerman, owner and company manager of Rockomax."

Reacquisition plus seven minutes. Flight Director Nelton has just confirmed that the spacecraft is lost. I repeat, Satellite 4 is lost over the far side of the Mün.

Chapter 22

The Dish

Lodan watched as the the little airplane swooped down onto the runway. The rear undercarriage skimmed delicately over the tarmac, settling onto the ground with only the faintest puff of smoke. The nose wheel dipped in a smooth, precise motion, touching down squarely on the centre line with plenty of room to spare for a leisurely rollout. The noise of the jet engine had barely died away before a fuel cart raced into view and pulled up smartly behind one wing. Two kerbals leapt off and set to work chocking the aircraft wheels. The fueling point cover flipped open and the cart driver set to work, plugging in an earthing wire and unreeling the fuel hose.

The rear door of the aircraft swung open with a hiss and a complicated set of steps unfolded onto the runway. A darkly clad kerbal strode down the aircraft steps and took up a position to one side, before a second, dressed in a grey suit, appeared in the doorway and gingerly descended. Lodan gulped as he recognised the shock of black wavy hair and jutting chin. He straightened his tie and briskly strode towards the waiting party.

"President Obrick - this is an unexpected honor, sir."

Obrick looked at the kerbal bowing in front of him, taking in the unassuming suit and slightly balding head. *Not much to this one*, he thought, *looks like a typical payroll watcher*. He glanced down. *Hmmm. Not afraid to get his shoes... boots dirty though and too busy for spit and polish*. Then Lodan straightened up and Obrick saw a rather lined face and a pair of sharp grey eyes, gazing steadily back at him.

Much better. Not too overawed and not letting his mouth run away with him either.

The steps clattered as another kerbal hurried down them, clutching a briefcase in each hand. Obrick dipped his head politely.

"Pleased to meet you Director Lodan. This is Sambus, my aide."

Sambus shook his hand. "Great to be here, Director," he said, "but please - just call me Sam."

"Pleased to meet you Sam," said Lodan. His nose twitched at the sudden pungent smell of aviation fuel. "Our ground crew will have your aircraft turned around within the half hour Mr President. Shall we visit the main building?"

Obrick nodded and Lodan led the way across the tarmac towards a small electric cart. Two small pennants fluttered in the breeze: on one, the familiar flag of all Kerbin and on the other, a stylised design of Kerbol rising over the horizon with six smaller stars scattered across the sky. A shiver ran down Sam's back as he saw the letters KSA stenciled on the gleaming white door.

Lodan opened the door and gestured for Obrick and Sam to get in. He surreptitiously checked Obrick's seatbelt, handed the two briefcases to Sam and climbed into the front seat. The cart rocked on its suspension as Obrick's bodyguard swung himself up onto the bench beside him. Lodan stared straight ahead through the windscreen as he buckled himself in and took a grip on the steering wheel. The purr of the motor shifted up a tone, as he wheeled the cart around and drove off.

Sam stared out of his window, as the cart rolled steadily along. In the distance, a skeletal web of girders stood boldly against the skyline. A spindly crane stooped low over the framework with a spiderweb array of struts suspended precariously from one end. As the cart drove around a bend, Sam's view shifted with it, flattening the spider web into a great latticework bowl. A team of kerbals swarmed over it like tiny green ants, some of them hauling new struts into place, others hanging in space over the edges of the bowl, working away on what appeared to be large square panels stuck here and there to the latticework.

Sam lurched sideways in his seat as the cart came to a sudden halt. Spinning orange lights cast luminous streaks across the window as a large tractor rumbled across the road in front of them, towing a flatbed trailer loaded with cable drums. Two kerbals wearing bright yellow hats were perched on top of the drums and waved cheerfully at him as they went past. Further away, a pair of excavators pecked at the ground, scooping out a ragged trench that stretched away in a perfectly straight line towards the structure on the skyline.

Sam's head swivelled as he followed the trench line back towards an elegant, cream coloured building. Two gracefully curved wings, swept out from an imposing main entrance, their roofs studded at regular intervals with domed skylights. Large arched windows were picked out in a slightly darker grey stone, giving the whole building a rather geometric look.

"Hmmm," said Obrick, "It's certainly eye-catching but it's a little too... angular for my taste."

"It is a bit minimal looking," said Sam, "although I think it goes rather well with whatever they're building out over there." He waved vaguely towards the rear window. "It'll probably look better once the rest of the site is grassed over."

The cart stopped and Lodan hopped down to open the passenger door. Obrick climbed out, looking impassively at the expanse of churned up mud between the road and the building

entrance. A walkway of wooden planks was kept out of the mire by a stepping stone arrangement of concrete slabs, although even this token effort at a path was generously decorated with muddy bootprints. Several workers were gesturing emphatically at a large pit near the front entrance, although Obrick couldn't hear them over the noise of the excavators behind him.

Lodan dipped his head. "I'm afraid it's a little rough and ready, Mr President," he said, "We weren't really expecting visitors for several weeks yet, let alone one of the Twelve Pillars."

The cart springs creaked as Obrick's bodyguard climbed out and then Sam jumped down, wincing as the mud splattered over his shoes. "Please tell me the inside is finished," he muttered.

Lodan coughed. "Mostly," he said, "We're still furnishing the north wing and moving equipment into the south wing. Anyway - welcome to the Kerbin Space Agency. Please mind your step on the walkway Mr..."

"Harsen, sir."

"...the foundations aren't terribly stable with four of us on here at the same time."

Harsen stepped onto the walkway, moving lightly from plank to plank and not seeming to notice when several of them wallowed alarmingly underfoot. Obrick and Sam followed him cautiously, keeping carefully to the middle of path. Lodan crossed his fingers behind his back and set off after them. As they approached the group of kerbals near the entrance, one of them glanced around casually at the sound of footsteps. His eyes widened and he frantically elbowed one of his companions in the ribs. By the time Obrick stepped off the walkway, a ragged honour guard was ready to greet him.

"Mr. President!"

"Welcome to the Kerbin Space Agency, Mr President!"

Sam smiled to himself as Obrick strode over to the line of kerbals.

"Thank you..." Obrick peered at the name plate attached to one battered yellow hard hat.

"Ms Fercan. It's all most impressive I have to say."

Fercan beamed. "It'll be a lot more impressive once we get the dish working, Mr President."

Obrick nodded and pointed towards the hole. "That's all for the dish then I presume. What have you got in there - power, servo feeds and main co-ax?"

One of the other kerbals in the line burst out laughing at the expression on Fercan's face.

"Uhh no co-ax, Mr. President. Primary signal processing is handled out at the dish itself but the data is piped back here for analysis."

"I'd like to see that," Obrick said, leaning over to peer into the hole. "What kind of pointing accuracy are you getting?"

"Too early to tell yet, sir, as we haven't tried moving it yet. We were getting around eight mdeg in testing but we're not expecting a that in practice, probably more like ten to eleven."

Obrick whistled. "That's still mighty impressive for something the size of that dish," he said. "I'd love to see *those* bearings but... ah, Director Lodan." He reached out to shake Fercan's hand. "I have to go I fear but good luck with the cabling and please - let me know how the pointing does work out in practice."

"I'd be honoured, Mr President!"

As he led his guests into the main building, Lodan glanced at Obrick from the corner of his eye. "I'm flattered Mr President," he said, "I didn't expect my report to be read quite so thoroughly - and I'm fairly sure I didn't include anything about the finer points of control or rf feeds."

Obrick shrugged. "I like to keep up. Besides, knowing about the latest space news is the only way to get an intelligent conversation out of half the office staff these days. Which reminds me - is there any news from the latest KIS flight?"

Sam's head snapped round but Lodan was looking apologetic. "Nothing since the last KBS broadcast I'm afraid," he said, "We had rather hoped to use the Muna 2 flight to test the antenna but the KIS were quicker off the mark than we expected. The last we heard, they'd made a successful mid-course correction and everything was looking good."

Obrick nodded. "Encouraging, but that doesn't mean too much," he said, "The Rockomax flight looked good too, right up to the point when they had their thruster problem."

"That's what I'm worried about," said Sam, "The main reason that the KIS were so quick to launch is that they pulled the Kerbin 2 probe out of their museum and used it as the core of the Muna 2."

"Kerbin 2?" said Lodan, "Wasn't that the one they brought back from orbit?"

"Yes," said Sam glumly, "so who knows what condition it was in." He shivered and looked around at the plain white walls around him. Apart from a row of doors there was very little to see. The overhead strip lights cast a stark but pallid light over everything, and their footsteps echoed on the polished concrete floor.

Lodan's office door was indistinguishable from all the rest, at least to Sam's eyes. Inside, the office was surprisingly modest. A large, plain desk divided the room in two, although at the moment it was less a desk than a holding area for mounds of papers, a large globe and an eclectic collection of cardboard boxes, desk toys and assorted pens. A drift of paper clips spilled over one corner and onto the floor and the opposite wall was entirely devoted to shelving, which was already cluttered with files of all sizes.

The other half of the room was more homely. A coffee table was placed in front of an electric fire, which glowed cheerfully under the little mantelpiece. Four chairs were set out around the table, although Sam wasn't particularly surprised to see that the chairs were also

stacked high with files. A jug of water and a state of the art coffee pot sat on their own table in one corner.

Obrick stood by the window gazing out high over the grounds towards the antenna dish, as Lodan fussed around, clearing papers out of the way, making coffee and rummaging around in various boxes. *The director of the Kerbin Space Agency does get one perk*, he thought, *This has to be the best view in the building.*

There was a sudden rattle of crockery and a satisfied grunt from Lodan as he unearthed three mugs from the depths of his desk. "I do apologise, Mr President," he said ruefully, "I haven't had much of a chance to get everything squared away yet. May I pour you a coffee?"

Obrick, Lodan and Sam took their places in front of the fire. Harsen accepted a mug of coffee but insisted on standing guard by the door. Lodan blew on his drink and took a cautious sip before perching himself on the edge of his chair.

"So if I may ask, Mr President," he said, "what brings you out to the KSA? Our reports were..."

"Commendably thorough," said Obrick. "and I understand that your last budget report found it's way onto a memo of best practice from the Finance Committee. Rumour has it that the chairman of the Committee has even been known to smile when a KSA report arrives, although personally I have my doubts. Relax Director, I'm not here on a cross-checking visit."

Lodan's shoulders relaxed and he sat back in his chair as Obrick continued.

"However, as you'll appreciate, the recent KSA budget requests have been... substantial, and so I thought a quiet visit and discussion of future plans was in order."

Lodan took another sip of coffee. "We appreciate that, Mr President and rest assured that we don't anticipate any further capital expenditure on that scale for quite some time. There will be ongoing expenses of course, staff costs, keeping the library up to date and so forth but nothing outside of our allocated budget."

Sam leaned forward. "A library?"

"Yes," said Lodan, "As I'm sure you'll be aware, our initial mandate was to 'find the questions that need to be asked' and then, if required, find ways to answer them. Some of the questions were fairly obvious as you might expect. For example, there is a great deal of basic aeronautical research we might usefully undertake. However, it quickly became obvious that the most important question of all to address was *which questions have already been answered?*"

Lodan raised an eyebrow. "We trust the Finance Committee will agree that we should have no particular interest in duplicating well established results. However, spaceflight on any meaningful scale is going to involve a whole host of rather disparate engineering and

scientific disciplines. So much so, that we decided that the most efficient way to access the information we need is to build our own library."

Obrick glanced at Sam. "That seems logical, Director, although it doesn't explain the extra construction work going on outside."

Lodan coughed. "Forgive me, Mr President," he said, "but could I be so bold as to suggest that we dispense with *some* of the formalities?"

Obrick dipped his head. "By all means Lodan," he said.

"Thank you, Mr President. The dish was my idea. In fact all three of them were."

Sam frowned. "Three dishes?" he said, "I only saw one."

Lodan walked over to his desk and returned with his globe under one arm. He put it down on the table and spun it round. "We are here," he said to Sam, prodding a finger at the Kolucław mountains. "KSA headquarters, research facilities and tracking site Alpha. In the foothills so we get some elevation without having to haul all the building supplies halfway up a mountain. Also we're roughly equidistant from Barkton and Foxham, which are of course the launch sites for the KIS and Rockomax respectively." He spun the globe again. "However we are also building tracking sites Beta and Gamma here... and here. Not particularly original names I must admit but they'll do for now."

"Kerbin wide coverage," said Obrick.

"Exactly," said Lodan. "We see Alpha, Beta and Gamma as the anchors of a global tracking network. By themselves they should be suitable for interplanetary or perhaps Minmus bound spacecraft. Full coverage for Munar or Kerbin orbital operations will require more tracking stations of course."

Sam studied the globe. "Well KIS and Rockomax have at least one site each," he said, "Plus I'm fairly sure that KIS have a secondary site in Wakira and Rockomax probably have a second site too. That's not a bad start."

"Provided that they both decide to cooperate," said Obrick.

Lodan shrugged. "I'd be surprised if they turn down a free expansion to their systems," he said. "The difficult bit is going to be getting three sets of equipment working well together but we're working on a set of common data and communication protocols to get around that."

Obrick nodded slowly. *Looks like you could do with a few more psychology books in that library, Director Lodan. Still - it's a good idea in principle.*

"So the KSA end up paying for a piece of global infrastructure for anyone to use," he said. "That would seem to overstep your mandate Director."

The corner of Lodan's eye twitched. "I'm well aware of our mandate, Mr President," he replied, "and with all respect, I believe we met it. We identified a serious problem that

would hinder the future development of spaceflight and we devised a solution to that problem."

"And then you took it upon yourself to implement that solution?"

Lodan didn't flinch. "Yes I did, Mr President. Right now we have two main players in the spaceflight business - and they have been set up as competitors. In the long run I trust to the wisdom of the Twelve Pillars. But in the short term I believe that policy will be a disaster."

There was a sudden sharp hiss as Sam sucked air through his teeth. Obrick kept his face carefully impassive. *It seems I was right about you Lodan.* "Go on," he said quietly.

"Rockomax and the KIS," said Lodan, "are both building their launch infrastructure from scratch and to a large extent they are duplicating each other's work. Sometimes, this is unavoidable - they are for example unlikely to share manufacturing or testing facilities." He gestured at the globe. "However, in other cases it is extremely wasteful. Brute necessity will eventually drive both companies to develop a Kerbin wide communication network. Cooperation in that venture seems unlikely so we will most probably end up with two separate networks. Similarly, any new company wishing to compete will also need to waste time and money building their own communication network."

Lodan took a swallow of coffee. "By acting now, Mr President," he said, "we can prevent this stupidity before it even gets started. Both companies have approximately equivalent communication networks, so we avoid favouring one company over the other. It is true that any new companies will gain an advantage by immediately having access to a global network and perhaps that is slightly unfair. However, I believe that that is an acceptable price to pay for a piece of global infrastructure that will speed the progress of established companies and newcomers alike."

"It should be a significant boost to crew safety too," said Sam, "I can think of at least one of the Twelve Pillars who would be very much in favour of that."

"I can see the advantages thank you," said Obrick, "Very well - construction of Alpha, Beta and Gamma stations is approved. Full expansion of the KSA mandate will require authorisation from the Twelve Pillars but as Sam has pointed out, there is already some support for that."

Lodan kept his face carefully neutral, "Thank you, Mr President."

"However," said Obrick, "for the moment, I *strongly* advise against any further unplanned expansions of that mandate. I trust we understand each other, Director Lodan?"

Lodan bowed his head. "Yes, Mr President."

Sam's mug rattled as he put it down on the table. "Time's moving on sir," he said, "Lodan - I believe that your itinerary included a tour of the building?"

Lodan pushed his chair back. "Absolutely, Sam. And you're very welcome to join the team for lunch afterwards if you have time."

The four kerbals emerged from the corridor into the main foyer. Watery sunlight poured in through the skylights overhead, giving the whole room a faintly abandoned air. Outside, Sam could see Fercan and the others still hard at work. He couldn't imagine how they'd managed to haul the drum over the walkway but as he watched, one of the engineers unwound a length of bright blue cable and tossed it down into the pit. A yellow hat popped into view as its owner reached out to grab something from a large toolbox resting in the mud. As Sam walked past the window, the hat disappeared out of sight again.

Lodan led his guests into the north wing. Compared to the starkly undecorated office block, the corridor was almost cosy and Sam's nose twitched at the scents of fresh paint and newly laid carpet. Even though both carpet and walls were the same institutional shades of green as a hundred other government offices across Kerbin, they were a welcome break from bleached white walls and concrete. Thick blinds over the skylights blocked out the cold winter sun and even the strip lights overhead didn't seem quite as bleak.

Lodan pushed through a pair of double doors and held one of them open for everyone else. "Welcome to the library," he said.

Obrick looked around. To his left the library was partitioned up into cubicles, each with its own desk and chair in front of a window. Obrick squinted at the row of data terminals standing against the far wall, their screens staring blankly back at him. *Not too much of a curve to the walls though, he thought, so there must be something else behind this library. Probably whatever computer they've got those terminals plugged into.*

To his right were row after row of tall shelves, with carts of books parked haphazardly amongst them. At least three kerbals were busily unloading them as another one prowled up and down making notes on an overstuffed clipboard. Lodan gestured towards the shelving. "Plenty of space for expansion," he said, "Archives and microfilm room are through at the far end and behind that we're setting up the mainframe."

Sam shuffled his feet. "Am I seeing things, Lodan, "Or is that shelf really marked off for Xenobiology?"

Lodan laughed, "You're not seeing things Sam. I suspect the xenobiology shelf was added as a little joke but we *have* tried to leave room for new fields of study. We've got shelves marked out for Munar geology, extraplanetary cartography, all sorts of things. Kerbolar magnetodynamics of course after Professor Kelvey's discovery of the radiation belts around Kerbin. Actually, we have our own plans for studying the Kelvey Belts but more on that later."

Sam blinked, "I suppose that makes sense," he said, "but *xenobiology*?"

"Why not?" said Lodan. "We known for years that there's water on Duna. Mainly as ice around the poles but what of that? There's plenty of life at Kerbin's poles and they're not exactly hospitable either. Then there are the latest results from the LOST team..."

"Lost?" said Sam.

"Laythe Observation and SpecTroscopy," said Lodan, "The data is a bit tentative to my mind but they're claiming evidence for water vapour and carbon dioxide in Laythe's atmosphere. I doubt it's the warmest place to visit but it might be just warm enough for life!"

Obrick shook his head. "Life beyond Kerbin," he said, "I don't think you're going to find anything to put on that shelf for a while."

Lodan smiled, "Not until we get close enough to have a really good look, Mr President," he said, "and even then, if we find anything, it'll probably be simple plants, bacteria, maybe insects if we're very lucky. Certainly not the pink skinned aliens of popular fiction."

"Even so," said Obrick soberly, "one single paper on that shelf would change the world." He looked at the lined face of the KSA Director. "I admire your optimism, Lodan but I'd take that label off the shelf for now."

Lodan nodded. "Oh indeed, Mr President. Apart from anything else, I hardly think that letting the world know that we're searching for extraplanetary life is the best way to establish a reputation for the Kerbin Space Agency."

"But you'll be doing it anyway?" said Obrick.

"Of course. Quietly and indirectly to begin with - and please rest assured that it is firmly at the bottom of our priority list. But as you pointed out yourself, a single paper on that shelf would change the world."

Lodan pushed the library door open. "In any case gentlemen, it's time you saw some of our less... speculative research. Please follow me."

After the almost completed north wing, the south wing was a shock. Wheel tracks and footprints snaked through the layers of dust on the floor, stacks of panels leaned against the raw concrete walls and the ceiling appeared to be very much a work in progress. Here and there, stepladders led up into the maze of ducts and cable runs and Sam could hear snatches of conversation from above, interspersed with the high pitched squeals of assorted power tools and the strains of a particularly enthusiastic Spearkan country band.

Sam looked pained. "Dear Kerm but that's awful," he said.

"Oy - I heard that Kelney!" A grimy head poked out from the ceiling. "This is quality music this is, which is more than I can say for the crap you..." The engineer spotted Obrick staring at him curiously and went pale.

"Oh no," he said in a very small voice and shot back into the crawlway, knocking his head against a duct with a loud clang and a burst of colourful but hastily sanitised oaths.

Lodan sighed and pointed towards a row of hard hats and laboratory coats hanging on pegs by the door. "Everyone take a hat please," he said. "The lab coats are optional but recommended. Welcome to our research and development wing."

All three kerbals put on their hats and lab coats without comment. Lodan left his jacket on a peg, pulled on a hat and led the way down the corridor.

"Just like the library and archive rooms, the lab block was designed for expansion. We originally intended to run a single lab to begin with but recent developments prompted us to start a second research program." Lodan gestured towards a closed door. Sam saw a large photograph of the Mün stuck to it, together with a crude sign reading 'MIR'.

"Mir?" he asked.

"Our first program," said Lodan, "Munar Imaging and Reconnaissance."

"That makes sense," said Sam, "I bet they can't wait to see the results from the Probodyne Prize!"

"The first images of the Far side will certainly be interesting," said Lodan, "and if we're lucky, some of them may even be good enough to work with. To be honest though, we're more interested in the spacecraft than the science at this point." He opened the door and poked his head inside.

"Ahh yes. Power is off for the moment whilst the engineers are working on the new gas lines. Come on in, good kerbals."

The laboratory was gloomy inside but Sam could still make out a set of workbenches with a bewildering array of tools and half assembled pieces of electronic equipment scattered over them. A pair of cameras stood on tripods in the middle of the room and what appeared to be the innards of a third camera were mounted on a set of stands fixed to a very heavy looking stone table. A number of cabinets and larger pieces of equipment stood around the edges of the room, although Sam couldn't begin to guess what they were for.

"This is our optics lab," said Lodan. "Design, prototyping and calibration in here, flight qualification and testing a couple of rooms back. We've just started phase three of the project, so we don't actually have a working model to show you I'm afraid."

"Phase three?" said Sam.

Lodan nodded. "Phase one was a review of the available literature on Munar astronomy, phase two was mission definition and hardware specification. Phase three is prototyping and development."

Sam wandered between the workbenches staring in fascination at the camera parts. "Some of these look so delicate," he said, "I can't quite believe you plan to put them on top of a rocket and fire them off to the Mün."

"They're sturdier than they look," said Lodan, "but yes, we've had to rethink some of our ideas already. The current model is looking promising however."

"You mentioned a second research program," said Obrick.

"I did," said Lodan, "We're not even out of phase one for that yet and we've only barely cleared out the lab space. You're welcome to see it of course but there's really not a lot to look at apart from a large collection of packing crates. We have big plans for the Space Radiation Laboratory though."

"Space Radiation," said Obrick, "I presume this has something to do with the Kelvey Belts?"

"Mapping the Belts is our highest priority at the moment, Mr President. Distribution, radiation intensity, particle density, energy spectra - we urgently need this data before planning any other missions. The radiation was strong enough to affect the cameras aboard Satellite Four, so goodness only knows what it might do to a crewed ship."

"Agreed," said Obrick, "Have you chosen a launcher yet?"

"Not yet," said Lodan, "but my preference would be Rockomax."

Sam frowned. "Why not offer it as a competition again?" he said.

"Mainly because Rockomax already have the experience with satellite operations," said Lodan. He raised an eyebrow at Sam's expression. "Don't worry - there'll be plenty of launches once MIR starts flying and even more once the Space Radiation Laboratory is finished with the Belts."

Sam bit back his first response. "Why - what happens then?" he said

"We go back to the Mün with radiation detectors," said Lodan calmly, "Gamma ray spectrometers to be precise."

"I don't follow you," said Sam. "Are we expecting Kelvey Belts around the Mün too?"

"No," said Lodan, "but Kelvey Belts aren't the only source of radiation in space. We've studied cosmic rays for decades - high energy particles in Kerbin's upper atmosphere. Those same particles will also be hitting the Mün and...look the physics gets complicated but we think we can make a chemical map of the Munar surface."

Obrick looked at him intently. "What sort of chemicals?" he asked

"Industrially useful metals," said Lodan. "Lighter elements too and possibly even water, although we think we might need another sort of detector for that."

"Water and metals," said Obrick to himself. "Excellent work, Lodan - excellent. I presume you were planning to mention this in your next report?"

Lodan caught the look on Obrick's face and smiled inwardly. *Gotcha.*

"Naturally, Mr President. Fully planned out and costed as always."

Obrick rubbed his hands together briskly. "Well I've seen everything I need to see here, Director Lodan. How are we doing for time Sam?"

"Just over an hour before we need to leave, sir,"

"In that case, good kerbals, I suggest we finish with a tour of the canteen. Please lead the way, Director."

As they approached the main foyer, Lodan was astonished to find it full to bursting with kerbals. He was about to clap his hands for attention when he heard a familiar voice echoing tinnily from a speaker.

"I repeat, loss of signal from the Muna 2 occurred precisely on schedule. All we can do now is watch, wait and hope that the engine fires as planned. If all goes well, Mission Control should reestablish contact with the spacecraft in exactly one hour and forty seven minutes. This is KBS News reporting from the Barkton Space Centre."

Jonton smiled as he accepted a mug of cocoa from a tired looking kermol. A pair of small green hands appeared over the lip of her pouch followed, after much squirming, by a pair of very wide eyes, looking solemnly back at him. The tiny kerblet chirped happily as Jonton gently ruffled its silky black hair.

"Congratulations," he said, "how old is..."

"He's just under three months old Keeper. Have you got a smile for the Keeper, Jebediah?"

Jonton reached out with one finger and stroked one of Jebediah's hands. "You're too busy taking everything in to bother with smiling aren't you, little guy," he said.

Jebediah squeaked and disappeared again. The pouch rippled and bulged and Jonton winced in sympathy as he saw a foot and then what looked like an elbow pushing out against its confining wall. He got to his feet.

"Here - take my seat," he said, "I'll lend a hand with the cocoa."

The kermol looked at him gratefully. "Thank you Keeper," she said, sinking onto Jonton's cushion and cupping her hands under her pouch.

Jonton smiled. "My pleasure," he said.

The village hall was full to bursting. A group of older kerblets were huddled together in one corner, safely out of earshot of their parents and ignoring two of their younger siblings who were busy squabbling over a KIS hat. Another pair of youngsters hurtled past, indulgently watched by the adults as they careered around the room.

Jonton blew on his cocoa and turned his attention to the television cabinet at the far end of the room. The black and white picture showed a studio, with two presenters sitting behind a table and talking. Jonton was too far away to hear what they were saying but from the sudden shushing from the cluster of kerbals sitting around the television, he assumed that it was something important. There was a call from the back of the room to turn the volume up as one of the presenters turned to face the camera.

"We are now going live to the Barkton Space Centre where we rejoin Leland Kerman outside Mission Control."

"Thank you Milfrid. If you are just joining us now, this is KBS news reporting from the Kerbin Interplanetary Society launch bunker and we are now in the final moments of the Muna 2 mission. A little over one hour and thirty minutes ago, the launch controllers lost contact with the Muna 2 as it swept around behind the Mün. By now, if all has gone to plan, the

probe will have fired its rocket engine and slowed down just enough to be pulled into Munar orbit."

Leland's voice dropped to a whisper.

"We're now going down into the control bunker itself to join the flight control team as they wait for a signal from the Muna 2. As our regular viewers will know, data from the probe is being relayed through the new KBS communication satellite which was designed and launched by the Rockomax Corporation."

The image on the television screen blurred and tilted as Leland and his cameraman climbed down into the bunker. As it steadied, the watching kermol could see a group of flight controllers hunched over their consoles and a countdown clock ticking away on a big screen behind them. As the camera panned around, they saw a row of kerbals standing quietly against the wall. One of them looked up, nodded and then walked towards the camera.

"I'm now talking to Bill Kerman, one of the flight dynamics officers at the KIS and of course, one of the Original 3 kerbonauts who flew on the Kerbal 1. Bill - what's the latest news from the Muna 2?"

"At the moment we're just watching and waiting with everyone else, Leland. We do know that the Muna 2 fired its engine but obviously we don't yet know whether the burn was successful."

"I know I've got my fingers crossed, Bill and I'm sure that everyone watching at home has as well. I do have a question though - how do you know that the engine has fired if you're out of contact with the spacecraft?"

"That's a little complicated Leland. We launched the Muna 2 towards the Mün on what we call a free return trajectory. If you picture a big figure-of-eight with Kerbin in one loop and the Mün in the other, you'll have the right idea. Now the big advantage of a free return is that once the spacecraft is on the right course it will fly around the Mün and back to Kerbin without us having to do anything else at all.

"Wasn't that the same trajectory that Rockomax used for their Satellite 4, Bill?"

"Absolutely, Leland and we used it for the same reason. If anything had gone wrong with the Muna 2 before it reached the Mün, we might still have had one chance to get some pictures and send them back to Kerbin. As it happened, everything looked fine so just before loss of signal we commanded the spacecraft to start the timer for Munar orbit insertion.

"That makes sense so far, Bill."

"Okay. Now if the spacecraft was still on a free return trajectory, then we should have picked up a signal about thirteen minutes ago. So we know that the engine fired but as I said - we have no way of telling whether it fired for the right amount of time."

"The burn time is quite important isn't it?"

"It certainly is, Leland. If the engine doesn't fire for long enough then the spacecraft will just fly round the Mün and off into space. If it fires just a little too long, then the spacecraft will crash into the Mün instead.

"Well, I guess I'll just keep those fingers crossed a bit longer then, Bill. Thank you for talking to KBS News."

"My pleasure, Leland."

Leland turned back to the camera. "For those of you who are just joining us, that was kerbonaut Bill Kerman, talking to us about the art and science of cosmic navigation. I am Leland Kerman at KIS Mission Control at a little under three minutes to go before we regain contact with the Muna 2 spacecraft on it's voyage around the Mün."

The village hall fell silent as the clock ticked downwards. The squabbling kerblets seemed to sense that something was happening and scampered back to sit down beside their parents. Even the KBS news team was quiet, content to simply record the moment and listen to the flight control team. Jonton paused in mid sip as the last digit flipped over from one to zero

"I'm picking up a signal, Flight. Downlink established... and we have telemetry!"

"How's she looking Joemy?"

"Looking good, Flight. Power systems are nominal and... one moment."

The camera zoomed in on one kerbal, working away at his console.

"Camera deployment confirmed, Flight. We're picking up..."

The rest of Joemy's report was drowned out as the clock disappeared from the main screen and was replaced by a complicated looking set of figures. They didn't mean a thing to Jonton but from the sheer volume of celebration in Mission Control, he assumed they meant good news. There was a squawk of electronic feedback as the flight director came back on the air.

"Settle down, guys! Let's see some pictures before we call this done. Joemy - say again please."

"Camera deployed and tracking, Gene. We're picking up data over the high gain antenna but it's still going to take a couple of minutes before we get a complete frame."

"Understood, Joemy. What have you got for me Lucan?"

"You'd almost think we'd planned this, Gene. Reacquisition time was right on the numbers, initial tracking data looks good, spacecraft is in orbital rate."

"Here we go - first picture coming through!"

Jonton leaned forward to get a better look. The KBS camera leaned in with him as it zoomed in towards the main screen. The numbers disappeared as it faded to black and then an image appeared! Jonton tilted his head to one side, trying to make sense of the strobing mess of white lines. *This can't be right*

There was a whispered conversation in the background and then Leland took the microphone again.

"Sorry about that everyone. We're having a little problem trying to take a television picture of umm another television picture. Please bear with us as we try to pick up the satellite transmission directly." He tapped the side of his earphones. "Thank you. Yes, we're ready to switch feed."

The television screen flickered. There was a burst of static and then the picture came back in to focus. Jonton gaped at the blurred, grainy image. It was unmistakably a picture of the Mün but with none of the familiar patches of dark and light that he was used to seeing from Kerbin. *The far side of the Mün* he thought, *I'm seeing the actual far side of the Mün!* A smile spread across his face as the picture changed, showing another brand new side to the most familiar object in Kerbin's skies.

A tap on the shoulder woke Jonton from his reverie.

"We're closing the hall I'm afraid, Keeper. Can I get you a night light for your walk home."

Jonton blinked at the elderly kerbal in front of him. "Uh, no thank you," he said, "that won't be necessary."

The kerbal nodded. "As you wish, Keeper. Going to be a long night for you I expect."

Jonton's knees popped as he climbed to his feet. "I expect so," he said, "The Kerm will want to know all about this." He smiled. "And I may just spend a while looking at this side of the Mün too."

"I can't quite believe it to tell you the truth, Keeper. The idea that tonight the Mün has a little mun all of it's own."

"Neither can I," said Jonton softly, "and it was put there by kerbals."

Chapter 23

Dreams

Jonton floated in the void. Visions of the Mün danced through his head but much to his surprise the Kerm was ignoring them. He could sense it flitting around in the darkness but apart from one fleeting brush against his mind, it seemed curiously reluctant to make contact.

Odd. Then again I suppose it's only the Mün. Perhaps I'm not being clear enough.

Jonton cast his mind back to the launch. Thousands of kerbals watching a slim metal shape in the distance. The flames and thunder of liftoff as the rocket engines blazed into life. The roiling plume of smoke as the booster climbed high into the sky and disappeared out of sight. He could only imagine the view as the spacecraft soared out of Kerbin's atmosphere and into orbit but he vividly remembered the awe inspiring pictures of his home from high orbit. Everything he had ever known and everywhere that he had ever been, wrapped around a cloud girdled sphere and set floating in the blackness of space. He remembered the images of the Mün rushing towards the camera, bigger, sharper and more beautiful than any astronomer's picture taken from Kerbin.

There was a flicker of interest from the Kerm as it skittered towards him. It brushed against his mind and for a moment, Jonton thought it was finally going to merge. Then something distracted it again and it fled out of range. With an effort, Jonton pushed away his mental images of the Mün and focused on the void around him, slowly and deliberately clearing his mind and allowing himself to sink into placid receptivity.

It's been a while since I've needed to do this.

Despite his best efforts, the Kerm still refused to come any closer. Its mental presence scuttled around, hyper-alert, agitated, trying to sense in all directions at once. Jonton extended a gentle query out towards it and it recoiled as if stung, leaving behind a metallic tang of cold fear. Jonton jerked away. *Fear? A lord in its own domain, master of its*

surroundings and old when my grandfather's grandfather was a kerblet. What on Kerbin could a Kerm be afraid of?

There was no reply. Jonton paused and then, feeling more than a little bit ridiculous, he tentatively reached out with a new set of thoughts. A Kerm sapling trembling in the night, a kerbal rushing towards it and then Jonton himself, embracing the sapling, patting its slender trunk and murmuring to it, in the same way that he would soothe a fretful Joenie.

There, there big fella. You tell your keeper all about it.

For a moment it seemed to be working. The agitated flitting stopped and the Kerm warily circled him, gradually coming closer. Then something spooked it and it scuttled away again. This time he caught a brief jumble of sensations. Shapeless forms in the dark. Untasted things, sensed but never caught. The struggle for control against a barrage of conflicting and confusing signals. And pain - many, many kinds of pain. Here, the sudden sting of a shaving blade nicking skin. There, the scorching fire of acid along fibre. Still elsewhere the dull aching throb of countless tiny presences chewing on roots, slowly but surely sapping their vitality.

Jonton reeled backwards. *Pain! What could possibly hurt a Kerm?* His shock was blasted away by a building consternation. *What would dare to hurt a Kerm?* The consternation peeled away and was swiftly replaced by a cold fury. *More to the point - who or what would dare to hurt my Kerm.* He reached out again with an image of a scowling kerbal standing defiantly in front of a sapling, ready to ward off any threat.

Let. Me. Help.

The Kerm stopped dead in its tracks and then hurtled towards him, its mind unfolding towards his. The desperate merging was far far more violent than Jonton was accustomed to. Instead of the usual mild disorientation, his senses melted like wax before a blowtorch, swirling together into a discordant whirlpool that scoured out the deepest recesses of his mind. He tasted the sickly sour colours of the room around him and he screwed his eyes shut to block them out. The rustling of the Kerm leaves around his head rippled like velvet, the creaking of the bed under him rasped like sandpaper against his skin. Then the familiar cinnamon scent of the Kerm leaves bloomed in his mind like an iridescent rose, drawing him helplessly forward.

The rose shattered. Minute fragments of stem and petal exploded outward, becoming nothing more than firefly sparks in the darkness. The sparks gambolled around him and everywhere they touched they ignited a new spark. Some of them traced out branching patterns in the darkness, others were scattered in small clumps that darted and danced through the branches. Still others lurked in the background or stood poised, quivering with a restless internal energy.

All the while, a raging flood of memories and *knowledge* swept through Jonton's mind. Bruised and buffeted, it was all he could do to keep his head above the torrent, let alone reach out to grasp any of the sparks or examine them more closely as they raced past. If he had been able to, his kerbal mind would have dimly grasped at the reality of the legions of

chemicals, sense fibres, tiny insects and other symbionts stretched out before him in all directions. Paralysed by detail, his kerbal mind would have drowned in the deluge of data.

Fortunately he was now far more than a kerbal and he had no need to examine the sparks. In the back of his mind he *knew* what each of the myriad of lights was, what they could do and how they fitted in to the whole. He was intimately aware of exactly where each of them was at any given moment in much the same way that he knew he could catch a ball without needing to consciously decide where his hand was or exactly how to curl his fingers around their prize.

Then the Others attacked.

New lights intruded on his awareness, forming their own patterns and disrupting his carefully arranged constellations of sparks. The new patterns twisted and turned, morphing fluidly from one form to the next. Instinctively, Jonton moved his own sparks to counter, blocking the foreigners or seeking to snip them off at their source. They rolled smoothly away out of reach, shifting like leaves in a breeze, their movements turbulent and difficult to predict.

It was all that Jonton could do to defend against them. Any counterattacks that he managed to contrive were repelled with ease as tiny filaments of light insinuated their way into his patterns and blew them apart like smoke. As the attacks swirled in from all directions in rapidly growing numbers, he reflexively burrowed into his sheltering link with the Kerm, willingly submersing himself within it.

Jonton's senses blurred and he *remembered* facing such attacks before. Deftly he parried, turning aside a first, then a second and then a third and fourth together. Filigrees of sparks slipped out, drawing the enemy towards him as they flickered just out of reach. The filigrees stuttered, collapsing into a simpler form as the Others spun aggressively towards them. Then the simple form flowed out into a myriad of silvery traces, each one melting away in the nick of time, leaving confusion and discord in their wake. Jonton swiftly spun out new webs. Coldly and efficiently, he encircled the faltering Others and crushed them without mercy.

The attacks became more complex but Jonton had seen their like before and *knew* how they were constructed, knew the timing of their waves and how to interrupt and confuse that timing. There was a moment of panic as he failed to recognise one particular sequence but it was poorly formed and after a brief struggle, snuffed out.

Encouraged by his momentary lapse in concentration, the Others swarmed against him in increasingly random patterns. Most of them were easily dispatched but others were not, wriggling through his outer defences before he could regroup and check their progress. Memory and experience began to give way to analysis and impromptu tactics hastily thrown together and hastily executed. For a while they held the line, Kerm experience and instinct allied with kerbal quick thinking and adaptability.

It wasn't enough. The enemy patterns smashed against them and pain flared in the darkness as, one after another, Jonton's sparks began to flicker and go out. *Too close. Cannot see (ha)*

the wood for the trees With a tremendous effort, he wrenched his mind free and leapt towards the surface. He swiftly surveyed the battle and dived back downwards.

This is a fight we cannot win

There was no time for an orderly retreat. As the Others flooded through his defences, Jonton broke all his patterns and fell back. A river of glowing motes flowed away from the battlefield, its edges whipped into a luminous froth as individual motes tried to avoid the enemy forces. Fire stabbed through Jonton and the froth became tattered and insubstantial as more and more motes were overwhelmed and consumed. An older and wiser part of him took over, rallying the stragglers and forming them up into a last desperate diversion. It was barely enough. The last of the main body slipped out of reach but seconds later Jonton screamed in agony as the diversion was ripped apart and devoured.

The Others swirled towards him. Grimly, Jonton set out a dense pattern of defending sparks. No subtlety, no thought of counterattack, just layer upon layer of interlocking forces holding each other up in an impenetrable barrier.

No further. This space is mine.

The end was as sudden as it was unexpected. The enemy patterns stretched out towards him and then they just fell apart. Jonton stared in disbelief at the milling crowd, too weary to take advantage of the confusion. As he watched helplessly, the Others formed their own defensive formations, separated from his own by a thin, invisible barrier.

He could sense the Kerm disengaging from his own thoughts. Slowly, the sparks lost their overtones of meaning and became a mere display of lights in the darkness. As he rose higher and higher away from the battlefield, their brilliance faded, becoming nothing more than the random bursts of noise conjured up by squeezing his eyelids tightly together.

Jonton sat bolt upright in bed, his head full of a great sense of relief, sadness and a swiftly fading nightmare.

Gerselle sat up in bed and frowned as she tried to bring back the dream. She remembered the triumph of freedom and a hard fought victory against an oppressive foe but after that she could recall little else apart from staring at the enemy across a thin invisible line. Gerselle yawned. The Kerm seemed to be contented enough so presumably the confusion wasn't all that important. Besides, there would always be another night.

Rose tinted dawn sunlight poured in through the windows washing over her bed and illuminating the interior of the shelter with a soft pink glow. Behind her, the Kerm sapling occupied much of the space in the small hut, finally growing tall enough that she could sleep in a proper bed beneath its leaves rather than on a bedroll.

Gerselle laced her fingers behind her head as she stared up at the pointed ceiling. At the rate the Kerm was growing, it would soon be time to build a larger hut - one with a hole in the ceiling for its trunk to pass through. She smiled. After that it would be time for a proper

four roomed Keeper's hut, with it's own sleeping area and maybe, just maybe a bathing pool, if the communal pools could spare enough sweetmoss.

Speaking of which, it was probably time to collect Joenie from Meleny's. And speaking of Meleny, she really ought to visit the carpentry shop this morning and see how they were getting on with her chair. She'd carefully saved all the leaves dropped by the growing Kerm and woven them into a little net bag to tuck under the seat. Not quite the same as making the whole thing from Kerm wood but the leaf bag would add a little more padding and according to Jonton, furniture made from the first shedding of a Kerm was supposed to be lucky. Hopefully it would be a suitable thank you gift for all the many hours of babysitting over the last few months.

Gerselle stretched, threw back her covers and prepared to face the new day.

Jonton groaned at the insistent tapping. Once could be ignored but twice meant that he should probably go and see who was at the door. He glanced at the clock on the wall and fought against the urge to pull the covers over his head and go back to sleep. For Kerm's sake it was only just after dawn.

"Keeper? Are you there, Keeper?"

Of course I'm here. Where else would I be at this ridiculous hour of the morning. He clambered out of bed, struggled into a rumpled poncho and blearily made his way to the door.

The kermol's jaw dropped. "Great Kerm above Keeper - you look awful. Is everything all right?"

Jonton decided not to trouble him with the details.

"Bad dreams and very little sleep, son - but apart from that I'm fine."

The kermol looked worried. "You are still able to help with the sunfruit harvest, Keeper?"

Jonton swore to himself. *Of course - the harvest. I knew there had to be a reason.* "Of course," he said. "In fact I could just do with a nice juicy bunch of sunfruit to wake me up a bit."

The kermol laughed. "I'm sure we can find a spare one, Keeper," he said cheerfully.

Jonton forced a smile in reply. "I hope so," he said. "Do come in for a minute, while I find my boots."

It took rather longer than a minute for Jonton to bathe, find a more reputable looking poncho and then find his boots. Privately, Ferry thought it was well worth the wait. The Keeper still looked tired, no doubt about it but the awful, wild eyed, stained and disheveled figure at the door had gone. He waited for Jonton to swallow his last mouthful of greenleaf roll and then got to his feet.

"Wagon is just outside, Keeper. Old Fredlorf is driving, so the ride shouldn't be too bumpy!"

The tractor started up with a whine, as Ferry helped Jonton up onto the trailer. He made sure the Keeper had found himself a seat amongst all the empty crates, then turned and thumped the elderly driver on the shoulder.

"Get 'er moving Fred - quicker we start the quicker we're done."

Fredlorf released the brakes and the tractor pulled away with a jerk that rattled all the crates in the back and rattled Ferry's teeth in his head. He looked apologetically at Jonton. "Sorry, Keeper. Old girl needs a bit of maintenance I'd say. Either that or Fred's driving isn't all it's cracked up to be."

Jonton managed a terse nod in reply before taking a very firm grip on the edge of the trailer, as it lurched down the road towards the sunfruit fields. It was an early spring morning but still close enough to winter to give the air a chilly bite. The first few hillflowers peeped through the frosty ground, covering the side of the road in erratic tufts of yellow and purple. As the fresh, pine scented air cleared Jonton's lungs, the accumulated stress of weeks of nightmares, slowly began to dissipate. The sun rose and the first birds of the day sang a cheerful greeting from the treetops.

The crates tilted to one side as the tractor chugged around the final bend and pulled up by a sturdy wooden gate. Fredlorf hopped down from the driver's seat, lifted the latch and pushed the gate open. Jonton heard the hinges creaking faintly over the hum of the tractor engine. He pulled on a pair of thick canvas gloves as Fredlorf scrambled back onto his seat and took hold of the steering wheel. He couldn't tell whether the brakes had warmed up or whether Fredlorf was a little more awake now but this time, the jerk was barely noticeable.

Jonton flipped open the lock on his shears and grunted as he worked the handles back and forth. As he reached for the oilcan, Ferry gasped and then swore loudly.

"Stop the wagon, Fred - stop the wagon!"

Jonton looked up. He was just about to ask Ferry what the problem was, when he saw the rows of sunfruit vines and the problem became all too clear.

The wilted brown vines drooped listlessly and the few berry clusters that Jonton could see were shrivelled and thickly blotched with a leprous black fungus. Weeds choked the ground around the vines, spotted here and there with mushy brown puddles of rotten sunfruit flesh.

Ferry stared at him in shock. "What in the name of... what happened here, Keeper," he said shakily. "Never seen anything like this in my life."

Jonton just stared mutely over his shoulder at the ruined vines. Fredlorf shuffled round in his seat and looked at them grimly.

"S'pose we'd better see if there's anything left to harvest," he said, "although it looks like this is going to be one helluva short day of picking." The tractor started up again, the sound of it's motor breaking the strained silence.

"Well I'll be a son-of-a-gronnek!"

Jonton and Ferry looked up at the sudden oath from the driver's seat.

"Looks like this morning won't be a total waste but just look at those kerb-blighted vines! One plant is dead and gone, the one right next to it is green and flowering. What in the name of the first Kerm happened to this field?"

Ferry grabbed a crate and jumped down from the trailer. "Don't ask me Fred," he said, "but I reckon we should grab any good fruit that we can before they catch whatever killed the rest of them off."

Jonton shook his head, picked up a crate and jumped down on the other side. Fredlorf switched his motor off and came to join them. All three kerbals set off down the rows of sunfruit, snipping bunches of succulent golden berries off the vines with practised ease and dropping them into their crates.

By mid morning, they had picked one unsullied patch of vines clean of berries and despite Ferry's pessimism had found a second patch at the far corner of the field. The morning frost had long since melted in the morning sun and three kerbals were sweating under their ponchos as they stopped to take a drink. Fredlorf leaned against one of the tractor wheels and stared thoughtfully across the field.

"If I didn't know better," he said, "I'd swear that somebody was playing a joke on us. Look at that line of healthy vines - damned thing is curved."

"That's what I thought," said Jonton slowly. "It's almost like a Year's End field sculpture but I can't believe anyone would do that to living plants with fruit still on them."

Ferry snorted. "It's not even a very good field sculpture," he said, "Look at it - all you'd need to do is mark out one circle at one end of the field, another circle at the other end of the field and then stamp down everything in the middle where the two circles cross." He scratched his head. "That's not quite right though - far as I can tell the centres of two circles would need to be outside the fields. Okay that's a bit clever then - keeping the ropes taut over the fence would be tricky."

Fredlorf brightened up. "Well if you've got that right, there should be a couple more clean patches in the other corners," he said. "Still going to be a sorry looking harvest but I'll take what I can get after seeing that Kerm-forsaken mess this morning."

Kerm-forsaken.... A cold hard lump settled in the pit of Jonton's stomach. He fixed one eye on the centre of the field and then traced a line out beyond the field. His other eye caught glimpses of sunlight sparkling off the village stream, followed the banks of the stream back across the grasslands and then settled on a dreadfully familiar hilltop.

A hilltop where he had once buried a seed.

Chapter 24

A Journey Around the World

Jeb lifted the picture onto its hook and squinted as he tilted it from side to side, holding it carefully by the edges of its frame. Satisfied, he climbed down off the chair and stepped back to admire his handiwork.

"Not bad, Jeb," said Geneney, "Bill's photo from the Kerbal 1 is still my favourite though." He stepped into Jeb's office. "Kerbin from thirty kilometres, Kerbin from orbit and the far side of the Mün. What's next - Minmus from orbit?"

Jeb grinned. "Actually I thought a nice snap of you posing by the lander on Minmus would finish the set off nicely, Genie."

Geneney rolled his eyes. "I admire your ambition, Jeb - but believe me - I know exactly how much we need to do before we can even think about it." he said, scrunching his voice into a passable imitation of Wernher's gruff tones.

Jeb laughed. "With a voice like that you could be his long lost brother, Genie."

"Whose brother would that be?", said Wernher as he walked in and took a seat by Jeb's desk. "Oh nice - is that one of the high res images from the Muna 2, Jeb? A couple more of those on the wall and people might even start to believe that we're running a space program from here." He raised an eyebrow. "Although we do indeed have a lot to do before you can take that picture of Gene on Minmus."

Jeb had the sense to keep a straight face as Geneney blushed. "Speaking of which, Genie," he said, "how's the new Mark 2 capsule coming along?"

"Not much more than an engineering mockup at the moment, Jeb," said Joemy from the doorway. "Nothing you could stick on top of a booster but it's a good test bed for crew fit and function and the new environmental systems."

"Are we still on for a three kerbal crew?"

"Probably," said Joemy, "provided that we can fit all the electronic gear in too. The lower equipment bay is starting to look a bit crowded but Bill's working on that. Oh hey, Bill - we were just talking about the electronics for the Mark 2."

Bill slumped into a chair. "Talk to me about that, once we've got the Mark 1 working properly," he said. "Any chance of a coffee, Jeb?"

"Right behind you, Bill," said Jeb, "Still having problems with the radar then?"

"Oh the radar is fine, Jeb," said Bill as he poured himself a coffee. He added a lump of sugar, paused for a moment and added two more. "Edsen found some lighter weight parts in that heap of old avionics gear that Ornie brought over. No it's the computer that's giving us all the problems."

"A three sugar problem?" said Jeb, "We haven't had one of those for a while."

Bill sighed as he took a sip of the thick, sweet brew. "No we haven't," he said, "although the radar came close. But getting the computer to talk to the radar and the SAS, making a robust enough interface board to survive the launch and making the whole mess small and light enough to cram into a Moho capsule is very definitely a three sugar problem."

"We can give you more weight to work with," said Wernher, "The LV909 in the upper stage is more efficient than the 905, so we can handle a slightly heavier capsule for the same fuel load."

Bill stared into his mug. "That's something anyway. Thanks, Wernher."

Just then, Lucan stuck his head around the door. "Sorry I'm late," he said. "The last Whirligig run took longer than expected. What have I missed?"

"Three sugars," said Jeb.

Lucan grimaced. "Computer still causing problems, Bill?" he asked

Bill looked up. "Edsen and Neling got the radar working at last," he said, "but we're having problems integrating the computer with the radar, SAS and rate indicators."

Lucan sat down beside him. "What if we pull the computer?" he said, "Will the radar play nicely with the rest of the capsule systems?"

Bill took another sip of coffee as he thought it over. "It should do," he said at last, "The computer takes data from the radar but isn't needed to control it. I should be able to rig up a reporter system so that Adelan can get rate, range and bearing data directly and hand off the calculations to Mission Control. It's a cumbersome way to fly though."

"Actually," said Lucan, "I don't think it'll be that bad. A couple of guys in the flight dynamics team have been figuring out some backup options. Visual navigation techniques, manoeuvre charts for flying manual rendezvous, that kind of thing. Theoretically we could just about do the whole thing by hand if we had to."

"Have you run these on the Whirligig?" said Jeb.

"We've had a couple of goes with the charts," said Lucan. "but the Whirligig isn't a good enough sim for the visual navigation procedures."

Geneney looked thoughtful. "It'll need some work," he said, "but using the backup options for a non-critical rendezvous would be a valuable test anyway and it would give Bill's team more time."

"Assuming that Adelan is willing, that sounds like a plan to me," said Jeb. "We'll need to have the computers working for Moho 5 and 6 though."

Bill nodded. "We will," he said, "and we'll have them working by then, Jeb."

"I know you will, Bill. Right, what's next?"

Geneney pulled a notebook out of his pocket. "I had a rather interesting phone call the other day from a Mr Lodan," he said. "Apparently he's the director of the Kerbin Space Agency..."

Jeb choked on his coffee. "The what!"

"That's about what I thought," said Geneney, "Director Lodan was remarkably non-specific about the details of his space agency but he did wonder whether we would be interested in joining his tracking and communication network."

Lucan looked across at him. "I'd say that we might be," he said, "What does it involve?"

"As far as I could work out, free access to three tracking and communication stations," said Geneney. "The first one has just finished testing - that's down by the Koluclaw mountains. I'm not quite sure where the others are - Mr Lodan did mention place names but they didn't mean much to me."

Lucan scratched his ear. "Another station out by the Koluclaws, would be useful," he said. "Between that and Sigbin and Doodie's station, it would improve our orbital coverage quite a bit. Are you sure you didn't recognise those other names, Gene?"

"Afraid not," said Geneney, "but I think they were supposed to be placed equidistantly around Kerbin, or as near to equidistant as they could manage."

Jeb sat up straight. "Now *that* would be helpful," he said. "Even better coverage for orbital spacecraft but more importantly - proper communications and tracking for Mün bound craft." He scowled. "There has to be a catch here somewhere."

Geneney shrugged. "Mr Lodan did say that his facilities were for 'the further development and free use of any and all spaceflight efforts on Kerbin.'"

"Sounds like a pompous bureaucrat to me," muttered Jeb, "This is a government organisation if I ever heard one."

"Probably," said Geneney, "but any money we can save on comms facilities is money we can spend on new hardware. And frankly, I'll take whatever help we can get right now."

"Help?" said Jeb, "Genie - we've got more money now than we've ever had thanks to you. The Moho 4 is going to be more of a flying billboard than a rocket ship. That new deal with Stratus was a masterpiece and I can't believe you talked Zaltonic into taking out that sponsorship deal *and* giving us free batteries for the rest of the Moho flights. We've even got some of the Probodone money left! I know that we can always use more funds but is it that much of a problem right now?"

"Yes," said Geneney, "it is. Look - the Moho booster can put a single crew capsule into orbit with enough consumables for maybe a day. With a bit of tweaking and a *lot* of weight shaving, it'll put a probe into orbit around the Mün or possibly Minmus if we pare the payload back to the bare essentials. For anything else - we're going to need a bigger rocket."

"How big is big?" said Jeb.

"Clustered LVT-20s in the main stage, plus more of the same or scaled up Trashcans for the strap on boosters. For the second stage we might get away with a 909 but we'll probably need to use another LVT for that as well."

Jeb's face fell. "Seriously, Genie - seven, maybe eight T-20s?"

"Yes," said Geneney, "Using engines and parts that we have right now, that's about the minimum we need to put a Mark 2 into orbit with a very basic service and propulsion module. The good news is that a slightly downsized version would also let us put a decent sized probe around the Mün, Minmus or possibly even Duna or Eve. Roncott and Camrie have also been doing some preliminary design work on a new probe chassis."

Jeb sighed. "I can see where this is going. Fine, go ahead and see what Mr Lodan is offering."

"If it makes you feel any better, Jeb," said Geneney, "I'm a bit suspicious about this myself. I can't believe that a new space agency would simply spring up out of nowhere and build a Kerbin wide space tracking network unless they were planning to do something with it."

Lucan laughed. "Maybe you can pick up some business for us, Gene."

Jeb finished his coffee and put his mug down. "OK then. Gene has a word with Mr Lodan and in the meantime, we go ahead with Moho 4 without the flight computer. Anything else?" He looked around his office but nobody else spoke up."

"Thank you, everyone."

Adelan jerked forward against her harness and narrowly managed to avoid bumping her head on the hatch wheel as the first stage engine shut down. A light blinked off on her control panel as the decoupler ring fired, pushing the spent stage away from the rest of the *Moho 4*. Seconds later she was pushed back into her seat again as the second stage engine lit with a reassuring rumble. She caught a brief glimpse of the midnight blue sky outside the hatch window before turning her attention back to her instrument panel.

"Flight, Moho 4. Second stage ignition confirmed. Altitude and velocity are green."

Lucan's voice echoed in her ear. "Copy that, Moho 4. Trajectory is nominal - you're flying straight through the window."

Not the best choice of words after that staging. "Understood, Flight."

Adelan kept a wary eye on the booster status displays as the Moho 4 continued its long climb to orbit but the tank pressures and engine temperature stayed firmly within their expected limits. Apart from the steady vibration from the engine it was almost like a simulated launch in the Whirligig.

Yeah and its about now that the Booth Crew like to throw something into the works. Keep on top of it Adelan.

"Moho 4, Flight. Forty seconds to loss of signal. All systems are Go. Good luck."

"Thank you, Flight. See you on the next orbit."

The radio crackled and fell silent. Twenty seconds later the second stage engine shut down and the capsule shuddered as the final decoupler ring fired to push the empty second stage away. The reaction control system fired automatically, nudging the capsule further away from the lazily tumbling rocket. As the capsule pitched down into the correct orbital attitude, Adelan's breath caught in her throat as a blue glow filled the capsule interior and she took her first proper look outside.

I don't think you're in the Whirligig any more, girl.

The flight plan for the first orbit was simple. Monitor capsule systems, enjoy the view and wait to re-establish contact with Mission Control. Adelan spent most of it with her face pressed up against the hatch window watching her home roll past beneath her. From this height it was almost impossible to get any sense of depth. Continents and oceans appeared flat, spread out before her like a fantastically detailed map. Towns and cities were clearly visible as irregular sprawls of densely packed shapes that flowed across their patches of landscape like amoebae, creeping around hills and insinuating themselves into the gaps between rivers. Away from the cities, a mosaic of fields and farms marched across the land broken up by forests and moors and ending in a ragged fringe near the mountains. The regular dots of Kerm groves covered farmland and moors alike.

Kerbol dipped below the horizon as the capsule sped out over the ocean. Streamers of crimson and cerise light washed through the clouds and all too soon, the capsule was plunged into darkness.

Then, as Adelan's eyes adjusted, the stars came out around her.

The softly glowing band of the Great River dominated her view but even from this perspective she could recognise some of the constellations; the Octopus, the Minor Fishes and the Little Snake, the Cookpot, the Plough and the Ship. Around and far beyond the familiar patterns from her childhood, uncounted shoals of new stars littered the sky.

They all look very different today, she murmured to herself as the capsule raced onwards.

The lights on the instrument panel dimmed as the first faint rays of light from Kerbol filtered through the clouds below. The radio crackled and buzzed and then she heard Sigbin's familiar voice.

"Moho 4, Wakira Station. Come in, Moho 4."

"Wakira Station, Moho 4. Peaceful morning, Sigbin."

"Peaceful morning to you too, Adelan. We're tracking you in a one six two by one eighty eight orbit. Barkton will confirm timing for the first burn but in the meantime we've got some thrusters to warm up."

"I have the checklist, Wakira. Standing by."

Adelan set to work, setting switch positions and watching for warning lights as she brought the reaction control system online.

"My board is green, Wakira. Please confirm."

"Our board is green, Moho 4."

"Horizon scanners are good. Starting IGU check."

The navball attitude and direction indicator on Adelan's control panel shifted slightly as the guidance system updated the gyro positions in the inertial guidance unit, aligning them with the capsule axes.

"Platform is good, Wakira, Re-orienting to local horizon."

"Go ahead, Moho 4."

Adelan took hold of the hand controller and nudged it gently to one side. There was a quick rattle of solenoids as the reaction control rockets fired, slewing the capsule slowly round. She watched the navball intently as it drifted round and then fired a second burst from to bring the capsule to a halt. Deftly she twisted the handgrip a fraction, triggering a second set of control thrusters. The capsule spun about it's axis. Flame puffed out of the thrusters again and it stopped.

"Wakira, Moho 4. Oriented to horizon, roll and yaw control is good."

"Copy that, Moho 4. Standby for handover to Barkton Control."

"Thank you, Wakira. Have a good day down there - looks like it's going to be a scorcher."

"Tell us about it. Wakira Station out."

The capsule was silent for a moment and then Lucan's voice crackled over her headset.

"Moho 4, Flight. How's it looking up there, Adelan?"

"Beautiful view from here, Flight. Capsule systems are good, platform is aligned, RCS checks out in roll and yaw."

"Understood, Moho 4. Everything looks good from here too. We'll confirm RCS in pitch and then we're Go for catch up. According to the flight dynamics team we can proceed as planned with an orbit raising burn at MET one-four-two minutes followed by circularisation at MET one-nine-one dot thirty minutes."

"Copy that, Flight. Apoapsis to two one zero kilometres and then circularise at the start of orbit three. Do you have the burn times?"

"Affirmative, Moho 4. Stand by."

Four tongues of fire lit up the darkness over Kerbin, although nobody on the surface would have been able to see them. The matt black flanks of the capsule remained hidden in the dark, although yellowy white light sparkled off thruster housings and antennas. Inside the capsule, Adelan settled gently into her seat. Then the thrusters flicked off and she bobbed back up against her harness.

An observer on the ground would have been extremely hard pressed to spot the *Moho 4* as it crossed the terminator on its way up to the highest point in its orbit. Even with quite a powerful telescope, the small, dark, swiftly moving capsule would have been next to impossible to find. Fortunately, the KIS tracking station did not rely on optical tracking and the kerbals sitting at their consoles in Mission Control knew exactly when the craft was supposed to pass overhead. Even so Edsen was relieved to see his screen light up with data at the expected time.

"Flight - we have reacquisition," he reported.

He pushed his headset back and scratched his sweaty scalp. In the background he could hear one side of the ground to air dialogue as Lucan ran through a systems check with Adelan. According to the altitude reading on his console, the *Moho 4* was near to apoapsis. Right on cue, it's velocity suddenly increased and then settled at precisely the pre-calculated value in the flight plan.

"That's a good burn, Flight."

"Copy that, Edsen. Let's see if we can find that satellite." Lucan turned back to his console. "Moho 4, Flight. We're Go for radar acquisition. Estimated distance to the Kerbin 1 is no more than three hundred kilometres."

Aboard the *Moho 4*, Adelan reached out and flicked a toggle switch. In the capsule nose, Bill's rendezvous radar came to life, sweeping the space in front of the spacecraft with its electronic gaze. The reflection from the metal sphere was weak but it was enough. Adelan smiled broadly as she thumbed the microphone switch.

"Flight, Moho 4. I have a lock. Range one-five-eight kilometres, bearing three dot six radial in, two dot two normal.

The satisfaction in Lucan's voice was unmistakeable. "Good work. Edsen is working the next burn. Stand by.

Several orbits later, the satisfaction had given way to frustration.

"This just isn't working, Flight! Maybe an onboard computer or more comms uptime would do it but trying to run the manoeuvre when I'm out of touch for most of each orbit is just impossible. It doesn't matter how close I get, the damn thing just slides past at a different angle every time!" Adelan paused. "Sorry, Flight."

"Judging from the language that I've been getting from the press loop, I think we can trust Leland not to write that down. We gave him a good interview with Edsen's team too. Okay, take a break and get set up for Objective Two on the next pass."

"Copy *that*, Flight. Speak to you in an hour or so."

Adelan's headset crackled and then fell silent as the *Moho 4* flew over Barkton's radio horizon. She stretched as best she could in the cramped confines of the capsule and then reached for the squeeze bottle clipped to the wall. The water was tepid but still wonderfully refreshing after nearly five hours of flying. She set the bottle floating by the window, pulled a foil package out of its clip on the wall and ripped it open. *Looks like one of Ornie's compressed ration bars. Oh well, better than nothing.* As she bit into the bar, her eyes lit up at the wholly unexpected taste of sweet dried sunfruit pieces and chocolate chips. *I take it all back. Ornie - I think I love you!.*

Washing down the end of the fruit bar with a last mouthful of water, Adelan clipped the bottle back to the wall and stowed the empty foil package. Then she reached under the control panel and retrieved a coil of crinkled silvery tubing fitted with a blue adapter plug and locking collar on each end. She fitted one plug into a socket on her spacesuit, twisted it and heard it click into place. Then she twisted the locking collar in the opposite direction and felt it click into place too.

Suit locked, suit lock locked.

Adelan uncoiled the umbilical and plugged the other end into its socket in the arm of her seat. The tubing was stiff and drifted awkwardly around her in the zero gravity environment of the capsule. She pushed it to one side as best she could and twisted the second collar into place.

Supply locked, supply lock locked

She forced her hands into her stiff spacesuit gloves and secured them at the cuffs. Finally she put her helmet back on, snapping it into place on the neck ring of her suit. The suit gloves were too restrictive to let her cross her fingers, so she tapped the edge of the control panel for luck and toggled the cabin air supply switch to EVA. As cool air began to flow over her face, she switched her headset from CAB to SUIT and waited.

"Wakira Station, Moho 4. Come in, Wakira."

There was no reply. Adelan checked the switch positions on the communications panel and tried again.

"Wakira Station, Moho 4. Come in, Wakira."

She heard a faint buzz from her headset and then Sigbin's muffled voice in her ear.

"Moho 4, Wakira. You're very faint, Moho 4."

Adelan twisted the volume dial up to full.

"I've boosted volume to maximum, Wakira. How do you read?"

"Not great but enough to do the job."

"Understood, Wakira. Environmental systems are Go for EVA. Requesting capsule systems check."

"Copy that. Your board is green and you are Go for depress."

Adelan reached out, flipped open a protective cage on her control panel and jabbed the button underneath with one padded forefinger. Immediately air began to vent from the capsule and her suit began to swell as the cabin pressure dropped. As the pressure fell below ten percent of normal, she closed the vents and re-caged the button.

"Wakira, Moho 4. I'm opening the hatch."

The wheel was stiff and cumbersome to operate with gloved hands but Adelan eventually managed to turn it far enough to withdraw the locking bolts and push the hatch open. She released her seat harness, took a firm hold of the hatch frame and then slowly and carefully stood up on her seat and pulled her head and body through the doorway into open space.

There was absolute silence over the air to ground loop. Sigbin shared a worried look with Doodlie and keyed her microphone again.

"Moho 4, Wakira. Do you read me?"

"Loud and clear, Wakira! You can't see me but I'm waving at you guys!"

Doodlie slapped his forehead and pressed a switch on his console. "Don't bet on that, Moho 4. How about another wave for the camera?"

A small television screen lit up and Doodlie's jaw dropped open. Sigbin glanced up too and promptly sat back in her chair with a thump. The curved surface of the *Moho 4* filled the bottom of the screen. For the first time ever, the capsule hatch was open in flight and a space suited figure was leaning out of it and waving at them. Behind the capsule, the bright backdrop of Kerbin lit up the entire scene. The image was good enough that Sigbin could just make out clouds and the edge of the Wakira coastline.

"Oh wow..." she said softly. "Moho 4, is that view as good as it looks?"

"Probably even better, Wakira!" came the exuberant reply. "The view from the capsule window is spectacular enough but this... this is something else! I tell you, Sigbin - every kerbonaut that we send up needs to see this."

"I don't suppose Jeb has any spaces left in the roster has he?" said Doodlie wistfully.

"Not for Moho flights," said Adelan, "but we'll need plenty of new pilots for the new three kerbal capsule. We all build them - we all fly them guys."

At that moment, both Doodlie and Sigbin decided that they would be taking a trip to Barkton in the not too distant future.

"It's a tempting thought, Adelan. Wish we could watch you out there all day but you're about out of range. One minute to loss of signal and transfer to Barkton Control."

"Understood, Wakira."

Adelan waited as the radio crackled into static and back again.

"Moho 4, Barkton. Come in, Moho 4."

"Do I have to, Flight?"

There was a pause and then a chuckle. "Not yet, Moho 4. We've got you right on camera and you've got a lot of people down here cheering at you. From the expression on Jeb's face, I think you're giving him an idea or two as well!"

"The boss is watching this too, Flight?"

"We're *all* watching this Moho 4. Everyone here at the junkyard and I don't know how many others around the world. You're headline news, Adelan!"

"Too bad I can't do much more than wave at the camera, Flight."

"That's good enough for us. We'll get to more complex EVAs in time but right now - you're making us proud here, Moho 4."

Adelan was suddenly very thankful that her face was obscured by a reflective visor.

"Uhh, thanks Flight. I just wish that everyone who helped put me up here could see this too. Flying the capsule is already pretty special but EVA... it's just me, Kerbin and the whole wide universe, Flight."

For a moment, there was silence from Mission Control.

"Copy that, Moho 4. I hate to bring us back to the flight plan but how's the suit holding up?"

"I'm as snug as a kerblet in its pouch, Flight. Thermal control is excellent, mobility is good, environmental systems are nominal. Feels great to be able to stretch my arms without worrying about knocking into anything important."

"That I can imagine, Moho 4. The Kerbal 2 was a bit cramped too but I only had to spend twenty minutes squashed between Gene and the capsule wall." Lucan paused. "OK, Moho 4, I've got a roomful of people here confirming your suit status report. How do you feel about staying outside for the extended thermal systems evaluation?"

Adelan smiled behind her visor. "I'd be happy to, Flight," she said.

The *Moho 4* soared around the night side of Kerbin. Adelan tucked her gloved hands under the hatch wheel and watched the lights unroll beneath her. Her suit radio had long since fallen silent, leaving her to contemplate the view in peace. *Enjoy it while it lasts girl* she told herself *You're probably the only kerbal who'll ever get to do this without having Mission Control in their ear the whole time.* She glanced down and checked the suit readings on her chest. *This is crazy. I'm a hundred miles into space, flying in the shadow of Kerbin and it feels like I'm tucked up in bed. Wonder if Mission Control could rig up a hammock next to the hatch? Something to lie back on and watch the stars go by.*

The stars faded away as Kerbol crept over the horizon, bathing Adelan and the *Moho 4* in sunlight once again. Adelan sighed and prepared to climb back inside the capsule. Then she grinned. *Might as well stay out here a little longer and finish the orbit first.*

Sigbin had to work hard to keep her voice sounding properly matter of fact. "Moho 4, Wakira. We're seeing a problem with your hatch bolts. Please confirm locking status."

The voice from space still sounded a little faint. "Wakira, Moho 4. Locking status is nominal. Recommend you check external camera systems."

Sigbin raised her eyebrows at Doodlie, who shrugged and flicked the camera back on.

"What the...! You're *still* out there, Moho 4?"

"Uh, it's in the flight plan, Wakira. Extended thermal systems evaluation on the suit."

"Well yes, yes it is. But running the extended evaluation first time out!"

Adelan's voice was soothing. "Relax, Wakira. Suit status was confirmed by Barkton before the EVA extension. Besides - I had enough light from inside the hatch and enough air in my helmet to get back inside if need be. I was just taking a nice easy journey around the world."

Astronomers all over Kerbin spotted an unusually bright shooting star passing overhead that night. The more astute ones noted its almost perfectly equatorial heading and realised what they were watching. Some of them even waved as it blazed overhead, silently wishing the pilot a safe landing.

Minutes later, a dark speck sailed through the sky and out over the Great Tranquil Sea. An orange ribbon snapped out behind it, pulled taut and broke away as two orange discs burst into view. The *Moho 4* was coming home.

I'd like to dedicate this one to Colonel David Randolph Scott; Apollo 15, Apollo 9 and Gemini 8, a great astronaut who never did get to take his walk around the world.

Chapter 25

Circles

Enley glanced at the altimeter, sighed and pulled the throttle levers back to their shutdown positions. The bone shaking howl of the twin C7 rocket engines faded to a sullen mutter, hiccupped and then cut out completely. Outside, plumes of white streamed out of the engine nozzles and were swiftly whipped away to nothingness by the hypersonic slipstream.

Enley clamped his lips together and blew sharply into his oxygen mask. The pressure on his eardrums subsided but he still couldn't hear anything through his heavy flight helmet. The fuel gauges showed a healthy reserve left in both propellant tanks and for a moment he was sorely tempted to try an engine restart and see just how high his aircraft could take him. The sluggish response of the control stick as he eased out of his zoom climb came as a sharp reminder that this would probably be a bad idea.

Enley checked the altimeter again and cautiously eased the *Skyhawk* into a shallow bank. He relaxed his grip on the control stick but the aircraft didn't respond and his eyes widened as the artificial horizon tipped past 60 degrees. He pushed the control stick hard over, feet dancing on the rudder pedals as he fought for control. Beads of cold sweat popped out on his forehead, as the bank angle fluttered perilously close to vertical.

At the last possible instant the control surfaces held, flipping the *Skyhawk* back over in another snap-roll. The aircraft see-sawed across the sky, ailerons flip-flopping up and down and rudder flicking from side to side. The nose dipped sharply and it plunged downward, wings still rocking wildly. Enley gritted his teeth and hauled back on his controls. For one agonising moment the *Skyhawk* refused to respond and then, centimetre by centimetre, the nose began to rise. Blinking the sweat out of his eyes, he released the back-pressure on the stick and let the aircraft settle into a shallow dive.

The utter blackness outside the cockpit canopy faded into a chilly indigo sky, lit from beneath by an iridescent blue glow. For a fleeting instant Enley marvelled at the spectacular view of Kerbin spread out before him. Then his eyes flicked back to his instruments and he

gave his full attention back to the task of putting his aircraft back on the ground in one piece.

The control stick began to feel more positive in his hands as the *Skyhawk's* flight surfaces bit into the thickening air and he warily began a descending turn. This time the bank held steady at the commanded twenty degrees. As he swooped down through fifteen thousand metres, Enley allowed himself another glimpse of the view outside. *Only not quite and all of it at once*, he murmured to himself. *Those crazy KIS guys sure got that bit right. Got some guts too, to try a stunt like that with nothing but a tin can and a parachute.*

The *Skyhawk* began to vibrate in the denser air. Enley scanned his instrument panel and nodded to himself as the altimeter unwound past ten thousand metres. Working his controls in short, precise movements, he rolled the *Skyhawk* to the right in the first of a planned series of wide S-shaped turns, designed to bleed off his excess speed before final approach. Far below, a vast expanse of forest whipped past in a supersonic blur.

Enley soared over the thinning forest canopy and across the surrounding grasslands. The edge of the forest was ragged with straggly clumps of trees spilling haphazardly onto the plains. As he shot past, he was startled by a sudden glimpse of smeared out muddy brown amidst the greenery. He pulled the *Skyhawk* round for the last time, easing into a shallow dive to maintain airspeed as he lined up on the distant runway.

The final pass over the trees was lower and slower and Enley blinked in surprise as he flew towards an enormous semicircle of wilted and browning vegetation stamped into the grass at the edge of the forest. *Looks like someone's making themselves a new field - but I don't see any signs of life. And what... no that can't be right.*

Enley frowned. Smack in the middle of the dying vegetation was neat semicircle of rich iridescent green. From this angle, the whole thing resembled nothing quite as much as a thick, muddy rainbow carved into the grass.

What on Kerbin could make plants grow in such neat lines. Maybe I'll have a word with John-B back at base. He's not long out of his Grove - maybe he would know.

The sail flapped in the stiffening breeze, beating against the rigging with the flat slap of canvas against rope. Lemdan pulled on the sheets, expertly trimming the sail until it just caught the wind and billowed out with a sharp crack. The heavy rope squeaked against a gleaming brass cleat as he made it fast, rocking back on his heels as his vessel lurched into motion. Almost keel-less, it was about as manoeuvrable as a kaya on a frozen pond but fortunately the light breeze was blowing dead aft, bringing the faintest whiff of salt from the Wakira coastline with it and providing almost perfect sailing conditions for the small, square rigged raft.

This close to the sea, the river Wak was still broad enough that even such a clumsy vessel as a raft was unlikely to hit anything. Lemdan pulled the tiller line smoothly around another

cleat, dropped a neat hitch over one end and pulled it tight. He pushed his broad brimmed cap back on his head and surveyed the river with some satisfaction.

A string of similar rafts trailed behind him, their captains less alert to the changing wind than he had been. Further ahead he could make out a number of the larger rafts edging ahead with their sails bulging and their pennants jauntily snapping in the breeze. He nodded to himself: *Anything more than this breeze will tip 'em right over. Wouldn't want to pole one of those damn whales either, never mind take one over the rapids.*

The tree-shaded river banks were lined with kerbals waving brightly patterned flags printed in the colours of their favourite raft. Small kerblets splashed happily in the shallows under the watchful eyes of their parents, whilst the older ones played with a colourful assortment of toy rafts. Some were painted in official team colours but as far as Lemdan could see, most of them weren't much more than hastily lashed together collections of sticks and string. He smiled and watched one of the bolder youngsters shin up a tree, climb out onto a convenient branch and plunged into the river with a yell and a mighty splash. Several of the erstwhile rafters quickly realised that it was better to drench than be drenched and soon the air was filled with spray, hurtling green bodies and shrieks of glee!

Some of the bolder spectators had taken to the water themselves, swimming or darting around the slow moving rafts on flat bottomed bodyboards. Lemdan kept a wary eye on the closest swimmers in case they decided to hitch a lift. *Doubt they'd tip me over but one of 'em would slow me down fer sure.*

One of the swimmers began to circle around behind him. Lemdan sauntered over to the centre of the raft and nonchalantly lifted his marlinspike off its hook. He propped himself against the mast and set to work unpicking a knotted hank of rope. The swimmer took the hint and backed off to a more respectful distance.

Further ashore, crowds of kerbals strolled amongst a host of tents and an eclectic throng of smaller booths and stands. One particularly large marquee was emblazoned with an enormous stylised sailing raft that proudly proclaimed its owner to be an official supplier of the 24th Annual Wak Race. Kites fluttered from tent poles and a haze of charcoal smoke, liberally flavoured with the appetising aromas of grilled meat, toasted breads and hot baked corn, hung in the air. Lemdan leaned out over the edge of his raft and cupped his hands around his mouth.

"Ho there!"

The nearest boarder looked up. Lemdan fished a coin out of his pocket and held it out at arms length.

"If yer goin' to be followin' me upriver, you can make yerself useful. I'll have a bucket o' corn bites an' a bluefish skewer. Salted not smoked and mind yer don't drop it! Rest o' the coin is for delivery!"

He flipped the coin over the side. The boarder grinned, snatched it out of the air and paddled swiftly towards the bank. Lemdan watched as the small damp figure hauled itself

out of the water, pulled its board out onto the shingle and disappeared into the crowd, emerging with a shiny white bundle, clutched in one hand. The boarder casually tossed his slender vessel back into the river and waded out after it, carrying his prize high over his head.

Lemdan raised his eyebrows as his impromptu deliveryman set out across the river. *Not too bad - cuttin' me off at the bend and aimin' across me bows instead o' chasing along behind. Lad's got some water sense.*

With a quick flick of his feet, the boarder darted in and grabbed the edge of Lemdan's raft. He shoved the shiny white bundle safely up onto the logs, tipped Lemdan a mocking salute and paddled away downriver. Lemdan retrieved his parcel, ripped open the thick waxed paper and sighed as the rich smell of tangy pepper sauce, toasted pine kernels and salted bluefish filled his nostrils.

By time Lemdan had finished his lunch and stowed away the empty wrappings, the last of the tents were drifting slowly astern. Up ahead, a lazy looping bend of the Wak river marked the first real challenge of the race. He unlashed his tiller, seized hold of the sheets and peered intently at the shallows by the inside bank. *No rocks, not seein any eddying worth mentioning. Should be plenty deep enough for this old lump 'o lumber..*

He pushed the tiller away, deftly working the sheets to bring the raft sluggishly about. *Careful, careful - keep 'er out of the irons. Not goin' fast enough fer any proper sailin here'.* The raft cut neatly across the bend, missing the bank by no more than two or three metres and edged back out into open water. *Not too shoddy if I do say so meself.*

The river glimmered in the afternoon sun. Sunbeams speared through a patch of shallow water, casting a lambent glow on the gravel beneath, whilst around the raft, surface ripples glinted in an ever shifting mosaic. Along the river banks, the tall trees and wildflower mats of the deep forest were gradually giving way to shorter hardier trees, shouldering their way through a dense carpet of bracken and thorny, blossom-speckled shrubs.

The afternoon wore on and the sun sank slowly towards the horizon. The low sunlight turned the river into a blinding mirror, forcing Lemdan to squint hard as he tried to pick out his course. He grumbled to himself and pulled his cap down firmly over his eyes. It didn't help.

Suddenly he heard raised voices. Blinking furiously he tried to see where all the commotion was coming from. Thankfully the sun chose that moment to disappear behind a particularly tall tree and Lemdan saw the pilots on the lead rafts all gesticulating wildly at something.

Lemdan's gaze instinctively dropped to the water's surface, although he couldn't imagine how any halfway competent river pilot could fall overboard in these conditions. His eyes darted to and fro, frantically searching for a bobbing green head. Then it struck him that all the other pilots were pointing at the river bank and not the water. Puzzled, he followed their gestures and nearly fell overboard himself.

A vast swathe of wilted grass stretched out as far as he could see. The few hardy shrubs that still dotted the landscape looked sickly and blighted with a faint haze of insects buzzing over them. Lemdan wrinkled his nose at the suddenly soured air. Behind the stench of rotting grass, he could just make out darker scents of... something. Something that smelt powerfully *wrong*, although he couldn't quite work out why.

Lemdan stared around in dismay as he floated on. The dismay turned to bewilderment as he spotted what appeared to be a perfectly healthy sapling jutting out from a nook in the river bank. He frowned. Much like the smell, there was something he couldn't quite identify about the lone survivor but at the same time it looked awfully familiar. Something about the shape of the leaves and the way they clustered around the stem.

Halby strode through the Veiidan woods with his tool belt clinking and jangling around his waist. Around him, the undergrowth was flattened and bent after the recent spring storms and several of the smaller trees were leaning over at odd angles with their roots protruding from the soil. Halby paused to paint a white cross on one particularly fine leatherbark to mark it for the cutting crews that would follow him.

A huge fallen sapwood tree blocked his path, its roots reaching into the sky like gnarled fingers. He ducked under it making sure not to touch the sticky sap still trickling down the grooves in its trunk. Underneath the forest floor was dank and slimy underfoot. Halby cursed as one foot skidded in the muck and grabbed at the nearest branch to steady himself. He wiped his boot on a tuft of sickly yellow grass and nearly gagged at the combination of bruised foliage and stagnant black mud. *Dear Kerm but that's awful.*

Halby bent down to retie his boot lace and was startled to see other clumps of the same yellow grass dotted over the forest floor. He pulled the can of white paint out of its holster and aimed it at the fallen giant. *Still plenty of sap in that one. Should be worth saving..* Then he paused and took a closer look. He drew his knife and tapped the hilt against the trunk.

Instead of the clear tap tap tap of steel against hardwood, he was rewarded with a dull thudding sound. Reversing the blade, he cautiously jabbed it into the bark. The blade slid effortlessly through and deep into the unnaturally spongy wood underneath. He frowned and pressed down on the handle. A large chunk of wood tore out of the trunk, ripping the rotten bark away as it went. A cloud of spores exploded into the air and Halby flung one arm over his face to protect himself.

What in the hells?!

Halby grabbed a second can of paint from his belt and viciously sprayed a bright red cross on the sapwood trunk. *Just in case. Would take a real bug-wit not to spot something was wrong but that amount of rot would catch anyone by surprise.*

The further Halby went into the forest, the more uneasy he became. The trees around him were encrusted with moss and lichens, even on the dry side of their trunks. Thick skeins of mistletoe ran wild over their branches, streaming down in great gauzy sheets that rustled in

the breeze. A cloying smell of mildew and rot hung over everything. Fighting down his rising nausea, he pressed on. *Need to get to the bottom of this. Doubt anything is worth cutter time though.* He pushed through a particularly thick curtain of mistletoe and emerged into a murky clearing.

There was a sudden crunching sound underfoot. Halby looked down in trepidation and leapt backwards with a startled cry. The floor of the was alive with trail after trail of ants, termites, woodlice and other creatures that he didn't even recognise. In places the leaf litter churned and rippled as waves of insects marched past. The few remaining tree stumps in the clearing were coated black with tiny writhing forms.

Then Halby lifted his gaze and his mouth fell open. Right in the very centre of the clearing was a tall slender sapling. It was tall enough to have started growing its first lateral branches and the second ring of leaves around it's stem were well developed. It's leaves were bright glossy green and perfectly formed. They rustled in the dank, fetid air.

It can't be. It can't be...

The emergency team stared around in horror. The village itself seemed to be largely intact but the surrounding fields and orchards were ruined. Most of the villagers wandered aimlessly, or sat outside their huts gazing blankly into space.

The hut door swung open and the medical team emerged, carrying an elderly kerbal on a stretcher. Sallow skin drooped off his emaciated frame in slack green folds and his eyes rolled wildly in their sockets as he thrashed against his restraints.

"They're coming! They're coming!"

One of the medics held up a syringe and raised his eyebrows. The senior doctor shook her head sharply and bent closer to the old kerbal, murmuring into his ear. Whatever she said only agitated her patient still further. Specks of foam spattered against his chin as he screamed.

"The sparks are coming! They're still coming! They're going to kill us all!"

Jonton's hand shook as he turned off the television and turned to face Gerselle. Her face was pale and drawn and her fingers trembled on the arm of her chair.

"Sparks. I didn't see any sparks."

Jonton's eyes twitched at the memory. "I did," he replied quietly. "What did you see instead?"

"I saw a great black wall," Gerselle said. Her voice quavered. "It was suffocating me, trapping us away from the light, crushing us into our prison."

"That makes sense," said Jonton slowly. "You were the new Kerm, trying to take your own ground. You didn't care that some of it was already taken." He grimaced. "We barely managed to hold you off. I don't think that poor fellow was as lucky."

Gerselle's voice shook. "Did you see the rest of the village? It was ruined, Jonton - just ruined! Whatever that Keeper was fighting must have been a lot closer to his grove."

"I don't think there's much 'whatever' about it," Jonton said grimly. "He was seeing sparks - he had to be fighting another Kerm."

"But how?" said Gerselle, "We planted my Grove too close to yours but mine was the first new Grove in..." Her eyes widened in horror.

Jonton nodded. "Yep. I don't know how they missed it but one of the trees in his Grove must have dropped a seed too." His fingernails dug painfully into his palms and his voice turned bitter. "A new Kerm, right in the middle of his Grove. He never stood a chance."

Gerselle's voice was very small. "I wonder if any other Kerm are starting to seed?"

"I don't know," said Jonton, "I've been trying to ask my Kerm but just the mention of another seed sends it into a panic. I get a lot of memories of sparks but one memory feels much the same as another to me. I don't know whether it's talking about the fight with your Kerm or fighting between all Kerm."

"What are we going to do? A few dozen seeds would be bad enough but if every Kerm on Kerbin decides to drop one!" Gerselle threw her hands up helplessly.

Jonton took a deep breath. "I do have one idea," he said, "but I don't like it. If we can't make our Kerm understand, then we need to make them capable of understanding."

Gerselle frowned. "I don't follow you."

"One Kerm tree on its own is barely intelligent," said Jonton. "Thirty-seven knitted together aren't quite intelligent enough. But thirty eight or thirty nine might be."

"No!" said Gerselle. "Jonton you can't break the..."

"Law of Thirty Six?" said Jonton. "That's what I thought too. The thing is, Gerselle, I can't find any reason *why* that law was ever written. Even the oldest records just take it for granted, just like they take so much else for granted. We follow the law blindly because it works - but we don't know why!"

"It's there for a reason, Jonton! It comes up in the Records time after time. Why bother doing that if it wasn't important?"

"The Records are like that, Gerselle. Old facts repeated again and again. For goodness sake, the Records insist that you should never plant leatherbark and sweetleaf together in the same Grove! Try telling that to my great great grandfather."

"The Records also insist that Groves should be planted a days walk apart, Jonton. That turned out to be pretty important wouldn't you say!"

Gerselle suddenly lifted her hand and cocked her head but there was no sound from the next room.

"I thought I heard Joenie, " she said quietly. "I don't like this plan, Jonton. It's just too dangerous."

"Nor do I," said Jonton, "but I honestly can't think what else to do. We need answers Gerselle and we need them badly."

"The Conclave?"

"That was my first thought. But you know as well as I do how long it takes to gather the Chief Ambassadors. How many more seeds will fall in that time?" His voice shook. "And we all own the same Records anyway. I hate to say it but I don't think they'll have any more idea what to do than we do."

Gerselle was silent. "One extra tree, Jonton. One extra tree - and if anything goes wrong we burn it to the ground and beneath."

Chapter 26

Docking - Part I

Hanbal gnawed on one knuckle and listened to the familiar cadences of Mission Control ebbing and flowing around him. Controllers murmured into their headsets, requesting system reports, issuing orders to their teams and relaying updates to the flight director. Keyboards clacked away, orchestrating shifting patterns of data that rippled over dozens of monitor screens and lit up constellations of tell-tale lamps.

Like the eye of a hurricane, the orbital tracking screen was the single point of calm at the centre of the data storm. The familiar map of Kerbin was empty apart from a single stylised rocket icon representing the *Endurance* on its launch pad. For now, Hanbal's gaze was fixed firmly on the next screen, which was currently showing a view over that very same launch pad.

Compared to previous generations of Rockomax boosters, *Endurance* looked deceptively simple. A gently tapered capsule sat atop a single unbroken tube of metal, with an engine bell attached to its base. The whole assembly was capped by a latticed spire, which in turn was topped with a cluster of smaller rockets. Only the tubing wrapped around the upper end of the engine bell - and the thin plumes of vapour rolling down her flanks - suggested that *Endurance* might be something different.

Hanbal caught a familiar whiff of hair oil as the control room door swung open behind him. He flicked a look to his left as Danfen joined him at the rail.

"Cutting things a bit fine weren't you?" he said quietly.

Danfen nodded. "Took longer than we thought to clear that last hold. Turned out to be a faulty sensor on the hatch."

Hanbal's reply was cut short by a squawk of feedback. Nelton adjusted a dial on her console.

"Understood, Bunker. That's a Go for terminal count."

One of the controllers got up from his seat, walked up the steps to the viewing balcony and locked the door. He nodded briefly to the two engineers and hurried back to his console.

Danfen glanced up at the monitor. The view over the launch pad flickered and was replaced by a close up image of the launch tower fuelling arm. Two thick hoses emerged from a port on the booster and disappeared off screen. The port itself was thickly rimed with frost and every so often a chunk broke away and dropped out of view. The image sputtered and dissolved into static before switching back to the view from the launch pad camera.

"She doesn't look like much from this distance does she?" said Danfen.

"No," said Hanbal, "the single booster makes it tricky to get a sense of scale, unless you know what you're looking at."

Danfen chewed on his thumbnail for a moment. "It's a nice simple design though," he said at last, "Two stages, two engines, two decouplers. No B1s strapped on the side to stress the airframe, less off-axis thrust to balance."

Hanbal snorted. "You forgot the two tankfuls of liquid oxygen," he said dryly. "That's quite enough stress on the airframe for my tastes. Not to mention a main engine that's about an order of magnitude more powerful than any liquid fuelled stage we've ever flown before."

Danfen's knuckles turned white on the rail. "I know," he said, "We learned a lot from the SK1-O though - version P is much more robust."

"Oh the Skipper is a good engine," said Hanbal. "Best machine we ever put on the stand and the test flights went off without a hitch. It's just..."

Danfen completed his thought. "Yeah. It's a big engine to put a crew on top of. Incidentally - 'Skipper'?"

"The propulsion team's nickname for the SK1-P," said Hanbal. "I don't recall who started it... but it stuck."

Danfen laughed. "You'll need to think of a better name for the upper stage," he said. "The 'Skigger' doesn't have quite the same ring to it."

Below the balcony, the tempo was picking up. The keyboards rattled away and the various clicks and clacks from the other controls grew steadily more urgent. One by one, auxiliary monitors lit up around the main orbital tracking screen, displaying detailed readouts of the different spacecraft systems. The controllers remained focused on their consoles, silent except for crisp, clipped reports to Nelton as they each signed off the final items on their checklists.

"APU disconnect Go."

"Capsule is on internal power."

"Tank pressures nominal. Clear for LOX feed detach."

"We are Go for autosequencer start."

Nelton tapped her microphone for attention. "All stations report in please. Booster?"

"Go, Flight."

"Flight Dynamics?"

"Go, Flight."

"Guidance?"

"We're Go, Flight."

"Telco?"

"Go, Flight."

"CapSys?"

"Go, Flight."

"Spacecraft?"

All the controllers smiled as James' and Sherfel's voices rang out in unison.

"Go!"

Hanbal's eyes scanned the screens restlessly as he silently counted off the final moments to lift-off. The water jet sound suppression system started with four seconds to go, drenching the base of the launch pad and shrouding the bottom of the booster in a dense mist. At two seconds, a painfully bright light flared through the fog, faded briefly and then exploded into a torrent of golden fire blazing out of the SK1-P engine bell. Thousands of litres of water instantly blasted into clouds of superheated steam, lit from within by the incandescent glare of rocket fire.

For a fraction of a second the rapidly building downdraft from the engine sucked the billowing mass back towards the rocket and out through the flame trench. Then, the sheer volume of exhaust pouring out of the Skipper overwhelmed the trench capacity and enveloped the launch pad in a roiling inferno of fire and smoke. Somewhere in the midst of the maelstrom, a set of launch clamps fell away.

"Lift-off. We have lift-off!"

Hanbal clenched his jaw as *Endurance* clawed her way unsteadily off the pad. *Come on, come on, come on!* The launch escape tower twitched from side to side as the booster fought its way skyward, guidance systems struggling to keep the unwieldy machine upright. Then the noise hit them.

Even from Mission Control, the roar was terrifying, shaking windows and knocking cups off consoles. The overhead lights rattled in their mounts, sending shadows pitching and swaying over the display screens. The vibrations pounded through the Hanbal's chest, gripping it in a primal embrace until he felt his entire body shaking in sympathy with the booster.

"Tower is clear!"

Danfen let out his breath explosively and grinned fiercely at Hanfal. On the monitor screen, *Endurance's* engine lifted clear of the launch tower, lofted out of the chaos by a solid, brilliant white pillar of fire. Now the rocket was picking up speed, accelerating smoothly as it climbed its own length and then it's own length again past the top of the tower. Far below on the ground and completely obscured by the dense smoke, the last tongues of flame gambolled across the launch pad, twisting and swirling in the superheated air.

"Approaching Max Q."

Nelton pushed a switch on her console. The overhead speakers crackled and roared and then fell silent. Everyone suddenly heard Sherfel calmly working through her checklist.

"*Endurance* is supersonic. Pitch and roll looking good. Skipper readouts are nominal."

Danfen chuckled as James' voice came over the loop.

"We got ourselves a nice smooth ride here, Flight - once we managed to get off the ground."

"Copy that *Endurance*" said Nelton blandly. "I'll be sure to let the engineering teams know that you approve of the anti-pogo systems."

"I just hope the second stage is as smooth," muttered Hanbal.

Danfen squeezed his shoulder.

"It'll be fine. How many times did we run through the chill-down procedure in testing?"

He raised his hand before Hanbal could speak. "Yes, I know - not the same as doing it under flight conditions. Admit it though Han - we couldn't have asked for a better launch to try it for the first time."

Hanbal scowled at him and turned back to the monitors.

Endurance sped through Kerbin's upper atmosphere. The brilliant yellow white flame from its main engine had long since fanned out into a dirty orange plume glowing dully in the thin, frigid air. Then, with a final cough of sooty flame, the SK1-P shut down. A sudden sharp crack of explosive bolts split the rocket in two and the spent lower stage fell slowly away, beginning a slow end over end tumble as it dropped back to Kerbin. A second, smaller set of bolts fired with a popping noise, sliding the interstage ring free. It slipped easily over the second stage engine bell and began its own long descent to the ground whilst the rest of the rocket coasted serenely upwards.

"Second stage ignition confirmed, Flight!"

"Thank you, Booster. Guidance?"

"Looking good, Flight."

"Telco?"

"We're Go, Flight. Routing the backup telemetry through the air to ground link but primary data is coming through the satellite feed."

"Flight - Booster."

"Go ahead, Booster."

"Escape tower jettison confirmed Flight. Clean separation."

Hanbal's shoulder's dipped by a fraction of a centimetre. "It worked," he murmured, "it actually worked."

"Just like it did in testing," agreed Danfen. "I'm no trajectory expert but I'm guessing that three kilometres per second at one-two-five kilometres, means we can't be far off the flight plan."

"No idea," said Hanbal. "It's enough to drop them back into the sea on a reasonable trajectory though if anything goes wrong." He glanced at the monitor. "Thrust looks okay, fuel consumption is right on the curve."

Danfen nodded. "No atmosphere left to stress the airframe. If she's held together this long, she..."

Hanbal poked him sharply in the ribs. "Don't say it. Just don't."

The two engineers watched the telemetry whilst *Endurance* climbed steadily to orbit. The atmosphere in Mission Control was still alert but the relaxed postures of the controllers and cheerful tones of the crew told their own story. Nelton however, was still sitting bolt upright at the flight directors console, head flicking from side to side as she shifted her attention from system to system. Occasionally she leaned forward and spoke quietly into her microphone, eyes still focused on the screens.

"Flight, this is Booster. Second stage shutdown in twenty."

"Thank you, Booster. Flight Dynamics?"

"We'll need confirmation from Tracking," said Lemgan "but right now, it looks like we're right at our predicted orbit."

Muted applause rippled around Mission Control. Nelton gave her team a moment to celebrate before tapping her microphone. The room instantly fell silent.

"Good work, everyone. *Endurance*, do you read?"

"Loud and clear, Flight," came the the prompt reply. "Our board is green and our view is... well our view is out of this world, Flight."

"Copy that, *Endurance*. Okay, I want both telemetry channels online for the next manoeuvre. Suggest you take half an orbit to do some sight-seeing and then get set up for transposition and docking on the next pass over Foxham."

Endurance drifted serenely in orbit, spinning slowly about one axis to keep her nose pointed in the direction of flight. Reflected light from Kerbin shimmered off the spacecraft hull, lighting up thruster mounts like miniature stars and turning the polished antenna dish a deep blue. Two of the thrusters spat fire in precise bursts bringing the slow rotation to a halt.

Puffs of flame flared in the darkness and a dark crack raced around the tapered forward end of the booster. Four curved steel petals folded back revealing a stubby cylindrical module nestled atop the booster second stage and allowing *Endurance* to float freely for the first time. A delicate choreography of thruster pulses pushed her clear of the booster, flipped her neatly over and then drove her back towards the booster with her nose aimed squarely at the centre of the docking port attached to the forward end of the module.

Delicately, with the merest puffs of flame from the thrusters to correct her course, *Endurance* brushed against the open port. There was a long pause as she seemingly gathered herself for the next effort. Then, with all four thruster blocks firing majestically against the starry blackness, she pulled away from the empty booster, hauling her prize from it's steel cradle into open space.

The module resembled a giant polished thread reel, cylindrical but with a thick raised rim at each end. Equipment boxes girded the centreline and the hull was festooned with hand - and foot - holds for spacewalking kerbonauts. A pair of small portholes were set into each side, glinting in the raw sunlight. *Endurance* was securely attached to one end, her heat shield pointing along the direction of flight.

Inside, James let go of the the thruster controls and wiped his forehead with the back of his hand. Beside him, Sherfel tapped away at a small keyboard set into the edge of her control panel.

"And done. Okay, Flight, orbital program loaded, RCS mode to Docked."

"Confirmed, *Endurance*. You're clear for an orbit raising burn in twelve minutes, circularising in fifty one. Stand by for burn parameters."

"Copy that, Flight - got my pad right here."

Sherfel cocked her head to one side, brow furrowed as she copied two strings of figures into her flight log and then read them back to Nelton.

"That's a good read, *Endurance*. Telco is picking up some noise on the backup telemetry link, requests you cycle breakers 22a through c."

Sherfel pulled out the toggles on her panel, waited five seconds and then pushed them back into place.

"How's that, Flight?"

"System is cleared, *Endurance*. Thank you."

The meagre acceleration from the thrusters cut out and James and Sherfel bobbed up against their harnesses. Sherfel tapped out an enquiry on her keyboard and the flight computer promptly flashed up three numbers.

"One nine seven by one nine three by twelve," she reported.

"Good enough for now, *Endurance*," replied Nelton. "According to CapSys, air pressure in the hab module is good, so you're Go for ingress at your convenience."

Sherfel couldn't quite keep the excitement out of her voice. "No time like the present, Flight, she said, unbuckling her harness and pulling herself free of her acceleration couch. She swung her legs slowly to one side, caught hold of the handgrips set into the edge of her control panel and pushed herself down under the two couches. She studied the hatch for a moment then braced herself and pulled the locking lever firmly down.

The hatch came free with a clunk of retracting bolts. The air pressure between the linked spacecraft equalised with a gust of air that rippled Sherfel's hair and wafted the scent of adhesives and fireproofed upholstery into *Endurance*.

"Mmmm," said James from above her head, "that new spacecraft smell! Air pressure is holding steady, Sherf."

Sherfel lifted the hatch out of its frame and stowed it carefully under the capsule couches. Then she wriggled through the narrow passageway into the habitation module.

"Okay - I'm in!" she called out to James. "Beginning inspection."

Two gently curved shelves extended along the length of the cabin walls in front of her, dividing the main accommodation area into upper and lower sections. *Yeah, yeah, no up and down in space*, Sherfel corrected herself automatically, *but it doesn't make much sense to put the controls on the floor*. Each shelf had a neatly stowed sleeping bag and set of restraints fastened to each end. She peered under one shelf and was surprised to see what looked like a set of thick rubber bands clipped under it. *Oh right - the exercise bungees*.

The cabin gangway was uncluttered but a pair of sack chairs - fitted with the seemingly ubiquitous restraints were stuck to the floor under each shelf. Grinning to herself, Sherfel pushed off from the wall behind her and drifted towards the centre of the room, languorously stretching out her limbs as she went. Compared to the cramped confines of *Endurance's* cockpit, this was luxury! She caught one of the sleep shelves with one hand and deftly spun herself about to face the passageway back to the capsule.

The reason for the narrow passageway instantly became clear. A bulkhead sectioned off most of the aft end of the cabin and two familiar signs stencilled on the bulkhead door made it very clear what lay behind. Hand over hand, Sherfel worked her way along the shelf and nudged the door open. *Wonder how this is supposed to work in zero-G?*

She was confronted with a seat perched atop a steel drum and surrounded by an improbable looking set of plumbing and attachments. *Okaaay - that's... different to the*

training rig. Those bits over there must be for the guys I guess. Either that or the engineers on the ground have more of a sense of humour than I thought. You know what? I think James can be the first to boldly go on this particular mission. She edged her way out of the tiny chamber and closed the door firmly behind her.

Right, sanitation this way, so that way must be the galley. Sherfel drifted over to the forward bulkhead and cautiously pushed the door open. Sure enough the small room contained little else but two water spigots and shelf after shelf of ration packs. Clipped to the front of one shelf however, was a very welcome surprise. Her eyes widened in incredulous delight at the row of capsules, each half opaque and half transparent and each containing an incongruous splash of green foliage.

She unscrewed the top of one capsule and gently bruised one of the thick fleshy leaves between her fingers, sniffing happily as they released a familiar aroma. *Pepper cactus! Well this place is certainly looking up. Plenty of space, a bit of greenery and a chance to do a little home cooking.* She bent forward and read the labels on the other tubes. *Marrowort, citrella, saltleaf, yellow clover and firewhisker. Oh this will do nicely!* She screwed the lid back on the capsule and made her way back out to the main cabin, trailing the pleasantly astringent scent of pepper cactus through the open door behind her.

"Everything looks in order through here!" she called.

"Gotcha, Sherf," James called back. He paused, "and Mission Control are giving us a Go for power up."

"Copy that. Deploying PV arrays."

Sherfel flipped back the locking bars over two prominently placed buttons and pushed the one marked PV-A. A green light began to blink on the control panel next to it and then, after an interminable wait, settled into a reassuringly steady, green glow. The needles on one set of dials swung smoothly over and other sections of the control panel began to light up. Sherfel scanned them, nodded to herself and pressed the second button.

The second green light blinked twice, then suddenly glowed orange. Sherfel jumped as a loud buzzer went off next to her ear and hastily pressed the button again. *Not good. Five seconds to cycle the systems then lets try that again.* The second attempt was no better. The buzzer sounded again and the orange caution light was replaced by a baleful red malfunction indicator. She jabbed the button again as James' startled voice echoed through the passageway.

"What's happening through there, Sherf? Bus A looks good but I keep getting warning lights on Bus B initialisation."

"Not sure, Jim, I'm going to take a look outside."

Sherfel pushed off towards the nearest window, hitting it with a solid thud. She craned her neck, trying to get a view back down the hull that wasn't hidden in a glare of sunlight.

"Can't see much from here, Jim. Give me a plus ten roll."

"Copy."

Sherfel stared out of the window as *Endurance* started a slow spin. Kerbol disappeared behind the hull and long shadows crept out from behind the hand holds and equipment boxes attached to the cabin exterior. Then she stiffened. *Oh sweet Kerm...*

"Hold it there, Jim. And... you'd better tell Control that we've got a problem here."

Chapter 27

Docking - Part II

"What kind of a problem, Sherf?"

"The boost cover over PV-B is stuck. Looks like the bolts fired but one of the dampers is only halfway open. Seems that's enough to trigger panel deployment though."

James swore under his breath. "Well at least that explains some of these warning lights," he said. "How much panel can you see?"

"Not much from this angle," said Sherfel, "but enough to see that it's trying to unfold. Looks like all six sub-panels have started to separate cleanly anyway, which is something."

"I guess," said James, "You'd best get back through here, Sherf. We'll both need to be on the loop with Mission Control."

"What have you got for me, CapSys?"

The Mission Control room was crowded with kerbals. Nelton could barely hear herself think over the babble of controllers conferring with their teams and calling suggestions to each other across the room. Both shifts of controllers were huddled around their respective consoles, Hanbal and Danfen stood behind Nelton's console and Joebal, head of electrical and environmental systems was standing at the CapSys console, conferring with the systems team.

Obler looked up. "We need to shut down the..."

"Quiet at the consoles!" Nelton shouted. The room fell silent. "Say again, CapSys."

"We need to shut down the power to the PV array motors before they burn out, Flight," said Obler. "Then we can work on freeing PV-B."

"PV array motors, CapSys - not PV-A array *motor*?"

"That's correct, Flight," said Obler. "Both sets of motors are powered from a common circuit, so unfortunately we don't have any way of leaving the PV-A steering online if we shut off PV-B. Not without re-routing most of the power network anyway. He coughed. "We might want to change that design in future."

"We can worry about that later," said Nelton. "Right now I need a shutdown procedure for the array motors - then I need numbers for the reserve batteries. Then I need options for PV-B."

"Tell the crew to toggle PVM 1 and PVM 2 to OFF, Flight. That'll disable the primary and backup power supplies. Reserve batteries are good for three orbits with all systems powered up. I'll have my team pull out the time limits at current draw levels but we do have time to work this."

"Understood, CapSys. Options for PV-B?"

"Two options, Flight. EVA to release the boost cover manually, or we can try applying transient loads with the RCS and hope we jerk it loose that way."

Nelton nodded. "CapSys, Telco - I'm going to need an EVA plan. Flight Dynamics - we're going for the RCS solution first so I need a run-through. Can we do this without breaking anything else?"

"That's affirmative, Flight," replied Lemgan. "Too little force is going to be our problem here rather than too much."

"Understood, Flight Dynamics. Just do what you can."

James tapped the controls and watched the rate indicators drop to zero.

"Rates nulled," he reported. "Still nothing happening with PV-B. Hope you've got another plan, Flight because we've spun this ship every which way now and this is just not working."

"We concur, *Endurance*," said Nelton. "We think it's time you took a little walk."

"That's about what Sherf and I were thinking too, Flight. So what's the plan?"

"CapSys has the procedure, *Endurance*. Stand by."

The two kerbonauts listened wordlessly to the stream of instructions from Mission Control. James muted the radio link and turned to Sherfel.

"That's the best they can come up with? We spend Kerm knows how much on this temple to technology and they want me to go outside and poke it with a stick?"

Sherfel shrugged. "It's not ideal but I can't think of anything else to do - can you?"

"No," said James heavily, "not really."

"Look on the bright side," said Sherfel, "poking things with a stick is a long and noble engineering tradition. But you'll be the first to do it in space."

James scowled at her and clicked his microphone on.

"Copy that, Flight. We have the flight plan and we're suiting up."

James peered down into *Endurance's* cockpit one last time. Sherfel scanned the instrument panel, tugged on the umbilical and then tipped her head up to face him. He could see her nod inside her helmet. She clasped his calf for luck - not that he could feel anything through the layers of insulation - before giving him a solemn thumbs-up. He reached up over his head, took a firm grip on the edge of the hatch and slowly pulled himself out of the capsule.

He immediately sensed the blue glow pouring through the top of his visor but kept his gaze resolutely fixed on *Endurance's* hull. Carefully, he worked his hands around the hatch rim, grabbed hold of the nearest handrail and made his way slowly down the spacecraft, hand over hand, until his boots were level with the first pair of foot loops. Blinking the sweat out of his eyes, he swung his body sideways from the ladder, hooked his boots into their restraints and straightened up.

The whole of Kerbin hung over his head.

Spellbound, James stared up at the azure expanse of Great Tranquil Sea. A scattering of islands off the coast glowed jewel-like in the sun, girded all about with the rich turquoise of shallower water. The Kolus coastline itself was picked out in a thousand shades of green and brown and fringed with shining white sand.

"James?"

"I'm here, Sherf," he said softly. He tore his gaze away from his homeworld and cast his mind over the checklist. Suit systems were looking good, no kinks in the umbilical, suit to ship comms loop was working. *Time to get this done.*

"Okay, time to go to work. Patch me into Mission Control please, Sherf."

"Patching you in now, James."

His headphones crackled. "Do you read me, EVA-1?"

"Loud and clear, Flight," he said. "I'm out of the capsule and heading aft towards the busybox."

"Copy that, EVA-1," said Nelton. "How's the suit?"

"Hard work, Flight," said James. "Range of movement is acceptable but maintaining joint flexion is tough, especially in the gloves. Suggest we add a wrist and hand exercise regime to the flight training."

"Noted, EVA-1."

"Okay, Flight, I'm passing the first set of windows on the hab module."

"Understood, EVA-1. The busybox should be aft and left as you face the hull."

"I see it, Flight. Moving off the main ladder. A little more umbilical please, Sherf."

James' boots rebounded off the hull and he cursed under his breath as the abrupt change in momentum swung his torso away from the ship, threatening to tear him free of the ladder. Straining against the stiff fabric of his spacesuit, he shook his head to clear the sweat from his eyes, clenched his hands around the ladder rung and twisted. By the time he'd brought the unwanted rotation under control his wrists were aching with the strain and he was panting hard inside the confines of his helmet.

Nelton watched in alarm from the Mission Control room as the readouts for James' heartbeat and temperature spiked upwards. His increasingly laboured breathing filled her headset.

"Secure yourself and take five, EVA-1," she ordered.

"Copy...that... Flight," came the halting reply. "Let me just....okay... got the foot loop. Sherf - could you turn up my air supply for a moment please - need to demist my helmet."

The cool air blowing through his helmet slowly cleared the fog from his visor. James wedged both boots firmly into a foot loop and hung against the ladder, head swimming with a combination of stress and increased oxygen flow. *So much for the suave kerbonaut - here I am clinging to this thing like a spider on a tin can.*

"Looking clearer now - thanks, Sherf. Air supply to nominal please and lets see if we have more luck with this box than we did with PV-B."

James inspected the busybox whilst the air washing over his face subsided to its usual comforting trickle. He leaned back to get a better view, glanced down to make sure his boots were properly secured and then cautiously took one hand off the ladder rung. *So far so good. Fingers in here... good thing they left plenty of space, think my gloves have expanded a bit in the vacuum. OK...squeeze and lift.*

The box lid pivoted smoothly open. James automatically lifted his elbow to stop any free floating equipment from escaping but, somewhat to his surprise, everything was still safely clipped down.

"Whoever stowed this gear did a good job, Flight. CapSys was right too, looks like the wrench is about the longest thing in here. Securing it to my belt now. Closing the lid... okay, Flight, EVA-1 confirms successful equipment transfer. Proceeding to PV-B shroud."

"Nice work, EVA-1. Copy you in progress to shroud."

The wrench bumped against a ladder rung and began to swing back and forth, ricocheting between the ladder and James' leg. He was barely aware of the impact through his spacesuit padding, although the extra mass pivoting about his waist was an unwanted distraction. *Ignore the damn wrench and keep going. Just take it easy around PV-B.*

"Okay, Flight, I'm in position. It's going to be a stretch but I can make this work."

"Copy, EVA-1. CapSys is asking whether you can get any closer."

"That's a negative, Flight. Available foot restraints won't let me get any nearer from this angle."

"Understood, EVA-1."

"Tell CapSys that I have visual confirmation of bolt release but the damper is jammed. I'm going to see if I can free up the joints some."

"Just go easy on the percussive maintenance, EVA-1."

James grinned inside his helmet. You had to dig deep sometimes but Flight had a sense of humour if you knew where to look. *And on that note - initiating percussive maintenance.* He wriggled his glove through the safety loop attached to the wrench handle and pulled the bulky tool free from his belt. Stretching forward as far as he could in his foot restraints, he reached out and gingerly tapped the damper mechanism.

Okay that didn't do much. Maybe the centre pivot?

Not even the thick, many layered fabric of his spacesuit arm could prevent James' hand trembling as he withdrew the wrench slightly and aimed it carefully at the pivot. *Not enough wrist movement to give this a proper swing - probably just as well.* Standing on tiptoes, boots barely in their restraints, he thrust the wrench delicately forward.

The two levers sprang a little way apart before jamming again. James tapped the pivot one last time and hastily pulled the wrench back as the damper mechanism unfolded in a smooth mechanical ballet. The blue skies of Kerbin shone through the sudden gap between the open boost cover and the partially unfurled photovoltaic array.

"Flight, this is EVA-1 reporting PV-B cover clear!"

"We see it, EVA-1 - excellent work."

The instant the cabin pressure warning light blinked off, James lifted his helmet off with a sigh of relief. Sherfel handed him a squeeze tube of sapwood juice and he took a long swallow of the sweet milky contents before handing it back.

"Thanks, Sherf. I needed that."

"Let's see if this bucket of bolts was worth all the trouble," said Sherfel. She stowed the squeeze tube and pushed off towards the lower hatch. James pulled himself back into his acceleration couch, happy just to be back inside the capsule and content to float free and follow the conversation between Sherfel and Mission Control.

"Flight, *Endurance*. All warning lights cleared."

"Confirmed, *Endurance*. PVMs 1 and 2 to ON."

James flicked both switches. A shadow drifted across the cabin window as PV-A began to rotate, hunting for sunlight once again.

"PV-A is tracking," he called, "we have visual confirmation."

"Copy, Endurance. You're Go for full power up."

A pair of green lights glowed on James' control board and two dials swung firmly over, twitched briefly, then settled into place.

"Flight, this is *Endurance*. PV-B is online and we have steady draw though buses A and B."

Sherfel's amused voice cut in over the air to ground loop. "Well don't just sit there staring at the pretty lights, EVA-1. Come and take a look at your new home."

Chapter 28

And Rendezvous

"Moho 6. Come in, Moho 6."

Before we do anything else in Kerbin orbit, thought Richlin, we need to figure out a better comm system. More ground stations, or maybe Bill could put together a couple of relay satellites. Whatever. But having to wait nearly a full orbit to tell whether we've even made it to orbit is getting ridiculous.

Flight seemed to share his feelings.

"It's the waiting that always gets me," said Jeb, "Not knowing whether the orbit is high enough to bring the capsule back into radio contact, or whether we've just managed to parachute a pilot into some Kerm forsaken wilderness on the other side of Kerbin."

Or worse, thought Richlin. "I was just thinking the same thing, Flight," he said, "You think Bill's team could knock together a couple of relay sats some time?"

"Depends how the KSA meeting goes next month," said Jeb, "and how much cash we have left after Muna 3. Don't forget the new link to Wakira either - that helps too. But yeah, it's past time we got a proper comms network in place."

The radio crackled.

"....oho 6, repeat... Wakira Station - Moho 6. Come in, Wakira Station."

"Moho 6 - Wakira Station. Good to have you with us Joemy."

"Copy *that* Wakira. Moho 6 confirms booster separation. Platform alignment is green, RCS checks out on all axes.

Geneney's voice broke in on the ground to air loop.

"Thanks, Wakira. Barkton confirms ground to ground telemetry link is good. Moho 6 - we copy all systems Go. Moho 5, status please."

Richlin grinned and scanned his own control board. *Welcome to the trip of a lifetime Joemy - let's get this show started!* "Platform and RCS are Go, Flight. Consumable reserves are acceptable. I have a filter blockage in number two air cyclor but CO2 levels are holding steady. Backup systems are Go, two reserve cartridges available." *And this fortified sunfruit juice is foul - but that can wait till I get home.*

"Copy that, Moho 5," said Geneney. "OK, people, we all know what we're doing. Ornie, Edsen, Ribory and Bill, please switch your headsets to channel one, Wernher, Lucan, Seanan and Neling, you're with Jeb on channel two. Wakira station, please go split loop. Sigbin you have Moho 6 with me, Doodlie, you have Moho 5 with Jeb. Six team, please give me a Go / No Go."

One by one, all of Joemy's controllers reported in.

"Thank you, Six Team." Geneney toggled his voice loop, bringing up a private channel with Jeb. "You all set, Jeb?"

"Five Team confirms Moho 5 status report," said Jeb, "We didn't hear your people check in, Genie - how's Joemy doing up there?"

"Doing fine Jeb," said Geneney, "Moho 6 is Go. Looks like Tomcan finally worked the bugs out of the dual loop comms too - we didn't hear you either."

"Just give me a shout if you need anything, Flight."

Geneney smiled. "Will do... Flight. Moho 5 - you're the target. Moho 6 will begin rendezvous manoeuvres on the next orbit."

The tiny single pilot spacecraft circled Kerbin, their dark hulls invisible to even the most dedicated and keen eyed stargazers. By radio however, the two ships were shining beacons sailing across the night sky. Fercan reflected that the Kerbin Interplanetary Society's fledgling space program had probably done more for Kerbin's amateur radio enthusiasts than any other single event in kerbal history. *Although Ademone's crowd aren't doing a bad job either. The TV footage from inside their space station was incredible!*

The radio began to crackle. Fercan caressed the fine tuning knob, eking out the last few seconds of transmission time before the signal faded into impenetrable static. Behind her, the pilot's voice dissolved into white noise too.

..py that B...kton. See y..... xt orbit. .

Fercan reached up behind her chair and clicked the secondary receiver off, fingertips unerringly finding the right button amidst all the paraphernalia crammed onto the narrow equipment racks that occupied most of the room. Fans whirled overhead, straining to expel the humid, ozone tinted fug inside Communication Room Number Three. At times, Fercan

swore she could almost see the fresh outside air swirling in through the ventilation grilles. She frowned at the green trace still scribbling its way across the main display. *Hmm - second one isn't switching off it's telemetry either. Corvan will be happy though.*

Fercan tapped at her keyboard, instructing the computer to save the incoming telemetry into a new file, before blanking the scribble from the main display and calling up the extended tracking data from the radio telescope. *Okay, lets cross-check the frequency shift data.* Numbers blurred up the screen. *Point oh one three delta. Hmmm.* Her fingers flew over the keys. *Keep the telescope tracking data in the primary buffer, store telemetry in secondary buffer... extract channel data into new file...*

By the time the telemetry feed faded into background noise, Fercan was reasonably confident in her predicted trajectory for the second spacecraft. She pulled on her headset, leaned forward and clicked the quick dial button for Beta station.

A familiar Spierkan brogue filled her ears.

"Beta station here. Tracking and comms."

"Hi Corvan, Fercan here. I'm tracking a second Moho - should be with you in fifteen minutes or so."

"Another Moho?" said Corvan skeptically, "You sure about that, Fercan?"

"Pretty sure," she said, "Telemetry streams look almost identical, orbit is more or less equatorial. Can't see where else it could have launched from other than Barkton and we'd have heard something if they were launching anything bigger."

Corvan whistled. "Sounds like another Moho then. Their flight director must be doin' his nut trying to follow two flights together."

"Either that or they've scraped together two flight control teams," said Fercan. "Wouldn't want to fit both of them into that bunker though."

"Me neither," agreed Corvan. "By the way, don't suppose yeh got a recording of that telemetry?"

Fercan rolled her eyes. "Yes I got a recording. Here - file's on it's way now. Luckily for you, the KIS seem to broadcast their telemetry to whoever's listening."

"No reason not to," said Corvan. "Not like anyone can do anything with it and I'm not thinking the pilots can be bothered switchin' it on and off as they go. Hey, Fercan - how much do yeh reckon a Moho weighs?"

Fercan blinked. "How in the... how should I know, Corvan?"

"No reason," he said equably, "Just trying to figure out how efficient their maneuvering rockets are. I'm pretty sure I've untangled enough of their telemetry to pick up their propellant levels and I *think* I've figured out which bits of the stream match up to burn times..."

Fercan interrupted him incredulously. "Corvan - they're coming to *visit* next month. If I ask them nicely, they'll probably tell me what every beep, burp and whistle in that data feed matches up to."

"And don't yeh dare spoil all the fun by sharing it with me, girly!" Corvan chuckled at Fercan's patient sigh.

"As if I would, Corvan. Besides Sheldun and the rest of your gang would never forgive me for taking away their little puzzle."

Corvan laughed, "Nope - and you don't take Sheldun's puzzles away. Tis terrible to see a grown kerbal sulk like that. Yer file's here in one piece by the way."

"Should be plenty more coming your way in a couple of minutes," replied Fercan. "I've got a couple of calibrations to run, so I'll let you enjoy it in peace."

"Got it." Corvan paused, "What do yeh reckon they're doing up there, Fercan?"

"Only one thing I can think of," said Fercan, "and that's an orbital rendezvous."

"Makes sense," said Corvan slowly, "Now that Rockomax have done it, KIS won't want to drop too far behind. You say they're *both* coming to Alpha next month?"

"As far as I know," said Fercan. "You planning to take a bet on them both joining Lodan's scheme?"

"Och I never bet against a certainty," said Corvan, "Specially now they're both working on rendezvous and *specially* now that Rockomax have got a decent sized crew cabin in orbit." He paused. "To be honest, I couldn't see either of them doing much more than orbitin' Kerbin with their one or two kerbal capsules. But if they can start *joining* stuff to the capsules in orbit - well I reckon things are about ter get a *lot* more interesting. Ahh - sounds like that second Moho is comin' into range! Speak soon, Fercan!"

The flickering light on Joemy's control board brightened into a reassuring green glow as the rendezvous radar found its target. The flight computer beeped and its screen lit up with range and bearing data. Joemy glanced at the tiny display, nodded and toggled his microphone.

"Flight, Moho 6. Radar is locked on and I have a good transponder return. Moho 5 dead ahead, range three two dot five kilometres, closing speed negligible."

"Copy that, Moho 6," replied Geneney, "Five Team confirms lock on to you, range three two dot five. You are Go for computer check."

"Checking now, Flight."

The flight computer keypad was enormously simplified in comparison to a standard general purpose keyboard but it was sufficient for the task of flying and navigating a spacecraft. Privately, Joemy preferred it that way although he knew that not all the engineers back at

Barkton shared his opinion. As a pilot though, fewer buttons to worry about was just fine with him, provided that they were enough for the job. He reached out and tapped in a manoeuvre request. The computer display blanked out and then produced a string of numbers.

"Okay, Flight. Closing speed ten metres per second. Attitude and burn numbers are as follows."

Geneney waited whilst Joemy read out the manoeuvre data. Bill and Edsen were both busy at the consoles next to him, entering the data and cross-checking it with their own tracking information. They both flashed him a quick thumbs up.

"Moho 6, Flight. Flight Dynamics confirms, Guidance confirms. You're Go for approach to holding point two."

"Understood, Flight. Orienting for burn."

Geneney heard the distant thump of relays in his headset as Joemy fired his thrusters. Bill and Edsen watched their console screens intently.

"Good burn, Flight."

"Flight, Moho 6. Approach burn complete, closing speed ten metres per second."

"Copy that, Moho 6. Please hold at five kilometres. We'll check over the RCS telemetry on the next pass and get you set up for final approach. Three minutes to loss of signal - good luck."

Geneney leaned back in his chair and toggled his headset over to his private channel.

"We're on our way, Jeb. How's Richlin getting on with those cards?"

"Got the numbers right here, Genie. They look about right to me but I'm no computer."

Geneney clenched his fist in triumph as Jeb read out the simulated burn data. "I think we each owe Bill a bottle of Jorful's finest," he said, "Those are pretty much the exact numbers we got from Joemy's computer."

"Astronavigation by pen and paper," replied Jeb, "Still seems like a crazy way to run a space program, Genie."

"That it does," said Geneney, "but I'm glad to have another backup option on board."

The two spacecraft soared over the Great Tranquil Sea, flying a bare handful of kilometres apart. They were too close for the limited resolution of the main tracking screen and Geneney watched the single spacecraft icon drifting along its orbital track, flickering as the computer tried in vain to display both spacecraft at once. In cosmic terms Geneney knew the two ships were practically touching. In practical terms, they were still light years apart. The culminating moments of Project Moho were about to begin.

"Moho 6, Flight. Your telemetry is green and you are clear for final approach."

Joemy's voice was steady in Geneney's headset. "Copy that, Flight. Proceeding to one kilometre, maximum closing speed four metres per second."

Geneney switched to his private channel. "We're moving, Jeb. Holding at one kilometre, max approach speed four metres per second."

"Gotcha, Genie. I'll have Richlin keep an eye out of the window."

Joemy's eyes flickered in a constant loop from the radar display to the flight computer to the navball and back again. He could hardly resist the temptation to look out of the capsule window even though he knew it would be a waste of time at this range. *Just focus on the instruments Joemy, he told himself, no point trying to eyeball the manoeuvres either at this range.* He toggled the air to ground loop.

"Flight, Moho 6. Range two kilometres, closing speed two metres per second."

"Copy, Moho 6. Any sign of Moho 5?"

"I haven't been looking, Flight but I doubt it at this range." Joemy paused. "Tell the truth, Flight, this orbital mechanics stuff takes some getting used to. Retrofire to speed up and all that good stuff. Right now I'm just watching the instruments and trusting the maths."

"It's working so far, Joemy."

"That's what the radar tells me, Flight. Okay, RCS to FINE, correcting residual plane alignment. Range one point eight and closing."

Richlin stared out of the window, scanning for any sign of an approaching spacecraft. He shook his head in disgust.

"I'm not seeing anything, Flight. Radar has them holding steady at one zero two one metres - I should be seeing *something* by now but I just don't have visual contact."

"Understood, Moho 5. I'll have Six Team put their capsule in a slow spin - give you some movement to track. Flight Dynamics also recommends a plus two degree yaw."

"Copy, Flight." Richlin nudged the thruster controls and the starscape outside drifted ever so slightly to one side. "Still not seeing... hold that, Flight! Correction - I have an intermittent light source in the upper half of my window!"

"Good work- and now?"

"Gone again, Flight - just one more star amongst thousands."

"That's one star that's going to get a lot closer, Richlin. Six Team reports Moho 6 on final approach!"

Looking back at his first spaceflight, Richlin would always compare the last minutes of rendezvous to landing onboard an aircraft. The same sense of almost imperceptible change,

without any true impression of changing scale, followed by an abrupt shift in perspective as the ground rises up to meet you and the sudden realisation of quite how close you really are to the ground.

Similarly, the Moho 5 seemed to hang in space, slowly but surely swimming across the stars towards him. And then suddenly - it was there, with sunlight glinting from its windows and brief tongues of flames licking out from its manoeuvring thrusters as it came to rest. One final burst of flame as the nose swung round to face him and then the unbelievable sight of Joemy waving at him through the capsule window. Two kerbonauts separated by nothing more than a few centimetres of bulkhead and a few metres of hard vacuum.

"Good to see you out there, Richlin. Thanks for waiting!"

Richlin's face split into a huge grin. "Good to see you too Joemy. Thanks for not scratching my paint!"

The two spacecraft soared over the Great Tranquil Sea, now flying a bare handful of metres apart and their pilot's ears ringing with the sounds of celebration from Mission Control.

Two green figures stood on top of a makeshift concrete bunker and watched a pair of orange parachutes float serenely towards the waiting ocean. Geneney's thoughts floated too, drifting back to another pair of parachutes marking the safe return of Jeb, Bill and Bob. *Thirty five kilometres up - not even close to the edge of space. But it was enough. The launchpad for Kerbal 2. The crucial technological stepping stone for our satellites around Kerbin - and the Mün. The inspiration that set other kerbals on the road to the stars. And the prelude to Project Moho - kerbalkind's first true journeys into space.*

As always Jeb seemed to sense his mood. "Not bad for a bunch of volunteers working out of a junkyard, Genie."

Geneney smiled. "Not bad at all, Jeb - not bad at all."

Jeb stared out to sea. "Still seems like a dream sometimes to tell the truth. Crazy, magnificent, but still a dream."

"Sometimes they're the best ones," Geneney said gently, "Don't stop yet old friend - we've got a long way to go."

Jeb looked at him wryly. "I like it when the money guy tells me to keep dreaming. Seriously though, Genie - its gonna take more than that to get *Eve 1* into orbit."

Geneney's eyes shone. "We'll get there, Jeb." He swept his arm out, flicking his fingers at the Space Centre buildings around them. "With the team we've got now, I honestly don't think there's much we *can't* do if we decide to give it a try!" He grinned. "We'll get that last picture for your office yet, my friend - just you wait!"

Chapter 29

The Cords That Bind

"Gene - where in my mother's Grove *are* we?" said Jeb. He switched off the motor, breathing heavily as he stared out at the dusty white rope, marking the boundary between road and roadside. "I have no idea where this blighted stretch of hardpack is taking us but I am *conspicuously* failing to spot so much as a gronnek-biting road sign, let alone a state of the art tracking, research and general wonderfulness centre."

Geneney fought to keep the irritation out of his voice. "You tell me, Jeb," he said, "Last turning but one according to the map - like I said at the time."

Jeb growled. "First order of business at this meeting is to politely find out why a damned *space* agency can't find anyone to draw up a decent map. For Kerm's sake, a 'facility for all of Kerbin' and they hide it halfway up a mountain and give us a kerblet's treasure map to find it."

"So you've already said - many, many times already,"

"Maybe that's the first test," said Neling cheerfully, "A place at the table but only if you're smart enough to find it first."

Jeb looked over his shoulder. "Perhaps," he said through gritted teeth, "they should lead by example by being smart enough to put up a snake kissing *signpost*. to their precious table." He grabbed his water bottle from under the dashboard and took a swallow, grimacing at the lukewarm, faintly metallic taste.

Ribory knocked her head against the window. "Look," she said, "why don't we turn around, go back and at least have a look up one of those turnings. I'm with Jeb - this way is taking us nowhere. Forget the last but one junction though - it was far too small."

"Small?" asked Geneney.

Ribory sighed. "*Think* for a moment, guys. You don't build a space centre with spades, dust and bad language. Whatever road we're looking for has to be big enough to get a good sized truck up at the very least."

"Last but two then you think?" said Geneney.

"Only one that looked likely," said Ribory, "unless we're even more lost than I thought."

"We could well be," said Geneney. "but that's good enough for me. Jeb?"

Jeb's only reply was to start the motor and jab the accelerator. The little car bumped awkwardly over the marker rope and shot off in a cloud of dust and flying gravel, leaving the high pitched whine of an overstressed drive train hanging in the air behind them as they rounded a bend and disappeared out of sight.

"Should be about another hundred or so metres after the corner, Jeb."

Jeb nodded and eased back on the accelerator, searching the road ahead for the first sign of turning. "Okay - I see it, Genie. Still not convinced but we'll give it a try." He slowed the car to a walking pace and cut across the road, trying not to wince at the sharp jolt of wheel hitting pothole.

"Stop the car!"

Startled, Jeb automatically slammed on the brakes. Ribory threw the door open and dashed over to the side of the road. Geneney blinked as she bent down to pick something up out of the gravel and then his face split into a cheerful grin as she waved a dusty, weatherbeaten but above all, *signpost* shaped piece of wood over her head. All three kerbals caught a glimpse of a faded image of Kerbol rising over a curved horizon with the letters KSA emblazoned underneath. Ribory propped the signpost against a nearby rock, hopped back into her seat and slammed the door.

"Let's go!"

Two kilometres later the rapidly improving mood inside the car became positively cheerful as they swung around yet another shallow bend and came face to face with as convincing a collection of roadbuilding machinery as Jeb had ever seen. The construction crew waved at them enthusiastically from their vehicles as Jeb bumped over a ragged asphalt apron and onto the road proper. Ribory and Neling leaned out of the rear windows and waved back at the yellow-hatted kerbals.

"Thanks, Ribory," said Jeb, "Should have had you in the front here instead of, Genie!"

Geneney shrugged. "What's a kerbal supposed to do with a map like this?" he said equably. "Especially when it looks like a gronnek *had* been chewing on their signpost."

Jeb's laugh was cut short by Neling's excited cry. "Look - over there on the hill!"

Geneney whistled as he spotted it. "Now *that's* what I call a radio telescope. What do you reckon, Ribory?"

"I reckon that's one beast of a tracking system, Gene," said Ribory, "Probably long range comms as well. Doesn't look like it'll have much a problem following the Muna 3 anyway."

"That's about what I thought," said Geneney soberly, "Not if they've got the other two up and running as well."

"Yep" said Neling, "and I'm guessing they've probably got plans for more than just the Muna 3. I think you're right, Gene - nobody builds something like that on the off-chance that it *might* be used."

"Works for me," said Jeb, "I'm more than happy to fly stuff to the Mün if they're happy to keep paying good money and sharing good data for the privilege." He slowed down as they approached a pair of bollards blocking their way and blinked as they sank smoothly into the road. "And they certainly seem to have plenty of good money."

Looking around, Geneney was inclined to agree. The radio telescope sat atop the hillside, surrounded by well cared for lawns that were artfully dotted with trees and clusters of outbuildings, all sprout profusions of radio antennas and other communication equipment. The main roadway led up to a generous parking space in front of a large, elegantly proportioned building. Two wings swept out from a central portico, one adorned with the flag of all Kerbin fluttering from a tall cream coloured pole and the other flying the same Kerbol-over-the-horizon emblem that he remembered from the fallen signpost.

Jeb pulled up in the nearest parking space with a creak of brakes and a rumble of wheels over close set paving blocks. He pressed a button on the dashboard and the steady persistent hum of the motor died away. The four kerbals looked at each other.

"Well," said Jeb, "we're here."

"Here just in time too," said Geneney ruefully, "although I could do with a moment to unwind before the meeting."

Neling bent over with a muffled groan and rummaged around between her feet, emerging with a plastic box. "No idea how cold these are any more," she said, popping the lid off the box and handing round a set of wet flannels, "but they might help a bit."

Jeb wrapped a flannel around his neck and sighed as the cool dampness trickled down his back. He mopped his face briskly and wadded up the now less than pristine cloth, dropping it into the proffered box with a grin.

"That's the second time you've kept me cool in a crisis."

Neling laughed and opened her door. All four kerbals sniffed happily at the herb-laden scent of fresh mountain air. Geneney's back popped as he stretched. "Fresh air, cold water on the neck - you haven't got any coffee back there have you, Neling?"

"Fraid not, Gene."

"Not a problem," said Jeb cheerfully, "You did say this place was for research?"

Geneney nodded. "It's kind of an all purpose research centre, HQ and tracking station."

"They'll have coffee then," said Jeb, "Rule 1 of science - where you get scientists, you get coffee. The place probably runs on the stuff."

"In that case," Geneney said firmly, "I think I'm about fit to be seen in public again. Let's go."

Golden afternoon sunlight poured in through the skylights, casting a lambent glow over the foyer as Jeb led the way through the main entrance and strode up to the reception desk.

"Good afternoon. We're here to see Director Lodan." He stuck out a hand. "Jeb Kerman, Kerbin Interplanetary Society. Here with my colleagues; Geneney, Neling and Ribory Kerman?"

The first receptionist visibly pulled himself together. "Uh, of course, sir. K-kerbin Interplanetary Society. I have your name badges here. Yes, yes, Jebediah, Geneney, Neling, Ribory." The box rattled in his hand.

Jeb looked puzzled. "Is everything all right?" he asked, "We have got the right date yes?"

"Oh yes, sir. It's just, just we never..." The receptionist lunged beneath his desk, surfacing with a tube of paper which he hastily unrolled. Jeb was astonished to see a poster of Geneney, Wernher and Lucan standing in front of the salvaged *Kerbal 2*. He dragged his attention back to the receptionist's nervous chatter.

"Couldn't get one of the *Kerbal 1*. Tried to - for my boy you know - but they'd, you'd that is, sold out. But a signed poster ... that would just make his birthday." He thrust his pen into Jeb's hand and looked at him hopefully.

Jeb grinned. "What's your lad's name?"

"Uh, Bobney. He's a real KIS fan you know. Actually, he's more of an all over spaceflight fan. Anything to do with rockets or kerbonauts."

Jeb thought for a moment, then quickly wrote something on the poster and signed his name with a flourish. He gestured to the rest of the team waiting behind him.

"You lot want to sign this as well?"

Ribory smiled at the receptionist. "Sure, why not." She looked over Jeb's shoulder. "Hmmm, 'To Bobney - See you out there some day! Your friends, Jeb....'. Not bad, Jeb!" She took the pen and signed her name underneath Jeb's, where it was rapidly joined by Geneney's and Neling's signatures. With a faraway look in his eyes, the receptionist stared at his newly signed poster and then rolled it up, taking great care only to handle it by its edges.

For a moment there was silence. Jeb coughed.

"So - where should we find Director Lodan?"

The receptionist blinked. "Director Lodan? Oh of course. The meeting room is in the south wing. Just down that corridor there, you can't miss it."

"Thanks," said Jeb, "and a happy birthday to Bobney when it arrives."

"Oh it will be now, sir - it will be now!"

Once the KIS team were safely out of earshot, the second receptionist turned to her colleague and raised her eyebrows.

"So congratulations are in order then, Bob? Good thing you're not the superstitious type - giving your son your own name and all."

Ribory eyed the rack of laboratory coats. "You guys reckon we need one of these?"

"Maybe later if we get a proper tour," said Neling. "I'm not going to bother for now."

Geneney tore his gaze away from one of the posters adorning the corridor walls. "Me neither," he agreed, "but if this summary is anything to go by, I'd love to get a look through that door. Anyone got any idea what MIR stands for?"

"Not a clue," said Jeb, "and I'm not feeling LOST yet either." He gestured down the corridor. "Space Radiation Laboratory seems pretty obvious though. Come on - I..."

The door to the MIR lab flew open and a small bespectacled kerbal dashed out, narrowly missing Jeb. She blinked at the newcomers and then her eyes widened. Stammering an apology she bolted back through the open door and slammed it behind her.

Geneney laughed. "Losing your touch there, Jeb," he said.

"Getting a chance to say something would have been a start," said Jeb. "Anyway, as I was saying - let's go find this meeting room."

As they walked down the corridor, the four kerbals heard door after door opening around them, together with snatches of whispered conversation.

"No - Jeb the janitor. Of course I mean 'that Jeb', sponge-brains..."

"...recognise, Geneney too. Wow..."

"Don't know either of the ladies but I'd sure like to..."

"Oh that was classy, Lim..."

"Yeah - you should apply to Rockomax. I hear they're looking for someone to grit-blast..."

"Lim's so smooth he wouldn't even need the grit..."

"Where have you been people - that's *Neling*..."

"Neling?"

"Yeh, the controller that saved Jeb's ... on the Moho 1..."

Ribory bit her lip, shoulders quaking as she tried not to laugh. Neling stared at the floor, flushing dark green as Geneney clapped her on the back. Meanwhile, Jeb was in his element, waving at the rapidly building crowd, offering a quick word here, a bright grin there and even shaking hands with one or two of the bolder scientists. A tentative handclap rapidly turned into enthusiastic applause and then became a standing ovation from the dozens of kerbals crammed into the corridor behind them.

The door closed with a soft thud, cutting out the commotion behind them. The group sitting around the large round table in front of them stood up politely although some of them looked rather bemused by all the noise. A grey eyed, balding kerbal stepped forward to greet them.

"The KIS team I presume? It seems a little superfluous after your... enthusiastic reception but nevertheless - welcome to the Kerbin Space Agency."

Jeb shook his hand vigorously. "Pleased to meet you - Director?" Lodan dipped his head and Jeb looked relieved. "This is Geneney, our flight director and head of systems integration, Neling, flight control, guidance and electronics and Ribory, flight control and spacecraft systems. I'm Jeb and I help fill in the gaps around the rest of the team."

Lodan looked momentarily confused at Neling's name. "Forgive me but I was expecting another member of your team - Bill I believe?"

"Ahh - allow me to present Bill's apologies, Director. I'm afraid he was needed to oversee the final equipment installation and checkout of our next spacecraft. We had hoped to have that finished in time for the meeting but..." Jeb looked apologetic, "unfortunately it all took a little longer than expected."

One of the kerbals around the table stepped forward and shook Neling's hand. "Nelton. Flight Director and head of crew operations at Rockomax. Just wanted to say that was a solid job with the *Moho 1*!" She turned to Lodan. "I'm sure Neling will be a perfectly competent stand in, Director."

Lodan coughed. "I think we can take *competence* as a given in this room," he said dryly. "Perhaps we could finish the introductions and make a start?"

A tall, female kerbal in an elegantly fitted suit came forward and shook Jeb's hand. "Ademone - founder and company manager of Rockomax Corporation. You've met Nelton already but allow me to introduce Joebal, our head of electrical and environmental systems and Professor Melvey, flight control, spacecraft systems and..."

"Discoverer of the Melvey Radiation Belts," said Jeb with a smile, "Pleased to meet you all and it's an honour to meet you in person, Professor."

"And likewise to meet you, Jebediah," said Melvey.

Jeb opened his mouth but was interrupted by Lodan. "And I'm here as Director of the KSA, alongside my colleague Fercan - our chief telecommunication and systems engineer. Please take your seats everyone."

Everyone sat down amidst a general fussing with water glasses and shuffling of notes. Lodan tapped the table for attention.

"Good Kerbals, we are here today to discuss opportunities for mutual benefit and cooperation between the Kerbin Space Agency, Rockomax Corporation and the Kerbin Interplanetary Society. Specifically, we are here to discuss the creation of a Kerbin wide tracking, data and communications network to support future spaceflight efforts. It is my fervent hope that we can create a global resource that avoids unnecessary duplication and waste, whilst providing common facilities for the common good."

Lodan took a sip of water. "It is our equally fervent hope that by pooling our expertise with that of Kerbin's two spaceflight pioneers, we can define the data exchange protocols necessary to make that global network work and that those protocols will then become the de-facto standards for any new entrants onto the spaceflight stage. I therefore call upon the KIS to start the discussion off by presenting an overview of their current systems."

Ribory stood up. "Good afternoon, everyone. I'd like to start by giving you a 'console side' view of our systems from a flight controller's perspective. At present we have two tracking and communication sites, our main facility at Barkton and a second smaller station at Wakira. Our primary communication links are..."

By the time Ribory finished her presentation, Geneney thought he had a good idea of where the differences between the KIS and Rockomax systems were. *Assuming that I'm reading the body language right. A lot of our stuff didn't seem to surprise them much but I think we're going to have some interesting discussions ahead of us on some points.* By the time Nelton finished her overview for Rockomax, most of his ideas were confirmed. *Okay, I think we can deal with most of the technical details but smoothing out two sets of procedures is going to take some work. I wonder who's going to get that job.*

Both the KIS and Rockomax teams listened intently to Fercan's presentation on the KSA tracking systems and the communication links between their three main sites. By the time she finished, Geneney's mind was quite made up. He glanced across the table at Jeb and wasn't surprised to see him nodding slowly to himself. *Looks like I'm not going to get any arguments from Jeb either. He's not big on working with the government but he can see sense when it's written in big enough letters. Be interesting to see if Rockomax are reading those letters too.*

The discussion moved on to a general brainstorming session and it wasn't long before Geneney noticed both Jeb and Ademone subtly siding with Lodan on some issues and equally subtly steering the discussion away from a KSA agenda on other issues. More importantly he quickly noticed the two company managers quietly backing each other up on various items whilst offering carefully phrased suggestions to defuse the more heated areas of contention or set them aside for later talks. Geneney rested his chin on one hand,

carefully concealing a smile. *You two would make quite the politicians, although I doubt either of you would thank me for saying it. Looks like you are both reading the same letters.*

At long last, Lodan tapped on the table again. "Thank you everyone. Lets take a break and reconvene in twenty minutes. There's coffee and drinks in the next room and the washrooms are just down the main corridor outside."

There was a general surge in the direction of the drinks. Geneney set aside his wistful visions of steaming hot coffee urns and fell into step alongside Ademone.

"Could I have a word please, Ademone?"

Ademone stepped aside to let Melvey and Jeb past. "By all means, Geneney," she said. "What can I do for you?"

Geneney waited until everyone had left the room before quietly closing the door behind them.

Ademone raised an eyebrow. "A *private* conversation, Geneney?" she said.

"I think that might be best for now," said Geneney, "At the very least, I'd prefer to keep these... business proposals out of earshot of the good Director."

"We're going to be working with the good Director," Ademone pointed out. She smiled faintly at the carefully blank look on Geneney's face. "Please don't bother telling me that comes as a surprise. I saw you watching Jebediah and myself at the meeting."

He shrugged. "I think it makes sense. We could certainly use the facilities and unless you're a lot further ahead than we think, I imagine that you could use them too. Incidentally - how are the *Endurance* crew? They must be nearly ready to come home by now?"

"They're doing very well thank you," said Ademone, "but come, Geneney - what are these business proposals that we need to keep secret from Lodan?"

Geneney looked at her. "We've got two...collaborative projects in mind," he said. "We think the first one makes sense, in much the same way that Lodan's proposal makes sense. The second one is a little more speculative."

"Lets put the speculation to one side for now," said Ademone. "What does your first project involve?"

"Jeb and I call it the CORDS programme," said Geneney, "Short for Common Orbital Rendezvous and Docking Systems, although I'm sure the media won't miss the obvious jokes about tying Rockomax and the KIS together. I'll be blunt Ademone. We've both worked out the details of orbital rendezvous, you've developed systems for docking and that's probably going to be our next step too. Rather than charging off and building our own systems, why don't we both sit down together and hammer out a common set of standards that we can both use."

"Standards, not designs?" said Ademone.

"Not unless you want to share them too," said Geneney.

"Common standards would make sense," Ademone conceded, "but with respect Geneney, we're not ready to hand over our designs just yet. She paused. "I presume you're thinking about emergency options?"

"Yes," said Geneney, "I think you know as well as I do that it's only a matter of time before *something* goes wrong for one of us up there. Speaking personally, I'd feel a lot more comfortable having another rescue option - or the possibility of another rescue option at least."

"Agreed," said Ademone, "I'll need to speak to my Board but I think they'll be amenable. So what's your speculative proposal."

Geneney took a deep breath. "A joint Munar landing programme."

Ademone's mouth quirked upwards and then froze at the look on Geneney's face. "You're serious aren't you?" she said.

Geneney nodded.

"Well then, allow me to be blunt in return, Geneney. What on Kerbin would Rockomax get out of such a ridiculous idea apart from the chance to spend a lot of money and take on a lot of extra risk?"

"Do you want the business reason or the other reason?" said Geneney calmly.

Ademone raised an eyebrow. "There's a business reason?" she asked.

"We think so," said Geneney. "Confidentially, Probodyne have offered us a contract to put a second satellite in orbit around the Mün. We're not precisely sure what it's for but it's a lot bigger than the Muna 2. Based on the specs we've been given for stability and control, Bill's best guess is that it's for detailed mapping of some kind."

"Interesting," said Ademone, "but I'm not sure I see your point."

"Well why bother with a detailed map unless you plan to do something with it?" said Geneney. "I mean there's curiosity and scientific interest but another Muna 2 style probe would be enough for that. No - we're thinking that this could be the beginning of something much bigger - and probably something that will eventually involve putting hardware on the surface. Now we could do that ourselves given time but we could do it a lot faster in partnership with Rockomax. Fast enough to corner the market before anyone else gets a chance to even compete."

He leaned forward. "Think about it, Ademone. We give Probodyne - and whoever is backing them - exactly what they want. No need for another Probodyne Prize when they can just use our ready to go Munar transportation system!"

Ademone looked thoughtful. "Confidentially?" she said.

"Of course," said Geneney.

"We've been offered a contract too," she said. "Long duration LKO satellite for mapping the Melvey belts."

"They start quite far out don't they?" said Geneney. "We sent up a couple of counters on the last Moho flights but didn't see much off-background."

"Professor Melvey has the detailed numbers," said Ademone, "but yes they start well outside low Kerbin orbit."

"And even then, they didn't noticeably affect Satellite 4?"

Ademone grimaced. "We don't think so. There was some lasting noise on the camera images but everything still seemed to be working when we got out to the Mün. We did wonder whether the guidance systems were damaged but Melvey thinks that any radiation strong enough to do that would have caused more damage to the cameras."

Geneney nodded. "And without wishing to salt old wounds, we didn't have any major problems with the Muna 2. We might just have been lucky though - sneaked through a gap in the Belts or something."

"Possibly," said Ademone, "but in that case we've managed to sneak all our communication satellites through the same gap. No - the more I think about this, the more I'm inclined to believe Nelton's theory."

"Which is?"

"That we're being hired to check whether the Belts are..."

"Safe for crewed flights?"

Two pairs of eyes met across the table. Ademone shook her head and leaned back in her chair. "Anyway," she said, "What was your other reason?"

Geneney steeled himself. "Because we can," he said quietly. "The first kerbals to walk on another world, Ademone - and we would put them there. It could be the dawn of a new era or we may get to the Mün and never go back - it doesn't matter. What matters is that we *tried*. What matters is that future generations will be able to look back at a time when we dared the impossible, when we braved the unknown and journeyed to a realm beyond the dreams of kerbalkind!"

He paused.

"At a time when we were magnificent."

The soft applause from the doorway startled both kerbals. Geneney looked up and saw Jeb standing quietly in the corner.

"Couldn't have put that better myself, Genie. So what do you say, Ademone? You want to join us crazy interplanetary characters on a voyage for the ages?"

"It's all blurry, Daddy!"

Footsteps crunch on the frozen grass and her father takes her hand in his, guiding it over the telescope barrel.

"No, no, this one here. Twist it.... like this."

She peers into the eyepiece, tries not to blink. How are you supposed to look through this stupid thing with eyelashes! Despite her best efforts the grey blob swims maddeningly before her, refusing to come into focus. She lifts her head from the telescope, wipes her eye and tries again, fingers clumsy in the cold.

Ohhhh!

"I can see them, Daddy! I can see the craters just like you said!"

"Did you get the picture, Ademone?"

"Oh I got it, Jerdo. Took forever though and nearly as long to print."

"Yeah, we need a better way of doing this than wirephoto. That last one you sent me of the Mün wasn't half bad though."

"Maybe we could send them by radio. Dot code maybe - send a dash for a white pixel and a dot for a black pixel."

"Hmph. Typical ham - every problem can be fixed with a radio."

"Well it could work."

"I guess - if you want to spend a week or so doing it."

She sits at her desk, listening to the radio whilst she works away on a stack of invoices for the Speciality Fireworks Company. The radio suddenly beeps and plays what she assumes to be a joke message from the 'Kerbin Interplanetary Society'. As jokes go, it's not bad.

Later that evening, she stares out of her office window at the night sky, the smell of fresh coffee filling her office, trying to persuade herself that taking a Mün watching break would be a good idea. She grins, remembering the joke message. Perhaps Bill, Bob and the rest of them could make her a map of the Mün instead...

"Ademone?"

She blinked the memories away.

"I still say its risky and expensive, Jeb. "Ademone smiled slightly. "But - a successful CORDS programme would go a long way towards mitigating those risks. Kerblet steps, good kerbals, kerblet steps - let's see if our teams can work together first before I take this to my

Board." She raised a finger. "I *will* need Board approval for this... scheme and I can't make any promises about getting it."

Geneney leaned forward, gripping the edge of the table tightly.

"But you will..."

"Yes, Geneney - I will ask. I can promise that much."

Jonton sat on the edge of his porch staring at nothing in particular. Beneath him, Joenie squatted on the lawn, talking to herself and poking at something in the grass. Jonton couldn't see exactly what she was playing with but it certainly appeared to require a great deal of concentration, along with a large number of different coloured stones. Behind him, the door creaked open and he heard Gerselle's small, precise footsteps on the leatherbark planks as she padded over to join him.

"Still no sign?" she asked quietly.

Jonton rested his chin in his hands. "Not a thing," he said, "I should go in and try again."

Gerselle put her arm around him. "You've been cooped up in that room all week," she said, "You need to take breaks too, hon."

"I suppose so. I just wish I knew what was happening is all."

"I'm worried too, Jonton - and well you know it - but I'm more worried about you killing yourself finding out. You're barely eating and you could carry Joenie in those bags under your eyes."

As if on cue, the kerblet giggled to herself and pelted away across the lawn. In spite of himself, Jonton smiled.

"What *is* she playing at down there?"

"It was 'sailors and rafts' last time," said Gerselle, "but goodness knows what the latest game is. You could always ask her at dinner," she added pointedly.

Jonton looked at her sheepishly. "Or I could go and see if Daddy can play too?" he said.

Gerselle squeezed his shoulder. "Why don't you go and do that, Jonton Kermol. And why don't I see if I can find some milk and cookies for the intrepid sailors. Or explorers. Or whatever it is this week!"

Jonton laughed and climbed to his feet. "All proper explorers need cookies," he said and went out to join his daughter under the Kerm tree.

"What have you got there, popkin?"

"Leaf!" exclaimed Joenie, offering her father a fistful of crushed foliage.

"That's right - and what kind of leaf is it?" said Jonton, kneeling down beside her.

"Potty leaf!"

Jonton blinked. "That's nice, Joenie," he said cautiously. "Can you find another potty leaf for Daddy?"

Joenie skipped away across the grass. She crawled around outside Jonton's sleep room window for a minute before bounding to her feet and hurtling back towards him. Giggling, she tumbled to the ground and waved the leaf at him.

"Potty leaf, Daddy!"

"Oh *spotty* leaf. Clever girl - that *is* a spotty leaf."

Then Jonton got a closer look at the spots.

Oh no. No nononono.

He scooped up Joenie and ran.

The back door slammed. Gerselle looked up in surprise as Jonton burst into the kitchen, thrust Joenie at her and turned and ran for the sleep room. Joenie's face puckered up in an all too familiar way and Gerselle hastily popped a cookie into one small green hand.

"What's the matter with Daddy, sweetheart? Is he not playing with you any more?"

"Daddy not like leaf."

"Well you just show the leaf to Mummy instead then."

Joenie sulkily threw the leaf onto the table and Gerselle froze. A page from the Records came back to her with dreadful clarity. A page with a picture of an identical black spotted leaf and a brutally short, two word translation scribbled alongside it.

Help.... Dying....

She dropped the leaf and fled after Jonton. Joenie scampered after her, still clutching her cookie. They both got to the sleep room door just in time to hear the screams begin.

Jonton thrashed wildly on his bed, back arched almost to breaking point. The thick clump of Kerm leaves wrapped around his head did little to muffle the awful throat tearing noises ripping their way out of him. Joenie took one look at her father and threw herself past Gerselle, tears streaming down her face.

"Bad Tree! Bad Tree!" she screamed, hammering on the Kerm trunk with both tiny fists. Leaf clusters lashed back and forth, trying to reach her. Jonton's eyes rolled back into their sockets with the strain. His fingernails dug into the palms of his hands as another spasm nearly wrenched him off the bed but he forced himself not to cry out.

"Joenie. Joenie! Listen to Daddy!"

Joenie's fists flailed uselessly against the thick bark. "Bad Tree stop!" she sobbed.

"I'm all right, popkin... I'm all right. *So help me - how do I explain this.* "Tree hurt too. Tree hurt lots."

Joenie turned her tear streaked face towards her father, who was now lying still on the bed.

"Tree hurt too?"

"That's right, sweetheart. Tree hurt lots. Daddy needs to make it all better."

Joenie eyed the Kerm tree suspiciously for a long moment. Jonton held his breath. Then she flung her arms around the trunk as best she could. "No more hurt, Tree," she said in a muffled voice. "Daddy make better." She backed away and to Jonton's awed surprise she wagged her finger at the Kerm. "Daddy make you better so you not hurt Daddy."

Jonton's shoulders twitched. "I need to talk to Mummy, popkin," he said, "Can you be a good girl and go and play with your bricks while Daddy makes the tree better?"

"Bricks!"

Jonton offered a silent thanks for the easy mood swings of kerblets. As soon as Joenie left the room, he called to Gerselle.

"I need you to summon Donman, love."

Another convulsion tore through him and he clenched his teeth against the pain. Gerselle shook her head. "If you think I'm leaving you like this, Jonton Kermol..!" The look in his eyes made her stop.

"Please, Gerselle. I think I'm through the worst of it ssssss now but I don't how long this is going to take."

"How long *what* is going to take?!"

"I'll explain everything, Gerselle - trust me. But I need to explain it to the Chief Ambassador too - and quickly."

Jonton saw the doubts flickering in her eyes. "He'll come Gerselle - he'll have no choice," he said softly and Gerselle reflexively drew herself up at the sudden note of authority in his voice.

"Stand, Gerselle Kermol. Stand and bear witness, for I invoke my Right of Conclave."

Gerselle turned and ran for the telephone.

Chapter 30

Echoes of Time

Donman hurried up the hill towards the Grove. The village lights twinkled in the dusk and the first stars of the evening were just coming out over the tree tops. So far as he could tell, everything was perfectly normal - which was definitely at odds with the urgent call from the local Keeper. *Correction*, thought Donman, *the local Keeper's partner. Who was also rather reticent about letting me speak to the Keeper in person.* He furrowed his brow in thought as he walked briskly through the village, winding up the hill towards the Keeper's hut. The light was too dim to get a proper look at the Kerm tree growing up through the centre of the hut but the sheer size of its trunk told Donman that it had to be very old indeed.

The door swung open as he approached and he was greeted by a very nervous looking kerbal.

"Ambassador. Thank you for coming so quickly. I'm Gerselle - Jonton is just through in our sleeping room."

Gerselle led Donman through her home. He could feel the tension in the air as she tapped on the sleeping room door. *What's going on here.*

"Jonton - the Ambassador is here."

She pushed the door open and stepped through into the dimly lit room. Donman's eyes watered at the sudden intense smell of Kerm leaves that gusted out from the doorway. Blinking furiously, he peered through the gloom, coughing as he tried to make out more details through his tears. He was dimly aware of a pair of luminous orbs floating amidst the great profusion of foliage around the base of the enormous Kerm trunk, Somehow they seemed almost ethereal in the muted dusk of the room.

Donman wiped his eyes and the room slowly swam into focus. Breathing deeply to calm himself, he glanced at the foliage and bit back a startled cry as the orbs resolved themselves into a pair of kerbal eyes. The rest of the kerbal was almost completely hidden by leaves and

- to Donman's horror - roots that burst up from the ground and twined about its legs, binding it securely to the trunk. From his vantage point by the door, Donman couldn't see where the root tips went but at that moment he decided that he really didn't want to know.

"Welcome, Ambassador. We are Jonton."

For a minute, Donman was deeply relieved. *It can talk. Whatever's happened in here, I'm still standing next to a living kerbal.* Then he shivered. The voice was almost as unsettling as its owner. It was oddly cultured in its way but echoed with hidden undercurrents that spoke directly to the darkest corners of his mind. The ones that it didn't normally pay to re-examine too closely, especially not in the half light before nightfall.

Then he realised. *Old - it sounds very very old.*

He frowned, "We are Jonton?"

"It would be easier to show than to tell. Please Ambassador - make yourself comfortable on our bed and join me. There is a great deal you must see."

The voice contained none of the usual deference that even a Keeper would normally show a chief Ambassador. Under the circumstances, Donman did not feel inclined to take issue with the lack of courtesy, nor to point out that sharing a Kerm would be a gross breach of etiquette and tradition. He looked over at Gerselle and was surprised to see the pleading in her eyes. Trying his best to control his sudden nausea, he lay back on the bed and braced himself. The leaves dipped towards his head and swiftly coiled around his temples.

A torrent of incoherent images blazed through his mind, like an old fashioned film strip accelerated beyond the point of sanity. Sounds, smells and even textures cascaded through his brain, threatening to sweep his fragile consciousness away altogether. Distantly, he could feel the convulsions, the ligaments in his back stretching as he arched off the bed, throat clenching around a silent scream.

Mercifully the deluge began to subside. The odours of hot tin and cinnamon drifted away into the background, the chaotic shriek of sound faded into a rushing of wind through the branches and then into the faint rustling of leaves. The torrent of images slowed and swirled into blackness. His stunned mind latched onto the rustling sound, finding in it a precarious mental ledge to cling to.

"I'm sorry, Ambassador. Believe me I know what you've just been through but there was simply no adequate way to prepare you." Somehow the voice seemed much less threatening, almost apologetic. "If it's any consolation, it was far worse for us." Jonton did his best to sound reassuring. "Hold on to the sound of the leaves, Ambassador. Hold on and watch."

The blackness faded into a grainy twilight grey shot through with streaks and whorls of washed out pastel colours. The colours coalesced into a faded image of a Kerm sapling surrounded by a group of kerbals. *Or I don't see what else they can be. They're odd looking though - smallest heads of any kerbals I've ever seen..* The grainy picture made it difficult to tell for certain but they also looked...coarser than most kerbals, with ragged, almost twiggy

tufts of hair sprouting from their heads. With a shock, Donman noticed that the nearest figures to him were also carrying crude stone axes.

"My apologies for the picture quality Ambassador," said Jonton, "but as you'll have noticed, they *are* rather old. They're also filtered through the perceptions of one of the other kerbals in the group and unfortunately, at this point in history, those perceptions aren't terribly acute." He paused. "Although neither were ours for that matter."

Donman couldn't take his eyes off the axes. "Are those really..."

"Stone axes? Yes, Ambassador. Late Stone Age I believe, although you'll understand I hope, if our own memories are rather vague on that point."

"Your *memories*." said Donman in disbelief. "That's impossible!" He snorted in disgust. "If those are late Stone Age kerbals then that would make you..."

"Many thousands of years old." Jonton said calmly. "Come, Ambassador - this should come as no surprise. Have you never grafted a new cutting onto the stump of an old departed sire? It is true that all trees will pass on in time but properly cared for, the *Kerm* will still endure."

"Well yes, but not for thousands of years." A thought struck Donman. "Besides, if this is true, then why is it not common knowledge amongst the Keepers? Surely there are other Kerm as ancient as you claim to be?"

"There are - but even for us, memories this old are hard to retrieve. The only reason why this one is quite so clear is because it's rather personal. You see, Ambassador - *we* are that sapling you see before you."

Donman frowned, "You keep referring to yourself as *we*. Am I speaking to Kerm or kerbal here?"

Jonton's voice sounded strangely sad. "I promise you that all will be revealed in time," he said. "In the meantime, welcome to the Kerbin of your far distant ancestors."

Donman recoiled from the series of grainy images flickering past his minds eye. A group of prehistoric kerbals curled up around the foot of a Kerm tree, all with their heads wrapped in a leaf cluster. The same group in pitched battles with other armed kerbals, leaving nothing but bloodied earth and mutilated corpses behind to rot amidst swathes of wilting and sickly vegetation. Worst of all, kerbals chopping down other Kerm trees, straining to uproot the stumps with their primitive tools and then planting something deep inside the scarred and muddy sockets left behind.

Jonton sighed. "Kerm and kerbals, both guided by little more than co-dependency and brute instinct. In a sense though, nothing important has changed over thousands of years. The Kerm still talk to us, they still provide us with food and shelter and still heal us when we are sick. And in return we spread their seeds for them as we have always done."

Donman was still trying to take it all in. "But why the fighting? Why the cutting down of other Kerm?"

"Because in many ways Kerm are not so very different from any other plants or trees," said Jonton. "Almost all plants compete with other plants for space and nutrients and many of them rely on animals to distribute their seeds. The one *crucial* difference is that Kerm are sentient beings - and so too are their chosen seed carriers."

The flickering images slowed to a halt as Jonton went on talking. "However a single Kerm tree by itself is barely sentient and at this point in history - or prehistory - our kerbals were only marginally more so. True, they were intelligent enough to use tools but they were still guided more by instinct and obedience to us than by any real awareness of the future."

There was a pregnant pause.

"It was not a pleasant combination," said Jonton at last. "Kerm are intensely territorial and a new Kerm sapling was simply another competitor to defeat. In such an environment, the saplings are naturally highly aggressive - they must be in order to survive. The adult Kerm respond in kind and even worse, *their* constant struggle to survive triggers an instinctive response to reproduce as quickly as possible. The result was a vicious, unending cycle that only intensified with the steadily increasing intelligence of both Kerm and kerbal."

A note of savage pride tinged Jonton's voice. "But *we* survived. Our roots were the more cunning and our kerbals were the stronger!"

Donman swallowed. "But what happened? Something must have happened."

"Oh yes," said Jonton softly, "Something happened. Such a simple thing but it was enough to bring about the end of an era. Watch, Ambassador."

A new image swirled into place. A single kerbal stood by a stick, planted upright in the ground. In the distance, a young Kerm tree stood silhouetted against the sky.

"It doesn't look like very much does it, Ambassador? We'll probably never know why but a single kerbal decided to plant a stick in the ground and leave it. But that was the pivot on which the entire history of Kerm and kerbal turned. Indeed, it was the reason why there *is* such a history and why we're here today watching it."

"You see, Ambassador, Kerm are also like other trees in one vitally important way. Plant a cutting from one Kerm tree in the ground and in time, it will develop and grow into a new tree *that is identical to its parent*. And *that* is the crucial difference. The parent tree recognises the other as self - and rather than fight, the two trees join and become a single larger being."

Jonton paused and his voice shifted subtly. "We weren't truly aware of the difference to begin with but I did know that it felt good. And because we knew it was good, my kerbals also knew that it was good and planted more cuttings in response. Dropped branches to begin with but later they grew quite adept at cutting off parts of us whilst causing the least amount of damage."

The images started moving again, although now they were much sharper and less grainy. Donman watched the kerbals plant their sticks and saw them grow. He saw the surrounding

vegetation take on a more ordered aspect and watched the kerbals grow stronger and more numerous amidst the increasing harvests. As the generations flickered past before him, Donman saw the cuttings planted in many different arrangements and spacings until the kerbals found a pattern that would be familiar to any modern day Keeper. He also began to see an entirely different sort of pattern emerging. The kerbals would plant their cuttings, the cuttings would grow and then beyond a certain number they would abruptly die back.

Donman had a sudden suspicion. As the next generations of planters paraded before his eyes, he made a careful count of the number of cuttings planted before the dieback. Suspicion crystallised into stunned certainty. Each and every time the number of cuttings exceeded thirty seven, everything seemed to go wrong. And as Donman well knew, thirty seven was the exact number prescribed in the Records for founding a new Grove.

It was as if Jonton could read his mind. "Indeed. The Records do set a limit of thirty seven - and for a very good reason, as I recently found out. His voice shook slightly. "As I mentioned, a Kerm is a collective organism Ambassador - a web of many trees. As each cutting grows it adds to that web and the whole organism develops greater intelligence, more complex feelings and instincts and much greater control over it's surroundings. However, even a full thirty-seven tree Kerm is not really self-aware in the kerbal sense. It has a great *breadth* of memory and experience but very little of the *depth* necessary to develop a true conscious personality."

Jonton paused. "But add another cutting and the Kerm crosses that final barrier - with disastrous consequences. You experienced a little of it yourself when you joined us. Now imagine an entire *lifetime* of sensations dropped into your mind in a single overpowering burst. You might barely be able to handle it but only because you've had - literally - a lifetime of practice and a brain that has evolved for the task over hundreds of thousands of years! The Kerm has no chance at all. At best it gets one brief moment of self awareness before its newly awakened personality shatters under the strain."

Donman was thunderstruck. Dimly he could hear Jonton's voice in the back of his mind.

"Gradually though, some of the kerbals learned. Slowly and painfully, they learned the Law of Thirty-Seven and finally they learned the Law of Territory and started planting their Kerm seeds far enough away from the older Kerm. And with that, the ancient cycle was finally broken."

"Not broken," said Donman slowly, "so much as reversed."

Jonton smiled. "Indeed. The new peace blunted the old instinct to reproduce at all costs, which led to fewer new Kerm, which helped to prolong the peace, which further blunted the urge to reproduce. It was far from an overnight change but within a relatively short span of generations, the modern pattern of dispersed, slow breeding Groves was well on the way to becoming established. It did help that a Grove of secure, well fed kerbals, with time on their hands to plan and build, tended to be more than a match for any that still held to the old ways."

The images began to shift again. Donman caught glimpses of crude fortifications, earthen walls and wooden palisades. The kerbals patrolling the the fortifications seemed to be rather better equipped too. Metal weapons and even pieces of armour began to make an appearance and quickly diversified into an inventive array of suitably lethal looking implements. To his surprise though, away from the walls, *groups* of kerbals sat in communion with each tree of their Kerm.

"Unfortunately, with peace came arrogance and overconfidence in their developing civilization. Many kerbal generations later, when the seeds started to drop again the memories of conflict had faded and the Law of Territory had been all but forgotten. Rather than setting forth to wage war on nearby Kerm, the kerbals decided to plant the seeds within their groves. To their credit, some of them did at least remember to uproot an older tree first but..."

Donman interrupted. "They were not self?"

Jonton nodded. "Even in those groves which enforced the Law of Thirty-Seven, the sudden introduction of a foreign Kerm caused chaos. For the Groves - such as ours - that did not remember, the result was tragedy. Rather than destroy the 'invader', we tried to assimilate it. It fought well but in the end, our thirty seven were able to subdue it. But then the thirty seven became thirty eight."

Donman had a sudden awful premonition.

"Believe me, Ambassador," Jonton said quietly, "The pain you experienced joining with us today is *nothing* compared to the agony of a Shattering mind. But even that agony pales into insignificance at the searing realisation that you just Shattered yourself *by killing your one and only child.*"

His voice turned bitter. "As if that wasn't enough, the backlash from that realisation was enough to break the minds of our kerbals too. All of them that were communing with us went berserk. They couldn't be reasoned with because there was nothing left of them to reason with. The only thing left to do was to kill them. For the first time since the Breaking of the Cycle, kerbal was forced to murder kerbal in order to survive."

Gradually Jonton regained a measure of control. "They did survive but at a terrible, terrible cost. By the end of the Age of Madness, the kerbal population had been cut in half and hundreds of verdant groves had been reduced to smouldering wasteland."

Gerselle watched fearfully as the body of the Ambassador twitched and thrashed on the bed. Suddenly his eyes snapped open revealing a face that was haunted and drawn.

"Please, he croaked, "Please let me drink and rest a while."

Silently, Gerselle went through to the eating room and came back with an earthenware mug of water. Donman sipped at it slowly, gathering his resources. Then he put the empty mug

to one side and with a look that was equal parts resignation and resolve, he lay back down on the bed and let the Kerm leaves wrap around his head again.

Even though he was better prepared the second time, union was still a wrenching, nerve shaking experience. The last of the explosions faded from behind his eyes, leaving him flailing helplessly in the darkness, with the sound of rustling leaves in his ears.

The leaves... focus on the leaves.

Jonton's voice was sympathetic. "We're sorry, Ambassador," he said. "I truly am. Believe me, this is a painful lesson for us also - and it's one we desperately need to master if we are to share these memories with others."

"Show me something," Donman pleaded, "Please. Anything for a distraction from this."

The pounding in his temples splintered into dozens of fractured knives which coalesced into a dull hammer beating at his skull. The whispering leaves became a susurrant of kerbal voices flowing past him. Colours swirled before his eyes and resolved themselves into a picture of muddy streets and half finished clapboard buildings. The image lurched sideways and Donman felt a momentary sense of nausea that the clean salt air swiftly washed away. His viewpoint shifted upwards and he caught a glimpse of a slate grey sea, streaked with lacy white foam.

"Where are we?" he said.

"A long way from home," said Jonton, "at least for that Age. And the last journey our first Keeper took before returning to the Grove to take up his duties."

"Hold on, hold on," said Donman, "your *first* Keeper?"

"Yes, Ambassador," said Jonton. "Let us see if we can... ahh."

The muddy streets and building sites vanished abruptly and were replaced by the more familiar vista of the early Grove, complete with walls, guards and....

Groups of kerbals, thought Donman. A whole group communing with each tree.

Jonton sounded pleased. "This seems to be getting a little easier," he said. "Anyhow - observe..."

"I can see," interrupted Donman, "There must be at least a hundred kerbals communing with... uh, with you."

"I think so too," said Jonton grimly, "and all of them doomed to insanity. That was a lesson that the kerbals learned all too well, Ambassador. A vocal minority advocated complete separation from us but even the more rational majority were scarred by the knowledge that communion with the Kerm bore a terrible terrible risk. Eventually, a handful of brave leaders volunteered to take that risk for their followers and from that day forward, they *and*

only they would commune with their Kerm. That tradition has remained unbroken ever since."

"And says everything about the Age of Madness," said Donman soberly. "Bad enough to scare us - us kerbals that is - into a tradition that's lasted for centuries. What happened to the separatists though? Did one of the new leaders take them in? That would be a pretty big gesture towards a group of miscreants that wanted nothing to do with the Kerm they volunteered to Keep."

The image of the Grove shimmered back to a view of muddy streets and half finished buildings.

"No, Ambassador - they sought a new life here. I don't remember if any of the new leaders did volunteer to take them but it wouldn't have made any difference. After the carnage and the chaos of the Age of Madness, they were determined to build a new kerbal society. They called themselves the Kerm-an, which in the language of the time meant literally 'outside the Kerm' or 'outwith the Kerm.' And just in case that wasn't enough, they called their new capital Bar-Katon, which translates roughly to 'freedom from the forest.'"

"Barkton," whispered Donman.

"Yes," said Jonton. He sighed. "For a place called 'freedom from the forest', they certainly used a lot of the forest to build it."

"They built well though," said Donman. He frowned. "And yet, modern day kerbals are all born in the Groves. What happened to the Kerm-an?"

"Nothing happened to them," said Jonton, "Come now, Ambassador. Even today, a kerbal that chooses to live outside the Groves calls himself - or herself - a kerman, although as a practical matter, 'male' and 'female' are mere labels. You see Ambassador, just as we Kerm have evolved to be entirely dependant on our kerbals to disperse our seeds, so too are the kerbals dependant on us to disperse theirs." He coughed, "In a manner of speaking."

He sensed Donman's next question. "And before you ask - no I don't know how. Some scent compound or other I expect - a kerman equipped with modern technology could probably work it out but all the original Kerm-an knew is that they couldn't bear children outside of the Groves."

"Another historical tradition then," muttered Donman, "and yet it works. Groves are good places to raise kerblets after all. Must have been galling for the Kerm-an though, forced to come crawling back to their Groves."

Jonton stayed tactfully silent but the image in Donman's minds eye flickered rapidly through a succession of scenes. Some of them were more a sketch of an idea than anything else but they still made their point. *A second hand memory perhaps? Something that a Keeper heard rather saw?*

A lone kerbal making the trek from the Grove to the city...

Kerbals hauling carts of gravel and other quarried stone...

Muddy tracks being replaced by metalled roads...

A huge throng of kerbals watching the final stone being set in place, on what Donman thought, would have been an impressive building for it's time...

A great meeting, kerbals up on their feet, shouting and gesticulating wildly...

The ebb and flow of kerbal couples going back to their Groves and then returning home with kerblets in their pouches...

Ever more numerous trains of wagons, ferrying goods between Bar-Katon and the surrounding Groves...

The parade of images slowed and settled on the interior of a large but plain wooden hut. A row of kerbals sat behind great desks, pens in hand and heads bent over heavy parchment scrolls. Jonton resumed his narrative.

"The Kerm-an didn't give up easily though. If they couldn't live apart from the Kerm, they could at least warn future generations about the perils of associating with them. The first scrolls in the great Archive were... controversial... and apparently included rather more Kerm-an propaganda than was thought to be strictly helpful. To their credit though, the first Keepers eventually recognised the value of an accurate - and permanent - record of the Age of Madness and the errors in Grove Law that caused it. In time, they also became the repository of accepted Grove Law and all *new* knowledge about the Kerm and their effect on the local plant and animal life."

"'Controversial' is a favourite word of diplomats," said Donman dryly. "It can cover so many situations."

"Fortunately," said Jonton, "memories of the Age of Madness were still too fresh for anyone to want to spill blood over it. My Keeper remembered a lot of shouting and hollow threats but very little of substance."

"I imagine the possible loss of trade stopped things getting out of hand too," said Donman.

"Not really," replied Jonton. "It helped a little but both communities were fairly self-reliant at this point in history. Trade was for exchanging luxuries rather than staples of life. However, the communities diverged over the next several generations - kerbal generations that is. Agriculture without Kerm support is *hard*, Ambassador and eventually, even the most die-hard kerman found it much easier to trade for most of their food rather than grow it. Meanwhile, the Groves grew increasingly attached to the quality of life improvements that the kerman kept inventing. Our second Keeper was particularly fond of her new eyeglasses for example." He sighed. "She was a good kerbal - worked hard to really embed the new ways in popular thinking."

"And so our modern system arose," said Donman wonderingly.

"Yes," said Jonton, "The kerman of the time called it the Age of Prosperity. We don't have many memories to show you I'm afraid Ambassador, because our Keepers only travelled so far. But believe us when we say that thanks to rigorous enforcement of Grove Law, Kerm,

Grove and Kerman all flourished. It was about this time that Grove dwelling kerbals began to refer to themselves as Kerm-olia, or 'protectors of the Kerm.' The modern rendering is kermol of course."

A thought struck Donman. "Forgive me but we must be getting close to the history I know by now? The Age of Sail and the Bill of Land, Jebediah Kerman and the First Council? Everything that I learned as a kerblet."

"We are," replied Jonton, "but your lessons missed the most important part. Hardly surprising really since the older reaches of the Archives are now obscure to the point of gibberish. But humour me for a minute, Ambassador - what is the Bill of Land?"

Donman thought for a moment, choosing his words carefully. "It's a treaty," he said at last. "It's the bedrock of all international law and it was designed by Jebediah Kerman himself to ensure a fair and equitable allocation of land to Kerm, Kermol and Kerman alike."

Jonton nodded. "At least one of your teachers knew his law," he said. "So why was the Bill necessary?"

"The Age of Sail opened up new lands for Kerm and kerbal," Donman said mechanically. "The proto-nations of Kerbin saw great opportunities across the oceans and raced to exploit them. What began as harmless competition threatened to become armed conflict as each nation vied with the others to secure their land holdings. The Council of the Twelve Pillars was formed as a peacekeeping force but its first leader, Jebediah Kerman, recognised that the only long term way to stave off conflict was to create a Bill that all could agree to." He coughed. "So my history lessons and reading of the Archives tells me, although I'm getting the distinct feeling that you're about to overturn them."

"Again, your lessons and researches are quite accurate as far as they go," said Jonton. "In many ways, the formation of the Council was *the* defining moment for the kerman and Jebediah was undoubtedly a gifted and far-sighted leader of the Council. We only wish that we could list him amongst our Keepers. However, I fear that the true reasons for the Age of Sail have been lost."

Jonton gathered himself with an effort. "Picture it, Ambassador," he said. "The Age of Prosperity. Groves and Kerman spreading across the land in waves, each wave driven by a new generation of Kerm. The great Seedings came more and more slowly with time and in truth, the last Seeding of the age was as much a surprise to us Kerm as it was to our kerbals. Only this time, there was no ready room left to expand into.

The void around Donman flickered and he found himself staring at curiously geometric swathes of browned and dying vegetation. *These look too stylised to be real memories. More second hand information I assume.*

"It's hard to believe, Ambassador," said Jonton, "but this time all of us were lucky. Each area of scarred land you see marks a battle between a new Kerm sapling and the Kerm of the surrounding Groves. Only this time, the Law of Thirty Seven was indelibly stamped into kerbal culture and the Keepers were able to prevent their Groves from assimilating the new

Kerm. By this minor miracle alone, did we avoid the catastrophe of a second Age of Madness."

The geometric scars swirled away and were replaced by a view of a large Kerman city. Donman was impressed in spite of himself. Clearly Kerman architecture had come a long way from the days of clapboard houses and log cabins and many of the newer buildings wouldn't have looked too out of place in a modern city. He grinned to himself. *The buildings might look the part but dear Kerm the fashions would stick out. Why - why did anyone think that eyebrow wigs were ever a good idea?*

The viewpoint swam through neatly paved streets, through leafy squares where ornate fountains sat amidst elaborate mosaics and finally down to the dockside. There, a small army of kerbals swarmed over, what seemed to Donman, to be a rather rickety looking sailing ship. He frowned. *Something about the view out to sea looks familiar.*

Jonton resumed his story. "The Age of Sail was a heroic time but no romantic wanderlust called these beings onto the waters, Ambassador: desperation drove them."

Something clicked in Donman's memory. "Barkton," he said, "that's Barkton again surely?"

"It is," said Jonton, "The kerman of Barkton already had a reputation as fishermen and seafarers, so building a shipyard there was a natural enough decision. Building the ships was another matter entirely. A small coastal cutter is one thing, an ocean crossing vessel something else altogether."

Donman eyed the ship. "I see what you mean," he said, "I'm no sailor but that craft doesn't look particularly sturdy."

"Most of them weren't," said Jonton shortly, "A lot of Groves lost a lot of good kerbals."

And a lot of inconvenient Kerm seeds too, thought Donman, then silently rebuked himself. *Would you be so callous if it were shiploads of kerblets going to a watery grave Donman.*

Aloud he said, "Those battle scars you showed me looked strangely familiar but I'm not sure why."

"They should do," said Jonton grimly, "Here's our memory of a KBS news broadcast from a few weeks ago. You might recognise it."

The emergency team stared around in horror. The village itself seemed to be largely intact but the surrounding fields and orchards were ruined. Most of the villagers wandered aimlessly, or sat outside their huts gazing blankly into space.

The hut door swung open and the medical team emerged, carrying an elderly kerbal on a stretcher. Sallow skin drooped off his emaciated frame in slack green folds and his eyes rolled wildly in their sockets as he thrashed against his restraints.

"They're coming! They're coming!"

One of the medics held up a syringe and raised his eyebrows. The senior doctor shook her head sharply and bent closer to the old kerbal, murmuring into his ear. Whatever she said only agitated

her patient still further. Specks of foam spattered against his chin as he screamed.

"The sparks are coming! They're still coming! They'll kill us all!"

Donman shivered uneasily. "I think I missed that one," he said, "What are the sparks that he keeps talking about."

"We hope to Kerm you never find out personally, Ambassador," Jonton said. "From personal experience, I believe they're a Keeper's eye view of the battle between two warring Kerm."

Donman hardly dared to breathe. "Personal experience?" he said quietly.

"I'm very much afraid... yes, personal experience," said Jonton. For the first time, Donman thought the Keeper sounded nervous. *Keeper, Kerm, who or what am I talking to here.* He listened silently as Jonton described the discovery of the new Kerm seed, the misconceived planting and finally the battle between themselves and the new Kerm.

This can't be happening. And yet... something doesn't sound right here. I think he / it dammit they are hiding something.

"What happened after the battle, Jonton?" he said.

Jonton's voice shook. "Nothing for a while, Ambassador, " he said. "Gerselle and I tried our best to talk to our Kerm but they wouldn't talk, or if they did, nothing made any sense." He took a deep breath. "So I decided that if thirty seven Kerm weren't enough for an intelligent reply, then maybe, just maybe thirty eight would be."

Donman's head jerked upwards in shock and ripped free from the Kerm leaves.

"What did you do?!"

"We planted another cutting in my Grove," said Jonton.

"Stop it - just stop it with all this talk of 'we' and 'us' shouted Donman." "Who are you? What have I been talking to for the last Kerm knows how many hours?!"

The eyes in the undergrowth looked miserably back at him. "We...I don't know, Ambassador. My Kerm Shattered but somehow I was able to help. I don't know how - maybe it just trusted me after we fought Gerselle's Kerm together. Right now though, I think my mind is the only thing holding the fragments together."

Donman's head jerked round at the sudden tremulous voice that spoke up from the corner of the room.

"What do you mean, Jonton?"

Jonton began to weep. "I think if I break the communion then we, the Kerm will die. I'm sorry my love - I'm so, so sorry."

Part Three

Kerbal Space Program

Chapter 31

Right of Conclave

Gerselle's legs buckled beneath her and she collapsed bonelessly onto the floor.

Silently, Donman helped her to her feet and gently led her over to the bed. He pressed his half empty cup of water into her hands, closing her fingers tightly around it. "Drink this," he said. "Trust me - it helps." *And we could both use a little help right now.*

Jonton's tear reddened eyes met Donman's in silent thanks. Gerselle took a hesitant sip, hardly noticing as her trembling hands spilt most of the water down her shirt. She drained the cup and put it to one side.

"I don't understand, Jonton," she said. "Breaking communion doesn't kill a Kerm and it certainly doesn't kill it's Keeper." She laughed nervously, "Otherwise there wouldn't be any Groves left on Kerbin."

Jonton began to speak but Donman held up a hand. "Let me try," he said quietly. "I need to make sure that I understand." He paced back and forth, his footsteps suddenly very loud against the floorboards. *Where do I even start.*

"You know about knitting," he said at last. "One Kerm tree alone is barely more intelligent than any other tree. Thirty seven together creates a being with feelings, memories and thoughts and the rudiments of personality. A little like a luffa maybe or perhaps one of the treebeasts of Spierka. So why not more? Forty, fifty or even a hundred? Why don't we have a single enormous Grove on each continent made of thousands of Kerm linked together into one super-being?"

"The Law of...", began Gerselle.

Donman nodded. "Indeed - the Law of Thirty Seven. But laws are a kerbal creation, Gerselle. Why should the Kerm obey them too?"

"They don't," said Gerselle, "Grove *law* is just a collection of instructions." She laughed shortly. "More like a collection of warnings. Jonton and I found out the hard way the true reason for planting Groves a day's walk apart."

"The Law of Territory," said Donman, "The second oldest law on Kerbin, after the Law of Thirty Seven."

"Well that certainly explains why we couldn't find either of them in the Archives," said Gerselle tartly, "Are you going to get to the point, Ambassador?"

The Kerm leaves rustled behind her. "Gerselle...", said Jonton.

Donman shook his head. "It's quite alright." He looked at Gerselle. "Thirty seven Kerm have the beginnings of personality and the barest inkling of self. A thirty eighth Kerm is enough to tip the balance towards full self awareness but it all happens too fast to control. Awareness unlocks a storm of disorganised and disjointed memories and the new personality simply doesn't have time to make sense of them before it breaks under the strain and shatters.

Gerselle blinked. "Oh," she said in a small voice. She thought for a moment. "What happens to the old Kerm?"

"It dies," said Donman bluntly. "A long painful death I imagine."

"Far worse than that, Ambassador," said Jonton bitterly. "It endures a long painful life. Remove the thirty eighth tree and the broken fragments of mind will eventually heal, although the healing is rarely complete. We... *I* was one of the lucky ones that survived mostly unscarred. A lot of us weren't so lucky and for many many others it was kinder to burn them to the ground than to let them live."

The leaves around Jonton's head lashed back and forth in agitation. "I think some of my kerbals must have tried to help the Shattered Groves. I can still remember the screaming as the broken Kerm pleaded for the fire." His face twisted. "Although perhaps those are just my own memories. Right now its hard to tell."

Gerselle gaped at him. "*Your* kerbals, Jonton? And which shattered Groves?" She buried her head in her hands, grimacing as her fingernails dug painfully into her temples. "I don't understand any of this!"

Jonton and Donman looked at each other. Donman dipped his head in acknowledgement.

"My kerbals," said Jonton at last. "Or our kerbals. Sometimes it seems like both at the same time." He closed his eyes. "Do you remember the black spots on the leaves?"

Gerselle's face was still hidden but Jonton saw her nod.

"I still don't know really what they meant but as soon as I saw them we feared the worst. Even then, I think my kermal got here just in time." Jonton groaned. "we... *I* went into communion just in time to witness us, me, our... *the Kerm* shattering. Somehow I absorbed the fragments."

Jonton's voice shook. "A fragment. Such a poor word for a hundred years or more of somebody else's thoughts and dreams and memories smashing into your mind. I don't even know how many there were - I just remember everything going black and then a voice screaming *Bad tree! Bad tree!* A precarious anchor to reality but just barely enough to stop me Shattering too. I managed to open my eyes and saw Joenie pummelling our trunk."

Jonton lifted a hand and peered at it curiously, watching the pull of tendons under the skin as the fingers flexed.

"We remember telling you to witness my right of Conclave," he said "and then you vanished. Ever since then I've been trying my best to... protect is a good word. Yes, protect the shards and try to make some sense of them."

Gerselle lifted her head and stared at him. "And have you made sense of them, Jonton?" she asked.

Jonton plucked at a leaf. "A little bit," he said. "There's an awful lot to make sense *of*, love."

"Do you know how long it took for the Ambassador to get here, Jonton?" said Gerselle.

"Nearly three days. I've been worried sick, Joenie has been crying for her father every night. How much longer will it take, Jonton!"

The colour drained from Jonton's face. "Three days," he whispered. "No... no it can't be that long."

"I'm afraid it is," said Donman quietly, "Believe me, I came as quickly as I could." He paused. "You just said that a Shattered Kerm will heal in time. If the shards are safe, why can't you break communion now?"

Jonton looked at them helplessly. "I can't," he said. "Neither of you have any *idea* what I'd be condemning them too. Besides, it's not..."

Gerselle rounded on him furiously. "It's not what, Jonton! Not as simple as a choice between some tree and your family? Between some tree and *Joenie*!" She stopped as Jonton's face crumpled, tears welling up in his eyes.

"...that simple," he said in a choked voice. "The shards are *melting* Gerselle. Some of my memories are still *mine*, most of them are still Kerm but the edges are blurring. Believe me, I'm trying to stop them but it's getting harder and harder to know whether I'm remembering something as Jonton-the-kerbal or Jonton-the-Kerm." He paused. "More often there doesn't seem to be any difference. It's all just Jonton."

Donman's eyes widened in alarm. "All the more reason to break communion now!" he said, "Before you lose yourself any further."

The last tear trickled down Jonton's cheek. "I think it's already too late, Ambassador," he said, "We're a Kerm of thirty nine now. Thirty eight trees - and one kerbal."

Donman's eyes flicked from Jonton to Gerselle and back again whilst he struggled to find something, anything to say. *Not that I have any real choice*, he thought. *Kerm hah knows*

this won't be easy for them but for the sake of all Kerbin I think that poor kerbal needs to stay exactly where he is.

"How are you going to eat," he said at last, "If you can't break communion?" *Stupid question Donman*, he thought, *He can still move his arms, so he'll eat just like any other bed-bound kerbal*. He was surprised to hear Jonton laugh.

"That's the least of my problems, Ambassador. Look."

Jonton pulled aside the leaves from around his waist and Donman suddenly felt the acrid taste of bile in the back of his throat. The things that he'd taken to be roots coiled around the Keeper's legs weren't roots at all but some kind of gnarled vine. The tip of each vine had split into a dozen or so tendrils and all of them had burrowed into Jonton's torso. Some of them grew straight inwards, whilst others tunnelled under his skin in hard, ridged weals before disappearing under the surface.

Well now you know Donman but oh sweet Kerm I'm going to be seeing that for far too many nights to come. He was dimly aware of a soft scream and Gerselle collapsing onto the bed beside him with a thump.

"It looks worse than it is really," said Jonton. "I don't even feel hungry any more. That was quite a distraction for a while you know. Obviously I couldn't really have been hungry with the Kerm looking after my needs but my empty belly refused to believe it at first." His voice suddenly rose in alarm.

"Gerselle! I'm fine, truly I am!"

Donman's head snapped round in time to see Gerselle's eyes roll forward in their sockets.

"It's no worse than going into communion; the connections are just a little thicker that's all!" said Jonton urgently. He grabbed one of the vines and tugged it. "They don't hurt - this doesn't hurt!" His voice softened. "Come here, my love, come here."

Mechanically, Gerselle picked herself off the bed and walked towards him. Jonton pushed the leaves to one side as best he could and held out his arms to catch her as she stumbled towards him. Deftly he caught her and wrapped his arms around her, pulling her into a tight embrace. The Kerm leaves rustled and twined protectively about the two kerbals.

Donman stood up. "Do you have a telephone I could use?", he asked quietly.

Jonton nodded at him over Gerselle's shoulder. "On the table in the kitchen," he said.

"Thank you, Ambassador."

The kerbal on the other end of the telephone sounded sleepy and more than a little put out.

"Desrigh - it's Donman. Sorry to wake you at such a ridiculous hour but is Corsen there please?"

"A-ambassador? Of course. He'll be right with you."

The mumbled words coming down the line were too indistinct for Donman to make out but their tone was clear enough. He held the receiver away from his ear for a moment until he heard the distinctive click of somebody picking up a second handset.

"Ambassador? Where are you?"

"Still at the Grove. It's been an...unusual night. Listen Corsen, I need an advisory meeting with the rest of the Council at their earliest convenience."

All traces of sleep vanished from Corsen's voice. "Do you mean an emergency meeting, Ambassador?"

"No - an advisory meeting will be fine."

"Understood, sir. Should I give a reason?"

"I'm authorising the Right of Conclave for one of my constituents. Please advise the Council that due to unforeseen circumstances, my constituent will not be able to attend in person."

Corsen's gulp was audible. "I'll see to it immediately, Ambassador."

"Thank you, Corsen. I'll be at Bar-Katon airport in two hours."

"I'll book you on the next flight, sir. Usual message at the executive desk." Corsen paused, "Bar-katon, sir?"

"Barkton. Slip of the tongue, Corsen. Like I said, it's been an unusual night."

Donman tapped on the sleep room door before cautiously peering into the room. Gerselle and Jonton were deep in conversation and he was relieved to see that Gerselle's face had regained some of its colour. *She's resilient. Thank the Kerm for that much.* He coughed politely.

"Jonton, Gerselle. I need to leave now."

Jonton bowed as best he could. "Of course, Ambassador. Thank you for taking the time to see us."

Donman smiled faintly. *Just like that. A little social call to smooth out a minor problem or two.*

"My pleasure, Keeper. You'll be glad to know that your right of Conclave has been granted but I trust you'll have no objections if I petition the Twelve Pillars on your behalf?"

"It would be an honour, Ambassador. Please convey my apologies to the Council for my... indisposition."

Donman's voice was suddenly serious. "I've convened an immediate session of the Council, Jonton. I shall do my best to explain but I shall also formally recommend that each of the Pillars pay you a discreet visit. You may consider your unreserved cooperation to be a mandate from the Council."

Gerselle bowed. "Naturally, Ambassador."

Jonton nodded solemnly. "Of course, Ambassador."

"Very well." Donman paused. *The usual Kerm-related pleasantries seem woefully inappropriate tonight.* "Good luck, Keeper." He turned to Gerselle. "And to you also - Keeper."

The steaming grass swished underfoot as Donman made his way through the park. Curliques of mist eddied around the graceful arches of the Capital building and swirled around the feet of the statues decorating its twelve outbuildings. Kerbol had barely lifted above the horizon and the flag of all Kerbin fluttering from the topmost flagpole fluttered against a cerise streaked dawn sky.

A trail of rapidly drying footprints marked Donman's progress across the central plaza. He dipped his head politely to the two Capital Guards standing silently by entrance and strode into the main atrium. Hurrying through the outer gallery, he pulled up short by the Council chamber doors, braced himself and then nodded to the guards.

The thud of closing doors broke the muted buzz of conversation from the Council table and eleven pairs of eyes followed Donman's silent progress towards the podium. He took a firm grip on his lectern, took a deep breath and lifted his head to face them.

"Misters President, mesdames President, honoured chief Ambassadors. We are assembled here today to grant the ancient Right of Conclave."

"I have answered the petitioner and I deem his request worthy and to be made in sound mind. Let the record note that the petitioner is indisposed and that I, Donman Kermol, have elected to speak for him. This I shall now do and I beg that the Twelve Pillars give his petition all due consideration and support." *Here goes nothing.*

"Five nights ago, I was summoned to a small Grove near Barkton..."

Donman watched the phrases of his carefully prepared speech roll over the Council. The mood around the table swiftly built from stony disapproval to mild curiosity, astonishment and then outright shock, laced with no small amount of raw fear.

Good. They get it. No need to labour any of this any further.

Aldwell's voice broke the stunned silence. "Thank you, Ambassador Donman. We hear the petition of Jonton Kermol and beg you retake your place as a Pillar of the Council."

Enomone spoke up next. "Let's get the minor business out of the way first. I trust we all agree that by right, this Council should hold Jonton Kermol guilty of two violations of Grove law? However, on careful reflection it seems to me that the first violation was made inadvertently during the faithful and compassionate observance of his duties and the second has brought upon him a greater punishment than anything this Council is mandated

to impose. I therefore respectfully vote that the violations be struck from the record and that this Council proceed to the next item of business."

"Seconded," said Aldwell. "I further suggest that this vote be decided by show of hands rather than formal ballot. Let any who disagree with President Enemone raise their hand now or forever remain silent."

"Very well. Let us strike Jonton Kermol's transgressions from the record and move on. Ambassador Burvis?"

"How much time do we have Ambassador Donman?"

"I don't know," said Donman frankly. "I did ask but as you'll appreciate, it was difficult to get a definite answer from Jonton in his current state of mind. If the Council concur, I shall return to his Grove on my way back to Barkton and see if I can find out."

"Thank you, Ambassador Donman." Burvis looked at the faces around her. "In the meantime, I suggest that we be pessimistic."

President Chadlin drummed his fingers on the table thoughtfully. "Do we actually know how many Groves there are on Kerbin?" he asked.

Burvis frowned. "You know, I'm not sure we do," she said slowly.

"I think that should be our next question," said Chadlin, "We need to know the size of the problem we face before we can devise any reasonable answers."

"I agree," said Burvis, "but how do you propose to count them?"

President Obrick smiled and tapped the table for attention. "Very easily, Madame Ambassador. We live in a time in which kerbals have sent artificial satellites to photograph the far side of the Mün! I'm sure the same ingenuity could be applied to counting Groves from space." He glanced at Chadlin. "I shall pay a visit to Director Lodan immediately after this meeting."

Chadlin nodded. "Rockomax?"

"Lodan will have his own views but Rockomax would be my preference." Obrick looked at Burvis. "Your pardon, Madame Ambassador. Rockomax Corporation are one of the few organisations capable of launching the required spacecraft. Under the circumstances I believe they would be the best choice."

"Hmph," said Burvis. "What about that other lot? The Kerbin Interplanetary Society or whatever they call themselves."

"Technically they're more than capable," said Obrick, "but I think Rockomax would be the more *discreet* option for the moment."

Enemone cleared her throat. "President Chadlin's comment is eminently sensible but I'm unsure where it leaves us. President Obrick's proposal sounds plausible but cameras in outer

space can't help us conjure up extra space on Kerbin. What happens next? What do we do with our census of Groves?"

"It puts an upper limit on the problem," said Aldwell. "Assuming one seed per Grove, we know how much more space we need. I think we can safely assume that we don't have nearly enough but it's still better to know."

"I think we can do better than that," said Donman. "If we can count Groves from space, I presume we can also make a map of Kerbin from space?"

"Yes," said Obrick. "Unless Director Lodan has any new tricks hidden behind his ears, we would use the spacecraft to thoroughly photograph the whole of Kerbin, stitch the photographs together to make a map and then count the Groves on the map by hand."

Donman nodded. "In which case, why not use the map to work out the best sites for planting new Groves, making the best use of the available space?"

"We could even allow a certain amount of overlap," said Burvis carefully. "If the ground between planting sites isn't much good anyway, then what harm in setting it aside for the Kerm to squabble over, if it lets us pack more Groves into the available space?"

There was a sudden silence.

"I'm not sure I agree," said Donman slowly. "It would be stressful for both Kerm and Keeper - and we would run the risk of Shattering. We'd be taking an awfully big risk."

Enemone snorted. "We're not going to deal with this *without* taking some awfully big risks," she said.

The discussion grew steadily more acrimonious until at last Chadlin banged on the table for attention.

"This is pointless," he snapped, "We can argue about the details all we like but we all know there simply won't be enough room for all the new Groves. So what then my esteemed colleagues? What do we do when there's no room left at all?"

"We find a new place to live," said a quiet voice.

Obrick's heart sank. *I knew somebody would suggest this sooner or later.*

"It's a bold plan, President Lanrick," he said "and psychologically speaking it's an attractive one." He scrubbed his eyes with the back of his hands. "The practicalities however, are daunting to put it kindly."

"Oh I'm certain it wouldn't be easy," said Lanrick, "but surely if the whole of Kerbin were behind the proposal?"

"Even then it would require an extraordinary effort for no guarantee of success," said Obrick. "And we'd better hope that Ambassador Burvis's comments regarding pessimism turn out to be unfounded too. Make no mistake, Mr President - your proposal could take decades, if not longer."

"I understand that," said Lanrick, "but surely we could find some way of preserving the Kerm seeds until we've prepared the ground for them off-world? A cold store or some such facility."

Obrick blinked. "That might work," he said cautiously. "Would you agree, honoured Ambassadors?"

Aldwell shook his head vigorously. "Would you put a kerblet into cold storage?" he asked. "Putting a Kerm seed there would scarcely be better. These are intelligent beings, Mr President; we don't simply lock them away in the dark for inconveniencing us."

"Ridiculous," said Burvis. "A Kerm tree is intelligent certainly but a Kerm seed is no more intelligent than one of my eggs. Far better to preserve the seed than condemn the Kerm to a short, brutal life of insanity."

"You may believe that, Madame Ambassador," said Aldwell "but I fear that you would find your opinion in the minority."

"And I believe that you'll find that most kerbals have enough common sense to see that I'm right!"

Obrick lifted his hands placatingly. "Please, dear colleagues. Cold storage is only an option if President Lanrick's audacious proposal becomes a reality - which is far from certain."

Aldwell scowled. "Let the record state that I am firmly against the notion, space programme or no space programme."

"And let the record also state that I am firmly against an irrational prejudice threatening the future of our world," said Burvis acidly.

"That is *enough*, Madame Ambassador!" Donman thundered. "You will apologise to Ambassador Aldwell for that unseemly outburst!"

Burvis glared at him and then grudgingly dipped her head to Aldwell. Aldwell stared at her expressionlessly before dipping his own head in response.

"Very well," said Donman, "I suggest we adjourn this meeting for twenty minutes to let everyone cool off. President Chadlin - would you be so kind as to summarise the results of this first session."

Chadlin stared down at his notes. "Ambassador Donman to arrange a further meeting with Jonton Kermol; reason, to establish timescale for Kerm seedings. President Obrick to meet with Director Lodan of the Kerbin Space Agency; reason, to order the launch of a mapping satellite into Kerbin orbit. If I may make one further comment, let the record state that I think each and every one of us should arrange a visit to Jonton's Grove. We have forgotten too much of our history good kerbals and it would behoove us to correct that grave mistake as soon as possible."

Donman stood up. "I second President Chadlin's comment and add my recommendation to his. In the meantime; we need ideas and we need them now. I declare this meeting adjourned and look forward to reconvening it in twenty minutes."

Chapter 32

Project Eve

"Three, two, one and... shutdown!"

The thunder from the test stand stopped. Jeb waited for a minute or two before cautiously removing his fingers from his ears.

"How they looking, Wernher?"

The rare smile on the chief engineer's face told him all he needed to know.

"Balanced propellant flow to all three engines, Jeb. Minimal off-axis loads across the main thrust assembly - and the flight control system caught those and responded perfectly!"

Jeb studied the strip charts on Wernher's console. "Interface and cabling to the test stand held up well too," he said, "Remind me to tell Hando when we get back. So we're going with the three engine configuration then?"

Wernher nodded. "Now that we've fixed the flow rate problem, I don't see why not. Three T-thirties in the core stage, T-twenties on the lateral boosters and a fourth on the upper stage. It should be enough, Jeb."

Jeb scratched his head. "Just about - if it'll hold to the ascent profile. Are you sure we've got enough thrust vector control with triangular symmetry?"

"According to Lucan and Neling we can do it with just the standard gimbals," said Wernher, "Which is good. I never liked Seelan's steerable fins idea - too many extra moving parts for my liking and too many complications if one of them fails mid-flight."

Jeb retrieved his mug of coffee from a nearby console and took a swig. "I didn't hear any squawking this time either," he said, "Did the propellant balancing fix that too?"

"Screeching," said Wernher patiently. "No, that was Malmy's new injector design. Not much to it in the end but enough to detune the combustion chamber away from that new

resonance mode." He shrugged. "Higher chamber pressure, hotter operating temperature - something was bound to crop up."

Jeb laughed. "It wasn't so long ago that you'd have been tearing your hair out over a problem like this," he said, "We've come an awful long way since the LV-1 old friend." He glanced at the monitor admiringly, "And it has to be said - that is a brute of a thrust assembly. Can't wait to see what it looks like with the rest of the booster on top!"

The bunker door banged open and Ornie hurried in, cheeks glowing. He bent over double, gasping for breath and then straightened up with an enormous grin on his face.

"Ornie!" exclaimed Jeb, "How did it sound from the stands?"

Ornie cupped one hand to his ear. "Sorry, Jeb?" he said.

"I said, HOW WAS THE...Oh very funny Ornie."

Ornie laughed. "Awesome! The bits I could see through the smoke at least. And that sound - whoooo boy! Not loud enough to hurt but plenty loud enough to shake the soles of your feet." His eyes glowed with enthusiasm. "Aint *nobody* gonna be listening to the band when *that* rocket goes up!"

Wernher grinned at him. "And that was just the T-thirties," he said, "Throw in the T-twenties too and it won't just shake the soles of your feet!"

"Actually we'd best be careful about that," said Jeb, "Maybe have somebody at the gate handing out ear plugs or something." He saw the look on his friends' faces. "I'm serious guys - we can't have people going deaf - really deaf that is - every time we launch an Eve booster!"

"Probably not," conceded Ornie. "Hey - that's a pretty good pitch though. 'The rocket so powerful you need earplugs to watch it.' We could print the KIS logo on the plugs and sell them as keepsakes."

"Or print parts on them," said Wernher. "'LV-T30s, fuel tanks, Eve capsules maybe. Collect the set and build your own mini foam rocket.'"

Jeb blinked, "I think you've both been spending too much time with Genie," he said dryly. "I'm not saying its a bad idea mind...but we should also have a bunch of plain ones to give away for free."

"No, you're right, Jeb," said Ornie reluctantly, "Selling protective equipment would look a bit tasteless." He frowned. "I like Wernher's idea of collectable parts though. I think I'll have a word with Bob; he likes quirky games, maybe he can think of something."

Jeb put down his mug. "Speaking of which," he said, "he and Genie should be back from Rockomax in an hour or so. Lets go unload the stand."

Wernher watched nervously whilst Ornie backed up his truck up, guided by Jeb's hand signals. *Watch it...watch it... steady Ornie. And hold it... HOLD IT!*

Ornie's tow-bar stopped mere centimetres from the test stand support leg. Jeb was already swinging the crane into place above the cluster of rocket engines. Wernher wiped the sweat off his forehead and ran forward to hook the chains onto the thrust assembly struts. He checked the propellant valves before carefully unclipping the fuel and oxidiser lines and coiling them neatly around the storage drums. Finally he unplugged a thick bundle of cables from the side of each engine and tossed them to one side.

"Ready, Jeb!"

The winch whined into life, accompanied by the rapid clanking of chains through pulleys. Wernher clambered onto the back of the truck and began calling out instructions;

"Left a bit, Jeb... more...more...Looking good. Forward, forward and... there! OK, lower away."

The engine bells dropped slowly towards the waiting cradle. Wernher caught the edge of the nearest one. "Hold it, Jeb - need to line this up. OK, that's got it - down another half metre... and stop!"

The three rocket motors settled gently into place. Wernher unhooked them from the crane and set to work lashing them onto the truck bed, oblivious to the chains dangling just above his head. Jeb hopped down from his seat and began unplugging the cables from the test stand.

"Are we taking the engines over to the Tent, Wernher?"

"Back to the VAB today, Jeb. According to Ordun, his team will have have the first stage superstructure ready for mating to the thrust assembly by tomorrow.

"Works for me," said Jeb, "I'm never that happy leaving unfinished parts in the Tent anyway. That's good work from Ordun's gang too." He paused. "VAB?"

"Ordun's nickname for the warehouse," said Wernher, "He seems to think 'Vehicle Assembly Building' sounds better."

Jeb sighed. "Why call a spade a spade when you could call it a Manual Earthmoving and Manipulation Tool", he said. "Still, 'Vehicle Assembly Building' is one of his better names."

"*Vertical* Assembly Building would be even better," said Wernher wistfully. "The Tent more or less worked for Project Moho but a proper hangar to build the Eve boosters in would really help."

Jeb dropped the cables onto the back of the truck. "One day," he said, "Maybe if Rockomax take up Genie's proposal."

Wernher thumbed the tail lift button. "You really think they'll go for a Munar program?" he said.

"No idea," said Jeb frankly, "CORDS is going well but whether that'll be enough for Ademone's board?" He held up his hands. "I have no idea."

"CORDS was worth doing whatever happens next," said Wernher, scrambling up into the cab after Jeb. "Especially after Bob managed to persuade them to give us a spare docking adapter to test our prototypes against."

"That was Bob?" said Ornie, "I figured it was Gene sweet talking Ademone." He pressed the starter button and the truck hummed into life. Gingerly, he pushed on the accelerator, one ear alert to any unexpected noises from the back.

Jeb laughed. "Gene's a fair diplomat too but he's got nothing on Bob. I swear you could drop that kerbal into a meeting of the Twelve Pillars and he'd come out an hour later telling you all about how President Chadwick hasn't seen his youngest for two weeks because he's been working late on a new bill, that President Enemone's been at a diplomatic conference in Wakira and she couldn't tell him much about it but it sounded stressful..."

"and that it's Ambassador Aldwell's old mum's birthday next week and maybe we could wish her happy birthday from orbit if we happened to be flying at the time..." added Wernher.

Ornie steered around a large hummock of grass and started at a sudden rattle from the trailer. The truck rolled to a stop and he hopped out. Jeb and Wernher heard the grumbling wheeze of tailgate hydraulics followed by the tapping of boots on steel and a disgusted snort. The tailgate thumped shut and Ornie clambered back into the cab clutching a handful of cables.

"Yours I believe," he said acidly, passing the cables over to Jeb and starting up the truck again. For a moment, there was silence apart from the whine of electric motors and the rumble of wheels over turf. Then Ornie chuckled. "Ambassador Aldwell's old mum," he said. "Maybe the *Eve 1* crew *should* give her a wave as they fly overhead."

"If Bob gets to go, he could serenade her from orbit on Beauty," said Wernher.

"Beauty?" said Ornie.

"His lucky guitar," said Jeb, "And don't knock her, Wernher - it was Beauty more than Bob that got us that docking adapter."

Wernher raised his eyebrows.

"Yep - turns out that one of the Rockomax engineers - Hanbal I think his name was - is into the same kaya-scaring racket that Bob likes. Next thing I know, he's invited along to a lunchtime jam session and it's all we can do to get them back to work in the afternoon. Even then the conversation is one part rocket engineering to one part obscure music." He shook his head. "I'm positive Bob makes half of those bands up."

Wernher smiled. "That sounds like Bob," he agreed.

"That's not the end of it," said Jeb, "They gave him a tour of their factory floor - which was pretty impressive by the way - and Bob spots a tank valve on a workbench. I didn't catch

what he said to Hanbal but it didn't seem to go down too well. So Bob just sets to work stripping down the valve. He picks out a couple of pieces and asks if he can rework them a little. I think Hanbal is getting curious now, so he tells Bob to go ahead. By the time Bob's switched off the mill, he's starting to attract a crowd, by the time he's rebuilt the valve, every engineer in the place is standing round his bench watching."

Ornie pulled up at an intersection and waited for the road ahead to clear. "I don't get it," he said, "You're not tellin' me that a factory-full of engineers hadn't seen another engineer tweak a valve before?"

"Of course not," said Jeb, "but you're forgetting that Bob went up on the *Kerbal 1*, which makes him a kerbonaut too - or close enough. I didn't ask but I got the impression that the Rockomax flight crews tend to keep to themselves. Having Bob turn up and start bending metal turned out to be quite the ice breaker."

"I've known pilots like that," said Ornie. "Most of 'em are just regular kerbals but there's always a handful that think they're a touch above the poor greasebuckets that actually build the planes. You run this place the right way, Jeb."

Jeb shrugged. "I can see some sense in having a separate kerbonaut corps," he said. "I bet it makes organising the training a lot easier for one."

"I agree with Ornie," said Wernher quietly.

Jeb looked uncomfortable. "It does seem like the fairest way to do things," he said. "And speaking of which, that looked like Bob's car out the front. Time to go inside and select *our* next kerbonauts."

Jeb stood by his office door, waste paper basket in one hand and surveyed the warehouse floor with pride. *Maybe Ordun has a point. A spaceship parts company should have a Vehicle Assembly Building, rather than a plain old warehouse.*

Ordrie and Adelan were busy installing RCS thrusters around the base of the *Eve 1* capsule. Through the open hatch Jeb could see Edsen perched on the edge of the centre couch sorting through a tangle of multicoloured cables. Lowise stood patiently by the opening holding a tray of tools, tags, cable ties and other assorted components and Jeb recognised a half assembled evaporator resting on a nearby bench.

Looks like the forward thrusters are finished already. And all the space inside compared to the old Kerbal 1! or a Moho. Yeah, we're finally building an honest to Kerm spaceship here.

Showers of sparks filled the air at the other end of the warehouse as another team of kerbals put the finishing touches on a great skeletal cylinder. Fuel tanks, photovoltaic panels and an an entire LV909 engine were stacked neatly on the equipment racks behind it. Seelan and Wilford stood behind a long workbench, each assembling an RCS thruster block under Malmy's watchful eye.

The elegant, gleaming Rockomax docking adaptor on its test stand took pride of place in the middle of the warehouse floor. A pair of steel rails led away from the stand and parked on the other end of the rails was, what looked to Jeb, very much like an old camera dolly with the distinctly less elegant bulk of the *Eve 1* docking port securely fixed to its upper platform.

Don't remember seeing that before. Wonder where we scrounged it up from. Actually, on second thoughts, I don't want to know.

Bill peered into an eyepiece set into the side of the docking port and delicately adjusted a crank handle. He nodded to himself, took a firm grip on the large lever poking out of the trolley next to him and gave the two kerbals standing behind it up a thumbs up. Straining against the weight, they rolled Bill and the docking port slowly down the track towards the waiting adaptor.

Jeb held his breath.

Bill applied the brakes with a brief squeal of metal on metal. The dolly crept down the rails towards its target and then, with a whisper of highly polished surfaces sliding past each other, the tapered probe protruding from the port slid smoothly into the adaptor. The rapid fire ripple-bang of docking latches slamming shut echoed around the warehouse, completely masking the gentle thump of wheels hitting chocks. Bill jumped off and joined the other two members of his team next to the adaptor. Try as they might, the three kerbals couldn't roll the dolly back up the tracks.

A cheer went up as Bill retrieved a portable gas cylinder and plugged it into the back of the port. He turned the valve and Jeb jumped at the sudden angry hissing roar that rattled the office window behind him.

What the...!

The wall of metal rolling past his office window brought him back to Kerbin.

Oh right; just the damn sand blaster. That's a point though; better call the tank team in too.

He strolled over to the outside door and poked his head out. The two kerbals cleaning the enormous sections of fuel tank were too intent on their work to notice him. One of the kerbals helping to wheel out the next section of tank from the main engineering shed spotted him and waved. Jeb waited for the howling din of sand against aluminium to stop and went out to join them, still clutching his wastepaper basket.

"You folks ready to take a break?"

"Just getting started, Jeb," grumbled Seelan, "We were figuring on getting both these sections finished before the weather closed in."

Jeb squinted up at the sky. "Looks like it's going to stay clear for a while yet," he said. He rattled the basket and grinned. "You *sure* you don't want to take a quick break?"

Seelan glanced down at the jumbled heap of folded paper scraps and her eyes lit up. "Well why didn't you say so in the first place?" she said. "Wouldn't want to deprive any of the boys here of a chance to actually *fly* this machine they're cleaning up!"

"Wouldn't want to deprive *you* either, boss," replied Jeb. "Why don't you stow your gear and I'll see you inside in ten minutes."

Jeb glanced at the pressure gauge hanging from the *Eve 1* docking port and was pleased to see that both dials appeared to be holding steady. He jumped up onto a convenient workbench and waited, one eye fixed on his office door. One by one, the members of the Kerbin Interplanetary Society broke off from their work and drifted towards him. The older ones recognised the wastepaper basket and a buzz of anticipation swiftly spread around the vehicle assembly building.

At last, the office door closed behind Seelan's team. Jeb surveyed the crowd and was relieved to see Bob and Geneney standing in a huddle with Wernher and Lucan. He cleared his throat and the room fell silent.

"My friends, the last time I stood here, we stood on the edge of new age for kerbalkind. We had just taken the first steps into space with the *Kerbal* sub-orbital flights and the two *Kerbin* satellites. Looking back they were small steps indeed but they gave us the confidence to embark on bigger and better things. We built new and powerful rockets and with them we launched the first ever kerbals into space - and brought them all home. We built the first ever kerbal-made object to orbit the Mün - and kerbals across the world watched it live on television!"

"So where do we go now? My friends - that I cannot tell. But I do know that we won't get there in a *Moho* capsule. Fortunately we're building something a lot bigger."

The basket in Jeb's hand shook slightly.

"And once again we will need brave volunteers to fly our new ships. To be pilots for Project Eve."

Geneney stared at the half assembled capsule whilst Jeb rattled through the details. *Not that they're anything new but Kerm do they sound impressive when they're all rolled together. A three kerbal capsule with separate service module for long duration power and life support. Built in flight computer for guidance, navigation and burn control. Separate reaction control systems for on-orbit maneuvers and re-entry stabilisation. And a proper engine in the back for 'advanced orbital maneuvers.'*

A faint smile tugged at his lips. *Even if the old showman carefully avoided any mention of where we plan to be orbiting. With specs like this though, I'm sure most of them have worked that out already. Dammit but I hope Ademone can convince her Board! Plan B is fine as it goes but even with paying passengers to help the cashflow it's going to take a long time to build our own Kerbin departure stage, let alone a lander.*

The sudden hush broke Geneney's reverie. Jeb gave the basket one last shake, dipped his hand inside and pulled out a folded scrap of paper.

"The first pilot for the *Eve 1* flight is.... Roncott!"

The logistics team went wild amidst some good natured ribbing and comments about bin-stuffing from the other engineers around them. *It's true*, thought Geneney, *First Camrie, now Roncott. Although he's not looking terribly happy about it.*

"The second pilot for *Eve 1* is.... Ribory!"

Geneney breathed a sigh of relief. *That's a bit of luck. Jeb's just picked the flight commander if I have any say in things.*

"And the final pilot for *Eve 1* is...Calzer!"

The rest of the Booth Crew grabbed hold of Calzer and hoisted the dazed looking kerbal into the air.

That's a good team. Not sure about Roncott but he's flying with a solid commander and a good systems guy.

Jeb grinned at the celebrating kerbals. "OK, folks! Like I said - we're not sure exactly how many *Eve* flights we're going to launch, so I'm only picking one more crew today!"

He slowly unfolded the slip of paper.

"The first pilot for the *Eve 2* flight is...Ornie!"

Geneney stuffed his fingers into his ears as every kerbal in the building rushed forward to congratulate the new kerbonaut. Richlin pounded his friend on the back in delight.

"The second pilot for *Eve 2* is...Ordrie!"

The crowd cheered. Ornie pushed his way through the throng and shook Ordrie by the hand.

"And the final pilot for *Eve 2* is... Wernher!"

The propulsion team gathered round the chief engineer to celebrate but their initial exuberance was slowly replaced by uncomfortable silence.

Oh.. dammit no! I don't want to spoil Wernher's day but we can't risk him and Ornie on the same flight. If we lose the Eve 2 it would gut the entire program.

Wernher caught Jeb's eye and raised his eyebrows a fraction of a millimetre. Jeb nodded solemnly and gestured for him to step forward.

"Thank you, Jeb," said Wernher, "but I'm sure Ornie will do a fine job of representing the propulsion team." He took the scrap of paper from Jeb's hand and dropped it back into the basket.

"Are you sure about this?" Jeb murmured under his breath.

"Quite sure," said Wernher quietly.

"I don't know about you, Jeb," Geneney called out, "but I reckon we've just selected the first *Eve 3* pilot."

A rumble of approval spread through the crowd and a relieved smile spread across Jeb's face. "Fine idea, Genie - fine idea!" he said. He fished Wernher's paper back out of the basket and held it aloft.

"The first pilot for the *Eve 3* flight will be Wernher! And now, the final pilot for the *Eve 2* is... Edsen!"

"Excellent news," shouted Ornie to general laughter "Just who we need to keep us pointed in the right direction!"

"That's easy for you to say, Ornie," Lucan called out. "You're not going to be the one sitting in Mission Control without our best trajectory guy to lend a hand!"

Wilford watched the meeting break up amidst laughter and good-humoured comments. *All except our first Eve pilot*, he thought. He strolled over and tapped Roncott on the shoulder.

"It's a lot to take in isn't it?" he said quietly. "Don't worry, Roncott; you'll do just fine."

Roncott nodded dumbly.

"Honestly," said Wilford. "When you get a minute, go ask Jeb about the night before the Moho 3 flight. I was seconds away from bailing out myself but thank the Kerm I didn't!" He looked at the younger kerbal solemnly. "Like I said - you'll be fine. But if you have any problems at all; training, late nights... anything, just give me a call. C'mon, lets go grab a coffee."

Chapter 33

Uncharted

"It sure looks like one. Let me get a better look."

Kirman lay on his stomach and leaned out over the river bank, trying his best to ignore the stench of rotting grass. Below him, the sapling jutted out from its cleft, its roots pushing up ridges in the shallow sandy soil. The rings of glossy green trefoil leaves around its stem rustled in the breeze.

Kirman wrinkled his nose. *Cinnamon. That settles it then.* He stood up and brushed the worst of the mouldering vegetation off his robes. Jonburry looked at him expectantly.

"Definitely a Kerm sapling. Trefoil leaves around the stem and it smells of cinnamon."

Jonburry swatted a stray bitefly away. "That doesn't make any sense," she said, "Unless one of the nearby Groves was re-grafting a tree and the cutting just blew away. But no Keeper would be that careless."

"It could have been carried here by the river I suppose," said Kirman. "Or maybe a stray twig washed ashore and sprouted?"

"In this soil?" said Jonburry skeptically, "Besides twigs don't 'just sprout', else we'd see stray Kerm all over the place after a storm."

Kirman frowned. "I'm sure I read something about it in the Archives," he said.

"You can check when you get back to your Grove," said Jonburry, "But forget how it got here - I want to know why it's the only thing around here that isn't dying."

Kirman shaded his eyes and peered across the river. "Everything looks fine on that side," he said slowly. "Maybe somebody dumped something nasty around here? It would explain why the damage is relatively contained - the river would stop it spreading to the other bank?"

"Dumping?" said Jonburry skeptically. "Doesn't seem likely - and it doesn't explain why it's not attacking the Kerm either."

Kirman shrugged. "Maybe Kerm are just tougher," he said. "They do grow pretty much anywhere after all." He bent down to tie his boot lace. "Anyway - we should get moving. Afternoon's wearing on and we still need to figure out how widespread the damage is."

The two kerbals set off across the brown, wilted plain. Skeletal bushes dotted the landscape; the few leaves left on them blotched and dappled with a rich variety of moulds. To the south, a dense belt of woodland wound away into the distance, its leafy canopy interrupted here and there by the familiar tip of a Kerm tree.

At least the sickness hasn't spread back to the forest thought Kirman, *We should warn the nearest Groves though, in case it gets any worse..* He stared around in dismay. *Whatever's causing this it's showing no sign of petering out yet.*

Biteflies buzzed around them, the faint breeze blowing across the river doing little to keep them away. Kirman flapped his arms irritably and rummaged in his pockets. *Yeah, didn't think I'd brought the bug repellent. Shouldn't be any need for it on a day like today.*

"Hey, Jonburry - don't suppose you brought any bug repellent? Damn things are eating me alive."

Jonburry gave him a baleful look whilst she brushed a cloud of smaller specklebugs away from her eyes.

"Does it look like it, Kirman."

Kirman shook his head. "Not really, no. Come on - the quicker we find the edge of this mess the better."

The end of the dead zone was as abrupt as it's beginning. Kirman and Jonburry climbed a shallow rise and stopped in astonishment at the sudden expanse of greenery laid out before them. Jonburry scratched her head.

"I think that does it for your toxic spill idea," she said. "The cut-off is just way too sharp."

Kirman retrieved a pair of sample containers from his belt and took a soil scraping from each side of the line.

"You're probably right," he agreed, "but lets wait till we get these back to the lab." He waved at the forest line in the distance. "Same curved edge as on the other side. It certainly *looks* like something is spreading out from a central point, poisoning everything as it goes."

Jonburry looked around. "This is a pretty straight stretch of river bank," she said thoughtfully. "We should be able to find that centre point." She unhooked a square metal plaque from her belt and consulted the dial set into its surface.

"That's odd. According to the step counter, the halfway point was right about where we stopped to look at that Kerm sapling."

Kirman looked at his watch. "That sounds about right," he agreed. "Which means that... oh." His eyes met Jonburry's. "C'mon, Jon - it's not the *Kerm* that's doing this."

"It would explain why it's the only thing in that wasteland that *isn't* dying," said Jonburry grimly.

"But it makes no sense," said Kirman, "Why would a Kerm decide to kill everything around it? Especially this close to other Groves."

"Nothing about this makes sense," said Jonburry. "Simple enough to test though - we just dig up the Kerm, move it somewhere else and see if the land around here recovers."

Kirman shook his head. "Easier said than done," he said. "It depends how well developed the roots are. Roots aren't the only thing either - if the sapling is causing all this..." He gestured helplessly, "all *this*, then it must already have an extensive fibre network in place. If we break too many of the fibres... it would be like carrying you to a new home but cutting off your fingers, poking your eyes out and breaking your nose on the way."

"Won't the fibres grow back?" said Jonburry quietly.

"I don't know," said Kirman. "As far as I know, nobody has ever tried transplanting a rooted Kerm sapling before."

Jonburry ran her fingers over the step counter. "But if we're right, we can't leave it here either," she said.

Kirman blew out his cheeks. "No," he said reluctantly, "no we can't. And we'd better re-plant it well away from other Groves too; we can't risk it attacking other Kerm."

"That's a long way upriver then," said Jonburry. "Not the best land for planting but better than leaving it here."

Kirman nodded. "I'll go back and get another sample from near the sapling," he said, "Just in case it's not the Kerm and there *is* something toxic spilt there. Either way my report to the Ambassador will recommend that we move the sapling upriver."

Jonburry hooked the step counter back onto her belt and shivered as the gathering wind blew around her robes. "So will my report to the Envoy," she said. "Let's hurry up with that last sample, Kirman; I can smell rain coming."

Gerrigh plucked the muddy, fibrous fragment out of the hole and stood up grimly.

"Casing. Or what's left of it. That's no cutting, Obrett - this sapling grew from a seed."

Obrett sighed. "In a strange sort of way I'm glad to hear that," she said. "At least that old Keeper wasn't foolish enough to plant another sapling in his Grove."

"No," said Gerrigh, "but he did manage to miss a new Kerm seed sprouting here."

"To be fair, it must have been buried somehow before it would germinate," said Obrett. "I'd be astonished if it was planted deliberately. What *does* surprise me is that nobody spotted the new Kerm shoot before it was too late."

Gerrigh began kicking soil back into the hole around the Kerm stem. "So what happened here?" he said, "Did you manage to find anything in the Archives?"

Obrett ran her fingers through her hair. "Nothing helpful," she said at last. "The older Records are hopeless - completely illegible where they haven't faded completely. A lot of stuff about the Law of Thirty-Seven of course but nothing to explain *why* the Law was written or what happens if it's broken."

Gerrigh stared around at the devastated fields full of sickly, dying crops. "I think we just found out *what* happens," he said bleakly. "What we don't know is how."

"We can guess," said Obrett. "Look at the zone of dead vegetation around the sapling - it's almost perfectly circular." She gestured at the rest of the village. "But the rest of the damage is scattered all over. Almost like something exploded."

"Go on," said Gerrigh intently.

"I think the new Kerm triggered some kind of reaction from the Grove Kerm. Something that disrupted its control over the surrounding plants and caused them to die." She blinked. "It sounds crazy but I think this circle is a Kerm battlefield."

"And the explosion?" said Gerrigh.

Obrett shivered. "That was the end of the battle," she said. "Remember what the old Keeper kept saying Gerrigh; 'The sparks are coming... they're still coming... they're going to kill us all...'"

Gerrigh looked at her in sudden horror. "I've no idea what the sparks are," he said "but if you're right then it sounds like that Keeper was in communion with his Kerm at the very end." He blinked hard, "and died trying to defend it."

Obrett nodded solemnly. "I think so too," she said. She braced herself. "I also think that one of us needs to try communing with it again."

The wind whistled mournfully through the abandoned village, stirring the weeds that peeped between every flagstone. Away from the fields, the Grove trees swayed against a steel grey sky. Most of the hut windows around them were shuttered but apart from the occasional creaking hinge, the village was unnervingly quiet. *Of course it is*, thought Obrett irritably, *It was evacuated not abandoned. You're just walking through an empty village not a ghost town..* Even so, the stark silhouette of the Kerm tree growing through the centre of the Keeper's hut, looked distinctly ominous set against the scudding clouds.

Gerrigh lifted the latch and cautiously pushed the hut door open. The two kerbals stepped inside. Obrett sniffed at the air and sighed with relief.

"What?" said Gerrigh.

"It smells clean in here. A bit stale and a *lot* of cinnamon but nothing rotten."

Gerrigh nodded. "I guess the medical team cleaned up the poor Keeper's hut before they left. Come on - lets get this over with."

He led the way out of the kitchen towards the sleeping room. He pushed the door open, coughing as the thick, cloying smell of Kerm leaves caught unpleasantly in the back of his throat. As far as he could tell, the tree looked normal. Its leaves were still but clean, unaffected by any of the assorted blights afflicting the crops outside.

Obrett eyed the bed and waiting leaf cluster with trepidation. Gerrigh gave her a sympathetic look. "I hate to say it," he said softly, "but if ever there was a job for a Keeper..."

She nodded, swallowed hard and walked over to the bed. She brushed her hair back from her scalp, closed her eyes and lay down under the leaves.

Gerrigh bit his lip as he watched the leaves curl around Obrett's head. *So far so good - I think*. Suddenly Obrett's knuckles tightened on the bed frame. Her feet twitched and Gerrigh heard her breathing go suddenly ragged. She held still for another couple of seconds before whipping her head free of the leaves and bolting for the door. Gerrigh winced at the loud retching noises filtering through the wall.

When Obrett came back she was pale and shaking. Gerrigh slipped off his overjacket and draped it round her shoulders.

"Come on," he said, "we can talk about this somewhere else."

Back in the kitchen, Obrett poured herself a mug of water and sat down at the table. She pulled Gerrigh's overjacket tightly around herself, took a long drink and looked up.

"We were right."

"About the battlefield?" said Gerrigh. "So... you managed to speak to the Kerm?"

Obrett shook her head. "That wasn't a Kerm, Gerrigh. I don't know what it was but it was ruined; smashed beyond healing or repair." Her voice rose. "I held on as long as I could but the fragments, oh sweet... the poor mangled fragments. And the voices - the unending torrent of voices!"

Obrett took a deep breath. "Sorry. Just give me a minute."

Gerrigh gulped his own water. His mug rattled as he put it down. "So what do we do?" he said.

"We salvage what we can from the village. Then we burn the entire Grove to the ground; branches, trunks, stumps, roots, fibres - everything. Then we plough the ashes into the soil."

Gerrigh's jaw dropped. "You can't be serious," he said weakly.

Obrett wiped her eyes. "Not yet," she said. "A better Keeper than me might be able to help but I doubt it. I think the only thing we can do is put whatever's trapped inside those trees out of its misery. Come on Gerrigh - I need to get out of here."

The two kerbals put their mugs on the draining rack, turned around and left. Gerrigh closed the door behind them, stopped and pulled a small paper packet of his pocket. He shook it and Obrett dipped her head in understanding. "Of course," she murmured.

Gerrigh knelt and pushed his fingers into the soil, making a row of indentations next to the hut wall. He opened the packet and then stopped dead. *No point really*. He closed the packet again and went back inside, emerging a moment later to join Obrett by the gate.

"No point planting sweetblossom vines in this soil," he said briefly, "I've left them on the table. Whatever happens to this village and whoever is responsible for it - hopefully they'll understand."

Silently, they turned to face the hut, folded their hands together and bowed their heads in remembrance of the departed Keeper. Over their heads, the Kerm leaves rustled in the chill wind.

"The performance numbers are impressive Hanbal but are they realistic?"

Hanbal rolled up his diagram and tapped it on the edge of his workbench. "They are," he said, "The one big unknown is the plate assembly; most of the rest are scaled up versions of our current parts."

"We don't have a use for anything that size," Ademone pointed out, "Even if you can get it to work."

Hanbal cocked an eyebrow at her. "Not yet," he said, "Not until anyone needs to put any serious mass beyond LKO. But if...when that day comes, Rockomax will be ready for them. Think better, think bigger - it's what we're all about, Ademone; says so right on our company logo."

Ademone stared impassively at her chief of propulsion. *It could be the dawn of a new era or we may get to the Mün and never go back - it doesn't matter. What matters is that we tried*. "Very well," she said at last. "Consider Project Windjammer authorised." She raised a hand. "Proof of concept only Hanbal; this is *not* a full scale system development project. I want to see detailed designs, I want to see critical component prototyping and testing. Then we'll think about taking this to the next level."

"Understood," said Hanbal. He nodded at the bespectacled kerbal hurrying towards them. "Hi, Lars."

"Hi, Hanbal," panted Lars. "The Director is here, ma'am - I've shown him up to your office."

Ademone frowned. "The Director?"

"Director Lodan, ma'am. I know he doesn't have an appointment but he did say it was urgent."

Surely the KSA have mastered the use of telephones. "I'm sure it must be urgent if the good Director came to see us in person," said Ademone. "Thank you, Lars. Please excuse me, Hanbal."

"Of course, Ademone. Mustn't keep the KSA waiting."

Lodan ambled around Ademone's office peering at the assorted memorabilia on display. Pictures of the Mün and Kerbin from space adorned the walls and two glass fronted cabinets held a selection of carefully labelled spacecraft parts and assorted tools, including a large wrench mounted in pride of place. A small display screen rested on Ademone's desk, cables snaking down to the much larger data terminal on the floor.

The display stand of old mortars and other fireworks, each conspicuously marked with the letters SFC in a bold jagged script, made an incongruous counter to all the high technology. Puzzled, Lodan squatted to inspect them more closely.

"Don't worry - they're empty."

Lodan stood up. "I'm glad to hear it," he said. "but why?"

"Just a reminder," said Ademone. "This is a pleasant surprise, Director. Please take a seat."

Lodan removed his jacket and hung it neatly on the back of his chair. "We're both busy kerbals, so I'll get straight to the point," he said, "I need a satellite launcher as quickly as possible."

Ademone looked at him. "I presume there's a reason why we couldn't discuss this by telephone?" she said.

"There is," said Lodan. "Perhaps I should rephrase my request. I need a satellite launcher as quickly and *discreetly* as possible."

"Rocket launches are quite noisy," said Ademone dryly, "and our launch manifest is full for the next few months."

"I'm pleased to hear it," said Lodan, "although I have no idea how you manage to fit in such an active program of research and development launches around your commercial schedule."

Ademone raised her eyebrows. "Not as active as we would like," she said, "but as it happens we might have one scheduled soon."

"Excellent," said Lodan blandly. "I don't suppose it would be capable of launching, say two tons to a polar orbit?"

"That would be one of our... larger research launchers," said Ademone carefully. "We have more BA-CA boosters in production of course but they're currently reserved for commercial use and extending the production run would be expensive."

"The KSA can cover any *reasonable* expenses," said Lodan. "When would the launcher be ready?"

"Would two weeks be acceptable?"

"Quite acceptable," said Lodan, "Reconfiguring the payload and delivering it to the launch site will take about that long in any case."

"Then I think we can meet your request," said Ademone."

Lodan drummed his fingers on the arm of his chair, deliberately avoiding Ademone's eyes. "It sounds like your satellite business is going well," he said at last, "If I may ask though - do you have any other plans in progress?"

Is it just me or does the good Director sound worried? "We have the CORDS program with the KIS," replied Ademone. "and I believe our research teams have some ideas for expanding the Endurance orbital station."

Lodan perked up. "CORDS?"

"Common Orbital Rendezvous and Docking Systems," said Ademone. "Our joint development program, including on-orbit testing, for interoperable spacecraft systems."

"Good... good," said Lodan. He smiled, "I imagine that the KIS and Rockomax do things rather differently."

Ademone nodded, "We do, but credit where credit's due - the KIS are nothing if not pragmatic. CORDS has actually been a lot easier - and a lot more productive - than I expected."

"And after CORDS?" said Lodan casually.

"We have no current plans for further collaboration," said Ademone.

"Rockomax might not have any plans," said Lodan, "but after speaking to Jebediah and his team, I'd be astonished if the KIS don't." He looked at Ademone thoughtfully. "What if the KSA was to offer its assistance?"

Ademone looked at him narrowly. "Exactly what kind of assistance did you have in mind?"

Lodan's eyelid twitched. "Financial assistance," he said. "I'm sure my research teams would be delighted to get access to some Rockomax hardware for a suitable consideration. A sponsored development program perhaps, with upfront payments."

Ademone's chair scraped across the floor as she stood up. "I think we're finished here, Director," she said coldly. "Rockomax has no interest in accepting bribes, however well intentioned."

Lodan pulled out an envelope from his jacket pocket. "It's not a bribe," he said quietly. "Each and every payment going to Rockomax will be properly accounted for and included in the KSA quarterly reports to President Obrick's office." He pushed the envelope across Ademone's desk, the ornate seal of the Council of Twelve Pillars clearly visible. "Please - go ahead and open it. I believe you'll find President Obrick's letter of authorisation to be quite in order."

Ademone's eyes widened. "That would have been a better way to start this conversation," she said. "But why...?"

"The secrecy?" asked Lodan. "I can't discuss specifics yet Ademone but the KSA has...plans and we're going to need contractors. From what you've just told me, your CORDS program is something we would need anyway, so we're content to treat it - and any immediate successors - as a light touch, *confidential* opportunity for Rockomax to demonstrate its capabilities." He cocked his head. "I don't require detailed costings of every last nut and bolt but I do expect reasonable outline proposals and budget estimates. *Collaborative* proposals will be looked on particularly favourably."

Gerrigh squirmed in his chair, trying to find a less uncomfortable place on the hard wood. The meeting room had very obviously been designed to resemble a kermol hut; round with a scattering of thin rugs on the plain wooden floor and most of the solid, practical furniture likewise constructed from plain woods. Tall pots of flowers or leaf decked branches stood around the outside of the room and what pictures there were on the walls also favoured leaf and flower motifs.

I appreciate the effort and it sure beats steel and glass kerman minimalism but somebody should let them know that the overly woodsy look went out a couple of years ago too.

Gusemy and Neilbin were both listening intently to Obrett's report. A shadow passed over the ambassador's normally cheerful face at the description of the ruined Kerm. All four kerbals bowed their heads in tribute to the dead Keeper.

"Thank you Obrett, " said Gusemy quietly, "and Gerrigh - please rest assured that the vines will be planted as soon as we can."

He sighed. "In the meantime, I'll pay a visit to the Berelgan. I know some people in their botany department who may be able to help that Kerm."

Neilbin completed the unspoken thought. "And find out what they know about Kerm seeds."

"Yes," said Gusemy heavily, "and find out what they know about Kerm seeds. I'll need to warn Conclave too of course..."

"Before any more seeds fall," said Neilbin soberly.

Gerrigh cleared his throat, "Forgive me, Envoy but what do we do if any more seeds *do* fall."

Obrett jerked forward in her seat. "We plant them as far away from any other Groves as we can!"

"Yes," said Gerrigh, "but *where* do we plant them? On the Koluclaw mountains? On the beaches? We're pretty boxed in here."

"Humilisia," said Obrett.

Neilbin looked at her incredulously. "You can't be serious," he said, "Doren would never stand for it."

Gusemy snorted. "So tell me something new. Doren has no territorial claim over the archipelago; their Ruling Council can hardly complain if we start a new Grove or two on the larger islands."

"Since when has lack of due cause ever stopped Doren from complaining about anything?" said Neilbin. "Besides, I've been to the Humilisian islands - they're nothing but mountains and scrubland. Fine for a wilderness holiday but hardly fertile ground for new Groves."

"Which is another reason why they can hardly complain. We're not depriving them of anything they would actually care about."

"If their Kerm start seeding too, they'll care about those islands for exactly the same reason that we care about them, Gus!"

Gusemy scrubbed his eyes with the back of his hand. "I know," he said quietly, "I don't like this any better than you do, my friend but we don't have many options."

"The Doren mainland must surely have space for new Groves, Ambassador?" said Gerrigh, "It's the biggest regionality on Kerbin after all."

"Hopefully," said Gusemy, "We just don't know."

"Envoy," said Obrett, "you said the Humilisian islands were mountainous? How mountainous exactly?"

Neilbin looked at her. "The largest island is almost a ring of mountains," he said. "The southeast corner is a bit less rugged but apart from that." He shrugged.

"Good," said Obrett. "It sounds quite easy to defend."

Neilbin's jaw dropped. "*Defend!*" he spluttered. "We're not going to *war* with Doren!"

"I hope not," said Obrett, "but if the Doren Groves start seeding, we could be dealing with some very frightened kerbals." Her voice hardened. "Trust me on this, Envoy - one broken Kerm is enough to frighten anyone. Too many broken Kerm and the Doreni are going to demand action from their Council. I will defer to our own Council of course but in my opinion, if we go to the Humilisian islands we should be prepared for the worst."

Chapter 34

Dewdrops

<Warmth. Sweetness flowing down. Water flowing in, flowing up, keeping damp, staying good. Many many tastes, some new. Some too weak, some too strong. Some... missing. Not right, not right. Some smells missing. Some still there. Not right, not right.>

<Voice gone. Gone where? Sense fear. Hard to think with fear, hard to make tastes go right, smells go right. Want voice, voice help think?>

Dawn. The warmth on my leaves opens them and brings them to life. I taste the new sugars building, gathering, slowly trickling from leaf to stem to branch to trunk. I sense the cool moist soil around my roots, taste the tang of water and salts as I draw them in. The water brings other tastes with it, spiky acidity, smooth musty currents, tiny droplets of a thousand varieties of sweetness scatted through the soil. Streaks and whorls of salt criss-crossing a filigree of root fibres, the patterns an imperfectly sensed part of a greater latticework.

The latticework frays. Here a ragged break in the salt traces. There a missing cluster of droplets. Elsewhere stagnant globules of...wrongness. I have no words for those but they jar, breaking the pattern like fine cracks in a pane of glass. And like the glass, the pattern will break if not tended to.

The smells are the same. Not as rich or as varied as the many-taste soil but each one a vital part of the whole. Each one has its tale to tell for those that can read it. But now the story is jumbled. These smells do not belong together. True, that one is fading but it should not be there at all. Elsewhere, other smells are missing.

My kerbal remembers the dawn. The joy of light on face, breeze in hair, smell of leaves, smell of cinnamon, smell of other kerbals. Where are the other kerbals? One tall, one small, two old; many dawns since they left. We showed the first old one many memories, we scared it although we did not mean to. We were more careful with the other old one; showed her less. Then she asked questions, too many questions, frightened by our answers.

Memories of all my kerbals. Memories of all the dawns. Memories of the lattice and how to repair it. We did not share those with the old ones, how could we make them understand? I cannot find the memories. Not on my own, not without my kerbal.

We tried after the second old one left. My kerbal was sad - I wanted to make it happy again. I thought that memories of other kerbals, of other sunrises would make it happy. I was wrong.

My kerbal is quiet now. Quiet, sad and frightened. It doesn't talk with me anymore, it can't help me to remember. How many dawns since the tall one left, carrying the small one? The small one was very angry; it attacked me with its branches. I think my kerbal had a special name for it. Maybe if I could remember... remember its name.

"Joenie! *She* is called Joenie! And I am not *my kerbal*, I am Jonton!"

Sparks exploded in front of Jonton's eyes and branches scraped across the side of his face, narrowly missing one eye. The air reeked of cinnamon. He drew his hand through the maze of twigs and gingerly patted the rapidly swelling lump on the back of his head.

Doesn't seem to be bleeding anyway. That's something. Wish Gerselle would come back; the same damn view from the same damn window and nothing but the perpetual stink of cinnamon in my nose is driving me crazy. She needs to tend to her Kerm of course and I'm hardly the greatest company these days.

Donman and Burvis both said that the other Pillars would be visiting. The company would be welcome but the thought of having to show them what I showed Donman scares me rigid. I dare not consciously remember anything now; even a simple thing like a sunrise triggers a flood of other memories. Memories of thousands of other sunrises seen through the eyes of hundreds of other kerbals. The thought of deliberately reaching out to the Kerm terrifies me.

That's the problem I guess. If you're told not to think of purple luffas then purple luffas are all you can think of. It's the constant trying, of being forced to remember nothing and live in the moment all the time that tires me out. So I sleep. And dream. And bit by bit the flood washes me away.

The flood feels wrong somehow. Nothing I can put my finger on, nothing I can sense directly. Like trying to spot the flaws in a mosaic that you can only glimpse out of the corner of your eye. I think the Kerm could show me what's wrong - and how to put it right again. But I don't want to go there.

I can't go there...

The hoe bit into the rich crumbly soil, narrowly missing the prickleberry bush stem. Ferry worked the blade around an especially large clump of ragleaf; flicking the uprooted weed into the waiting basket. He chopped viciously at a patch of knotweed, breaking up the stringy green mat and burying it. He chivvied the soil around unenthusiastically with the hoe blade until it was more or less level and moved on to the next bush.

The neighbouring row was mostly hidden by dense foliage but Ferry could hear the regular scrape-scraping of hoe against soil interspersed with the thud of weed hitting basket and the clinking of steel on stone. Fredlorf's steady mutter provided a pungent running commentary on the possible ancestry of assorted plants and the lack of suitable tools for dealing with them. Ferry burst out laughing at one particularly heartfelt request for a flamethrower.

"Seared pricklesberry wouldn't taste so good, Fred."

"Just as well there aint any damn berries to sear then," said Fredlorf. "I'm serious, Ferry; if we're going to be diggin' up weeds all summer, I'm gonna borrow one of those rocket contraptions. Get me a nice big one and I figure it should blow fire clear down one of these rows."

Ferry laughed. *Fred's right though. Bushes have been flowering for weeks - berries should be coming out by now.* He gently pulled the nearest branch towards him, inspecting the large cup-shaped flowers drooping from their stems. Cautiously he tugged one of the translucent yellow petals. *Seems healthy enough.*

The flower bobbed when he let it go, scattering a fine mist of pollen over his hand. Startled, Ferry lifted it up to peer inside. The sweetly musty scent from the nectaries tickled the back of his throat and the heavily laden stamen peered back at him like rows of tiny eyes. *Huh - that explains it. No silverlace, no fruit. Hmmm, wonder if we could do the pollination by hand?* He stared at the rows of flower laden bushes. *Yeah, Fred's going to love that idea.*

Ferry reached the end of his row. He wiped the sweat out of his eyes, lugged his basket over to Fredlorf's tractor and dumped the weeds onto the larger pile heaped up on the trailer bed. He squatted, back braced against the trailer wheel and rolled his shoulders to relieve their stiffness. Fredlorf stumbled towards him, carrying his own basket of weeds.

"Reckon I've found the problem, Fred."

"You an' me both then. Pollen?"

"That's about what I figured. You think we could shift it by hand?"

"Probably," grunted Fredlorf, "once we get done with the damn weeding. We could get Gerselle or Meleny to take a look too."

Ferry nodded. "Pricklesberry bushes aren't much like sapwoods but yeah - may as well get what help we can." He looked at his friend. "What's happening to this place, Fred? First there was all the business with the sunfruits, now the silverlace are late too."

"Beats me," said Fredlorf heavily, "Least the pricklesberry bushes haven't rotted away on us too." He shuddered. "Don't ever want to see a field like that again."

"Me neither," said Ferry. "That's a thought, Fred - I should check on Jonton, make sure he's all right. He looked downright awful before the sunfruit harvest; like he hadn't slept for about a week."

Fredlorf scratched his head. "Come to think of it - have you actually seen Jonton recently?"

"Nope. Seen Gerselle out and about with her wee one but never a sign of Jonton."

"Probably best if you have a word with Gerselle first," said Fredlorf, "She'll know what's happened to him."

"I think I will," said Ferry, "I think I'll do just that." He picked up his basket. "Day's a-wasting, Fred - time to get back to the weeding."

The sleep room door creaked open and Gerselle padded in bearing a laden tray. Jonton sighed contentedly at the smell of savoury mushroom pie, white bean stew and a peppery greenleaf and mixed herb salad.

"That smells wonderful, love," he said, "Thank you."

Gerselle smiled and began setting out the food onto two plates. Jonton smiled back. "Better not tell Joenie that Daddy has borrowed her favourite plate."

"It was her idea," said Gerselle, "I told her that Daddy wasn't feeling well and couldn't eat very much. She went straight over to the cupboard and brought it out for you."

Jonton swallowed a sudden lump in his throat. "She's a good girl," he said at last. He scooped up a forkful of beans and chewed them silently.

Gerselle cut herself a slice of pie. "The Grove is doing well," she said brightly, "I think everyone's getting bored of digging in clover but you wouldn't believe the improvement to the soil. According to the Archives we should be able to start planting whitebean in a couple of months."

Jonton nodded and reached for the salad bowl. "How's your Kerm doing?" he asked. "No more blue spots I'm guessing?"

"Not a single one," said Gerselle, "It's doing very well actually. Still watching you but it doesn't seem to be scared any more, just alert."

"Oh that's good," said Jonton, "Maybe it will..." He shook his head. "No; it won't forget but it sounds like the memory is already losing some of its potency." He speared a stray mushroom with his fork. "I wonder how it will react to the whitebean after dealing with nothing but clover for so long?"

"I don't know," said Gerselle thoughtfully, "I don't really understand what happens when we start planting crops either. I've been reading through the older Records but they're confusing." She snapped her fingers. "Speaking of crops, Ferry was asking after you. He and Fredlorf were hoeing the prickleberry bushes the other day and noticed..."

"Hoeing?" said Jonton.

"That's what I thought too," said Gerselle. She saw a flicker in Jonton's eyes. "It can wait till after supper," she added.

The Kerm leaves rustled as Jonton leaned forward. "Hmm, yes," he said, "Especially since supper includes a Gerselle Kermol special berry posset." He looked up at her through moistened eyes. "I really appreciate this love - I know I haven't been very good company lately."

Gerselle put a finger to her lips. "Hush, Jonton Kermol," she said, "That can wait till after supper too."

The two kerbals spent the rest of the meal in companionable silence. Jonton cleaned every last scrap of posset out of his bowl before pushing it away with a rueful smile.

"I wish I could eat more of that," he said, "but I'm full."

Gerselle put her own spoon down. "You will be all right with solid food, won't you?" she asked.

Jonton nodded. "This much will be fine," he said, "and it's such a treat to taste *anything*, let alone a meal like that!" *I'll probably suffer for it later on but right now I don't care.* He stifled a belch. "Now, what were you saying about Ferry and Fredlorf hoeing the prickleberry fields?"

"They were keeping the weeds down apparently," said Gerselle. "Which I didn't understand to start with. Then Ferry told me that the bushes were still flowering, which I didn't understand either. They should have been pollinated and fruiting by now."

Jonton closed his eyes. "I was afraid of something like this," he said. "I think the Kerm has been trying to warn me for a while now but I haven't been able to talk to it."

"I'm not surprised," said Gerselle gently, "It's a miracle that it can even warn you, let alone talk to you."

"Oh, it can talk," Jonton said sadly. "The problem is me." He paused to gather his thoughts. "Do you remember what I said about the shards melting?"

Gerselle nodded uneasily.

Jonton wrung his hands, hunting for the right words. "It's like the edges between me and the Kerm are blurring. As soon as I think of anything for more than a few seconds, I get thousands of...*echoes*, of the same thing seen by hundreds of other kerbals. It gets harder and harder to tell which thoughts are mine and which are just an echo from another long dead Keeper." His voice cracked. "It's starting to drive me crazy, Gerselle. The effort of *not* thinking about anything all day, tires me out. Then I go to sleep and I can't stop them! They're washing me away. Bit by bit they're washing me away."

Gerselle's eyes widened. "What can..."

"I do?" said Jonton. He sagged against the vines wrapped around his waist. "I think there's only one thing I can do, love. Stop trying to keep the shards intact and just let them melt. Put all the pieces back together, give the Kerm its voice and let it concentrate on mending the Grove."

Gerselle's eyes filled with tears. "Pestilence take the Grove, Jonton! What happens to *you*?"

Jonton wilted. "I don't know, love," he said, "but fighting it isn't helping. If I let go now, maybe there'll be enough of me left after the melting that..." His voice tailed away. "Enough of me left that I can still remember Joenie... still be her father."

He lifted his head. "And be there for her birthday." He clenched his jaw. "Whatever happens, I *swear* I'll be there to watch her with her birthday presents!" He forced a smile. "I've just thought of something else to give her. Promise me, love. Promise that you'll both be in the garden before sunrise on her birthday.

Gerselle burrowed through the Kerm leaves surrounding her husband and wrapped her arms around him. "I will," she said through her tears. "I will."

The metallic chattering of the alarm clock rang in her ear. Gerselle groaned, reached out and slapped the off button. Silvery, pre-dawn light crept around the gaps in the curtains, throwing pale streaks across the floor. She rubbed her eyes and yawned, smiling despite herself at the sudden excited babble from the next room. The door burst open and Joenie hurtled across the room.

"Party, Mummy, party!"

Gerselle climbed out of bed and pulled on a poncho. "Not yet, sweetheart, no party yet. Why don't you come out into the garden with Mummy and see your special present from Daddy?"

Gerselle opened the back door, stepped out onto the porch and froze. Every single Kerm branch was draped in a softly sparkling gauzy fabric. The morning light shone through it, sending thousands of tiny rainbows dancing over each twig and shimmering fluidly over every leaf.

Joenie's eyes lit up. "Butterfies, Mummy. Butterfies!" She let go of Gerselle's hand and scampered across the grass.

Gerselle's eyes misted over. *They're beautiful Jonton. I don't know how you did this but thank you.*

From my window I watch Joenie darting from branch to branch, pointing at the silverlace and dragging Gerselle along behind her. Her mouth moves but from this distance I can't hear a sound. No matter; the look in her eyes tells me all I need to know. Gerselle too; she looks happy for the first time in far too many weeks.

Joenie reaches out to touch one of the silverlace. The butterfly trembles on its leaf but does not flee. I see Gerselle talking, no doubt telling Joenie to be gentle. Both of them wide eyed as the silverlace hops onto Joenie's outstretched finger, spreading its wings towards the morning sun. Odd - I wasn't expecting that. Gerselle turns to me and smiles.

I sense the first stirrings of warmth on my leaves. I cannot hold them much longer - they are creatures of the dawn, of cool air and dew, too delicate for the rising sun. I smile back at Gerselle, lifting my hand, palm up, to the ceiling. She nods, takes Joenie by the hand and steps back.

I let the silverlace go.

Floating on the breeze like a sparkling cloud of iridescent dewdrops, soaring up into the shell-blue morning sky. Twisting and swirling, the cloud breaks apart into pale rainbow streamers of glimmering gauzy wings that swirl away towards the prickleberry fields. Joenie dances on the damp grass, waving at the silverlace until, at last, they disappear; their translucent wings too distant to catch the first rays of sunlight shining through the treetops.

I feel... content; at ease with myself for the first time in weeks. Fresh air, light, faces smiling because of something that I did. Perhaps Joenie and Gerselle will come to see me in a minute - I would enjoy that.

Most of all, I'm free from the constant struggle. I have accepted that which I am, even if I do not yet fully understand it. Neither Kerm nor kerbal but a fusion of the two, I am something new upon this world.

I am an-Kerm.

Chapter 35

Preparations

The music rose to a crescendo of blaring guitars, followed by a final crash of drums, and then, much to Patbro's relief, silence. Live bands before launch had been a tradition at the Barkton Space Centre ever since the *Moho 1* flight, although in Patbro's opinion, the music had a tendency to be deplorably modern. Something inspiring by Kolzt would be just as appropriate for spaceflight, or better yet, the ethereal harmonies of Gemeny's 'Celestial Wanderer.'

Still, he thought, the Kerbin Interplanetary Society had certainly done their best to make this an event to remember; what with the press conference to unveil their new spaceship, the opening ceremony for the new exhibition building, the kerbonauts mingling with the crowds, and the extended stands. Which seem to be set much further back from the launch pad.

Patbro turned to admire the exhibition building again. A circle of pylons erupted from it's domed canopy, the two connected by a web of suspending cables. It should have been nothing more than a glorified tent, but somehow it managed to embody a dignified blend of traditional kerbal architecture with a distinctly space age aesthetic.

The earplugs were a nice touch too, he thought, especially the ones with brightly coloured rockets printed on the sides. Getting Jebediah to hand them out had been especially clever; if the first kerbal in space thought you needed earplugs for the launch, then by the Kerm, you probably did need them.

The commentary box speakers crackled. "Good afternoon everyone. I am Leland Kerman, this is KBS News, and we are broadcasting live from the Barkton Space Centre! We are now thirty minutes into a planned countdown hold at T minus twenty minutes. For everybody just tuning in, this is the maiden flight of the brand new Eve spacecraft and booster, designed to..."

Patbro let the commentary wash over him. Presumably most of it was just intended for KBS viewers anyway, since nothing that Leland was saying was news to the rows of kerbals in the stands. Everyone had been to the opening ceremony, everyone had seen the eye-catching models of the new rocket, and everyone had seen the three kerbonauts riding out to the launchpad, waving enthusiastically to the crowds from their trailer. The new rocket certainly *looked* much bigger, and sturdier, than the old *Mohos* and Patbro was quite prepared to believe that it could loft three kerbals into space. *Although I wouldn't fancy being stuck inside one for this long.*

Absently, he surveyed the crowd around him. There were plenty of poncho-clad figures dotted around the stands and even the occasional grey robe. *Hmmm, still no sign of Jonton. Haven't seen him for the last few launches either, but I was sure he'd be here to see the new rocket.* He gave a mental shrug. *It's a big crowd - maybe he just came in through the other gate.*

Suddenly, something struck him neatly on the ear. Puzzled, he turned round to find a sheepish looking kerblet being told off by her horrified mother. He glanced down and saw a slightly crumpled Kerlington, 'Heroes of Duna', model rocket lying next to his feet. Smiling, he picked it up, expertly straightened out its nose cone, and handed it back.

"No harm done," he said cheerfully, "Good thing it wasn't going backwards though." His eyes widened dramatically. "If we'd damaged the Proton Ultraboosters, she might never have flown again!"

The kerblet giggled. Her mother raised her eyebrows, "You sound like quite the fan, Keeper?" she said.

"The joys of having two young nephews," said Patbro affably. He knelt down and bumped knuckles with the kerblet. "What's your name, Commander?"

"Adelan!"

"Ahhh, just like the kerbonaut," Patbro smiled. "I don't think she's flying the rocket today though."

"Nuh-uh," said Adelan, "Commander Ribory - she's my favourite! - Roncott and Calzer are going to space today! Their rocket is called the Eve 1 - Eve is a planet you know."

"I do know," said Patbro. "You sure know lots about space, Adelan."

Adelan beamed at him. "I'm going to be a kerbonaut too, when I grow up! Just like Jebediah and Camrie and Wilford and the other Adelan and Richlin and Joemy and Tommal and Barrie and Sherfel and..."

Adelan was interrupted by a burst of static from the commentary box.

"And now we have confirmation from Rockomax mission control at Foxham. The *Next Step* is on orbit and, here at Barkton, the countdown has resumed at T minus twenty minutes."

Adelan pulled on her mother's hand. Resignedly, she picked her daughter up and set her on her shoulders. Patbro smiled at them both and all three kerbals turned to watch the launch.

"T minus eleven minutes and counting. Capsule is on internal power, and all systems are Go as we approach the ten minute mark."

Patbro imagined the three kerbonauts squashed into their capsule. By now they'd be setting their final switches, listening to the flight director run through the final steps in the countdown, and waiting for the nine minutes of controlled fury that would hurl them into orbit. He crossed his fingers behind his back.

"T minus five minutes and counting. Gantry systems moving to launch positions. Commander Ribory reports: "The capsule is good and we're looking forward to the flight." "

Patbro watched the two spidery launch tower gantries: one by the capsule, the other midway up the booster. Slowly they swung clear of the spacecraft. He glanced at Adelan perched atop her mother's shoulders. The kerblet was staring raptly at the gleaming rocket standing on its launch pad.

"T minus two minutes and counting. All gantry systems are at launch positions and we have a Go for engine start."

Adelan tapped Patbro's shoulder. "You should put your earplugs in, " she said solemnly. "Jebediah told me that this rocket is going to be *really* loud."

"T minus sixty seconds. Autosequencer is Go; we have launch commit."

"T minus thirty seconds."

Every kerbal in the stands turned towards the launch pad. Patbro saw more than a few other kerbals around him with crossed fingers behind *their* backs. He pushed his earplugs firmly into his ears.

"T minus twenty seconds. T minus twelve, eleven, ten, nine..."

"...four, three, two, one, Ignition!"

Brilliant white fire boiled out of the six engine bells, rapidly coalescing into a single, blinding light amidst a dense cloud of roiling smoke.

"And liftoff - we have liftoff! Eve 1 has cleared the tower!"

Mercifully, the earplugs muffled the noise to bearable levels but it was still an almost physical presence, battering at his chest and shaking the boards under his feet. Adelan was waving at the *Eve 1*, her eyes shining as brightly as the torrent of fire spewing from its six engines. A thick, grey plume followed the booster out over the Great Tranquil Sea, like an enormous smoky arrow pointing the way to space.

"The KIS are on orbit too. Understood, Fercan, thank you. Yes, please do keep me informed of progress. Hmmm? Oh, more than likely, the KIS are most adept at publicity. Thank you Fercan."

Lodan put the phone down and checked his watch. *Just got time to catch up on any progress at MIR before the Probodyne meeting.* He tucked his notes into his briefcase, dropped a pen into the plastic holder resting snugly in his shirt pocket, and set off for the laboratory wing.

Strictly speaking, thought Lodan, *MIR should be renamed for the duration of this project.* The large map pinned to the long wall of the Munar Imaging and Reconnaissance laboratory was decked out in shades of greens, browns and yellows rather than the more usual greyscale. Each of Kerbin's continents and major island clusters were numbered and marked out with a red dotted border. A set of correspondingly numbered maps adorned the remaining wall space, each overlaid with a ruled grid. The upper left corners of each grid square was marked with a four digit code. Some of them had a second number; hand-written in a box in the bottom right corner. The matching boxes in the bottom left hand corners were, so far, all empty.

Lodan frowned. The numbered squares were supposed to be set out in vertical bands but instead they were striped diagonally across the maps. He did a swift mental calculation and nodded grimly. Even now the numbers were clear. *Far too many Groves and not enough space left. We'll have to count up how many new Groves we can fit in soon, but that's going to let the gronnek out the bag for sure.*

Half of the room was taken up by a row of data consoles, each occupied by a serious looking kerbal staring intently at his or her screen. The operators all sported a large headset clamped over their ears and Lodan could just make out the faint strains of music, made tinny by the headphones. The nearest operator scribbled a number on the checklist next to his keyboard, blanked his screen and then called up a new map square.

Lodan watched in fascination as the operator deftly spun his trackball, marking the corners of the map with little blue flags. The trackball button clicked rapidly and three small white circles appeared on the map. The operator tapped a key and leaned back in his chair. There was a brief pause, a row of lights flickered on the console and the screen began to fill up with an overlaid grid of grey circles.

Lodan nodded to himself. *Good thinking. Evenly spaced Groves is a reasonable starting assumption, so a first pass automated count should be quite efficient.*

He spotted the opening door reflected in the glass screen, and flicked a sideways glance at the young bespectacled kerbal standing in the doorway. Aldsen studied the row of monitors for a moment then came over to join him.

"My office, Director?" he asked quietly. Lodan nodded and followed him into a small windowless cubicle that was largely occupied by a desk and a pair of enormous filing cabinets. Aldsen carefully lifted a stack of printouts off the one spare chair, and indicated that Lodan should take a seat.

"What can I do for you, Director?"

"Very little at the moment," said Lodan. "I was here out of curiosity rather than any concerns about the project." He pointed through Aldsen's office window at the row of consoles in the main laboratory. "I'm impressed - an automated first count wouldn't have occurred to me."

"It certainly speeds things up," replied Aldsen. "And it ought to compensate for the problems we've been having with the satellite."

Lodan blinked. "Go on," he said.

Aldsen laced his hands behind his head and stared at his desk for a moment. "Stuck actuator on the MCP - sorry, motion compensating platform," he said. "We tried everything we could think of from here: hammering the actuator, spinning the vehicle to shake any debris loose, angling it to keep the actuator out of direct sunlight. Doesn't seem to be an electrical problem either, so our best guess is that the platform rail has buckled somehow; either during the flight or through unanticipated thermal expansion on-orbit."

He looked up wearily. "We'll re-work the design of course, but in the meantime, we've got a busted bird up there."

"The platform was supposed to compensate for Kerbin's rotation wasn't it?" said Lodan.

Aldsen nodded. "Yes. The idea was to line up the images on each pass. A nice pole-to-pole strip of constant longitude to simplify the eventual map synthesis." He shrugged, "So much for that plan. We did wonder about using the reaction wheels instead but they're not really set up for that kind of fine pointing."

"I presume you're just using a new shutter sequence then," said Lodan. "Capturing images stepwise in both latitude and longitude." He smiled faintly at Aldsen's carefully concealed look of surprise. "I wondered why you were filling in the map along diagonal stripes."

"It makes the image registration harder," replied Aldsen, "and it's taking longer to collect all the data. It's the best we can do though." He paused, "Why are we doing this Director? It's interesting enough as a technical challenge, but who on Kerbin is this interested in counting Kerm groves?"

Lodan shrugged. "President Obrick didn't see fit to tell me," he said, "I decided this was a good time to follow instructions without asking too many questions."

That doesn't sound like you, Lodan. "I suppose so," said Aldsen slowly, "but I'm still kinda curious."

Lodan eyed him thoughtfully. "Trust me," he said, "I'll let you know as soon as I hear anything." He stood up. "For now, please excuse me; I have a meeting with the Probodyne management team in ten minutes."

Aldsen stood up too. "Of course, Director. Let me show you out."

Dunney was already waiting for him in the meeting room. Tall, almost lanky by kerbal standards and sporting an old fashioned drooping moustache, Dunney was the instantly recognisable face of professional astronomy on Kerbin. For all his slightly old-fashioned public persona, Lodan knew him to be a skilled team leader, with a well earned reputation in planetary geology. Spaceflight was revolutionising that particular field: which until recently had depended on a combination of ingenious instrumentation, patient mapping, and more than a little educated guesswork.

"Ah, Director. It's good to see you."

Despite himself, Lodan smiled. "It's good to see you too, Professor. But please, this is an informal meeting."

"Lodan and Dunney it is then! So what brings you to our corner of the Space Centre on this, quite frankly, miserable day?"

"A need for some professional advice, Dunney - and some help saving the world."

Dunney rubbed his hands together. "Well that should brighten up the day nicely. Professional advice I can do right now, saving the world might take a little longer!" Then he caught sight of Lodan's expression and his smile slipped.

"You're serious aren't you?"

Lodan dipped his head.

"In that case, I think we'd better wait for the rest of my errant team to arrive. This sounds like the kind of thing we should only discuss once."

The awkward silence was broken by the meeting room door bursting open and disgorging three out of breath kerbals.

"Sorry we're late, Dunney. Took longer than expected to work through the new perturbations for the Muna 3 orbit, but Germore's new AMC model is looking promising!"

"Good, good," said Dunney, "but, fascinating as they are, we can talk about anomalous mass concentrations later. For now, I believe we are needed for other matters."

Lodan locked the door and studied the new arrivals. Jernie and Sidbo, he knew, were two of Dunney's students who'd chosen to come with him to the KSA. Both had been heavily involved in designing and building the *Muna 3*. Apparently Germore's work was more theoretical; he didn't know her personally, although the fact that Dunney had recommended her spoke volumes for her competence.

All four kerbals took a seat. Lodan poured water for everyone, before taking his place at the head of the table.

"First things first," he said, once everyone had had a chance to settle. "I'm afraid I haven't been entirely fair to you all, and for that I owe you an apology." Jernie, Sidbo and Germore stared at him in polite confusion, whilst Dunney looked at him expressionlessly.

"I will also need to insist on absolute confidentiality for some of the things we're about to discuss. If anyone feels unable to guarantee this, I would appreciate it if you left the room now. Please be assured that this is an informal meeting and however you choose to proceed, your decision will not go beyond these four walls."

Nobody moved. Lodan nodded in satisfaction, retrieved a sheaf of papers from his briefcase and dropped them on the table. The front page of each document was prominently marked Confidential and stamped with the Seal of Twelve Pillars. Jernie, Sidbo and Germore stared at him wide eyed, and even Dunney looked taken aback.

"Thank you everyone. Please read these carefully before signing them." The corner of Lodan's mouth twitched in a brief half smile. "I think you'll find them to be remarkably self-explanatory - and quite succinct for legal documents."

The room was quiet apart from the rustling of turning pages and then, one by one, the scratching of pens, as each kербal signed his or her agreement. Silently, they passed them back to Lodan.

"Thank you. Now, to start the meeting proper, I have one question. If you needed to set up an off-world colony in ten years, where would you go?"

Dunney's jaw dropped. "Off-world *colony*. Great Kerm, we've barely made it to Munar orbit - and there with half a handful of the lightest probes we could build!" He shook his head.

"We're not going to be building a colony *anywhere* in this *century*, let alone in ten years!"

"Normally I would agree with you," Lodan said quietly, "but it appears we have no choice."

Everyone listened silently as Lodan laid it all out. Donman's revelations to the Twelve Pillars; Jonton's story and the history of kербalkind; and finally, the significance of the Blighted areas, and the sudden, desperate race against time that they faced.

Dunney recovered first. "Saving the world indeed," he murmured. "I presume you intend us to be the scouting party?"

"Yes," said Lodan. "I propose to turn the Probodyne team into a semi-autonomous branch of the KSA. Eventually, I hope you'll become an independent organisation, but for now, we simply cannot afford to have your work held up by the uncertainties of commercial considerations. Your remit has just doubled, good kербals. Not only will you be responsible for building our robotic probes, but you will also be tasked with using them to find us a new home within the Kerbol system."

"So we're Probo-double-dyne now?" said Jernie.

"I think Probodobodyne sounds better," said Sidbo, with a straight face.

Germore glanced at Lodan but fortunately the director seemed to be taking the comments in good humour. *All the same...* "How many probes did you have in mind, Director?" she asked.

"As many as we need, I would imagine," said Dunney, "but the powers-that-be will doubtless prefer us to prioritise."

"So we're going to Duna." said Jernie briskly. "The Mün is no good for a colony, Minmus not much better, Eve... no thanks, and everything else is either too far away, or just a lump of orbiting rock."

"We *think* they're lumps of rock," corrected Dunney. "We hardly *know* anything about them at all."

"Jool isn't a lump of rock either," said Lodan. He saw the disbelieving looks around the table. "Probodyne will investigate *all* necessary options. If the only viable colony site is Jool's upper atmosphere, then that is where we'll be going." He sipped his water. "Although I devoutly hope that you can find an easier site to work with."

"What about Laythe?" said Sidbo. "The LOST guys have found water and ozone there, which means oxygen."

Jernie shook her head, "Too far," she said, "and Kerm knows what the radiation will be like. Plus, the LOST results don't say anything about liquid water - that close to Jool, I'm betting on surface hydrates."

"Duna could have surface hydrates too," Sidbo pointed out.

"With that albedo at the poles?" scoffed Jernie, "C'mon Sid - we've been through all this."

"Yeah, but what about the atmosphere?" said Sidbo.

Jernie shrugged. "Thin most likely, but hopefully enough for Kerm, if not kerbals."

"You hope!" said Sidbo. "I still think Laythe is a better option."

"I think we could probably go to both," said Germore quietly.

Dunney tapped on the table for attention. "Germore makes a good point," he said dryly. "We could always go to Laythe *and* Duna." He raised an eyebrow. "And much as I'd hate to see hard facts spoil a perfectly good running debate, we *have* just been tasked with uncovering those facts."

Lodan listened as the conversation turned to technical matters: instrument packages, trajectories and launch windows, the feasibility of landers and and a debate about the ability of photovoltaic panels to power a Laythe-bound probe, which showed every sign of progressing from debate to heated argument. He tapped the table firmly.

"That will be all, thank you." He ticked off their conclusions on his fingers. "Very well then. Probodyne is expanding to meet the needs of a new KSA robotic exploration programme. Primary programme goals are purely scientific; secondary goals are to scout for resources; real goals not to be disclosed at this time. First two missions are to send orbital probes to Duna and Laythe; these will be followed by landers, should they be deemed necessary. Probe instruments will include cameras, spectrometers and gravimeters."

Lodan looked around the table. "Does anyone have any questions?"

To everyone's surprise, Germore raised her hand. "I don't have any questions, Director, but I do have a suggestion. We should increase the initial number of missions to three, and send a probe to Minmus. It's unlikely to be unsuitable as a colony site, but we have good reason to believe that there is accessible water there, which will be an invaluable resource for the colonisation effort. Besides, to outside observers, it would seem strange to start an ostensibly scientific programme by going to Duna and Jool, whilst neglecting an obvious, and much closer, target."

Dunney nodded, "I concur."

Lodan nodded too. *Good to see that one of them has some sense.* "Agreed. I want to see budgets and development charts for all three probes by the end of the week. Dunney, we need to discuss staffing and other resources for Probodyne. Tomass will be able to find you the next space in my calendar." He pushed his chair back. "We have a lot to do, good kerbals - I suggest we make a start."

The *Moho* flights had proved that a multi-kerbal crew was not technically required for a successful orbital rendezvous, but according to the *Eve 1* flight plan, all such manoeuvres were to be treated as a 'crew coordination exercise.' In Ribory's opinion, the exercise was going remarkably well, all things considered. She nudged the RCS hand controller, neatly halting her spacecraft relative to the distant *Next Step*. At this range, it was nothing more than a set of numbers on the radar display.

"Flight, Eve 1. Range eighty kilometres."

Beside her, Roncott was tapping away at the flight computer keyboard. "That's confirmed, Flight. Planes matched, closing with *Next Step* at five metres per second."

"Copy that, Roncott," Geneney replied. "Calzer, do you have visual confirmation?"

"Negative, Flight."

"Understood. Foxham also reports negative visual contact from the *Next Step*. Eve 1, please proceed to ten kilometres and hold."

Roncott tapped out the manoeuvre request and dutifully read the computed burn data out to Ribory. Across the capsule, Calzer's attention was fixed on the view through the rendezvous window; his gaze flicking back and forth, as he searched for any signs of the other spacecraft.

Ribory glanced at the radar display. "Sixty kilometres and closing, Flight. Circularisation data please, Roncott." She nudged the RCS controls, lining up *Eve 1* for the burn. Then, at last, Calzer caught a sudden flash of sunlight on metal.

"Flight, Eve 1. Got a bright light here. Looks too big for a star and too bright for a planet. Reckon we've found them."

"Copy that, Eve 1. Good work."

"Thirty kilometres and closing, Ribory."

"Thank you, Roncott."

At eighteen kilometres, Ribory made a last correction to *Eve 1*'s attitude and waited for the radar to display the correct range for the manoeuvre. Then she eased the translation controller back. All three kerbonauts sank back into their couches.

"Closing at point two metres per second."

"Good enough, Eve 1," replied Geneney, "*Next Step* is orienting for docking."

From five kilometres away, the *Next Step* looked like a tiny, blunt cone. Calzer watched as it slowly disappeared.

"OK, they're all ready for you, Eve 1. Please proceed to one hundred metres."

Roncott automatically reached for his keyboard. "Copy that, Flight."

From two hundred metres out, the *Next Step* was clearly visible as a dark, blunt cone, perched atop a gleaming base. Calzer watched it drift closer and closer, and then two lines of running lights lit up alongside the capsule windows. Ribory fired a burst from *Eve 1*'s thrusters.

"Flight, Eve 1. Velocity cancelled. RCS to FINE. Target orientation lights confirmed."

"Copy that, Eve 1. You're Go for docking."

Ribory's hands were sweating inside her spacesuit gloves. She worked the attitude thrusters in short precise bursts, lining up the two rows of lights with a matching pair of slanted lines painted on the rendezvous window. She gave the translation controller a quick squeeze for luck and then fired the aft thrusters. The *Next Step* began to drift slowly towards them.

Fifty metres to go... forty metres...thirty metres...

The *Eve 1* crew held their breath as the *Next Step*'s docking port loomed ever larger in the window.

Ten metres...

There was a muffled clank and then the capsule shuddered with a welcome ripple-bang of docking latches snapping shut. Ribory exhaled sharply and was amused to hear similar sighs of relief from Roncott and Calzer. The distant cheering from Mission Control filled her headset.

"Flight, Eve 1. We have a hard dock."

"Fine flying, Ribory. Rockomax confirm that their crew are ready to open the hatch."

"*Next Step* cabin pressure holding steady. You're Go, Ribory."

Ribory pulled the hatch lever down. The locking bolts retracted with a clunk and a brief hiss of air. She lifted the hatch out of its frame, stowed it under the capsule seats and flipped herself over to face the open tunnel between the two spacecraft. A space helmet of unfamiliar design blocked the opposing hatchway, visor open, and its owner grinning cheerfully back at her. Together, the two kerbonauts reached up, removed their head gear, and then clasped hands.

"Good to see you up here! I'm Jondun - you would be Ribory, right?"

"That's me. Welcome aboard!"

Ribory backed away, and Jondun nimbly followed her. She looked around the *Eve 1* with great interest.

"Nice capsule you've got here, guys. Pretty roomy compared to the old *Next Step*."

Calzer edged his way out of his couch and floated over to join them. "Hi, Jondun, I'm Calzer. Roncott's still over there enjoying the view."

"No hurry," said Jondun comfortably. She gestured at the hatch where a fifth kerbal had just poked his head through. "This is Kerke."

Kerke waved at everyone. "Hey, folks."

"Tell you what," said Jondun, "Why don't you move back a bit, Kerke, and let Ribory take a peek at the *Next Step*. That way there's enough room for everyone down here. Dunno how you make them over at Barkton, but if your couches are anything like ours, I'm betting Roncott could do with stretching his legs!"

Ribory laughed. "Sounds like you make them the same way we do." She grabbed a handhold and followed Kerke through the tunnel. "Your life-support people do a better job than ours though - I never figured a capsule could smell this good after a day on orbit."

Kerke reached up, unclipped something from the capsule wall and handed it to her. "Herbs," he explained. "The *Endurance* crews liked having them around so much, that they became a bit of a tradition."

"Now *that*," said Ribory, "is one idea that we're definitely going to borrow. Are you picking this up, Flight?"

"Loud and clear, Ribory," replied Geneney. "Consider it borrowed."

Back in the *Eve 1*, Roncott had finally managed to clamber out of his couch. He removed his helmet and blinked shyly at Jondun.

"Hi, Roncott."

"Hi, Jondun." *Kerm, what do I say now?* "Um, I like your badge."

Jondun looked nonplussed. "Badge? Oh right - the mission patches? Yeah, they're a bit of a Rockomax tradition too." She grinned, "Glad you like them - we brought a couple of spares

for you." She reached into her leg pocket and pulled out three stiff fabric discs. She handed one each to Roncott and Calzer and flipped the third one end-over-end towards Ribory.

Ribory inspected the patch curiously. A braided rope circle was embroidered on a black background. Inside the circle, stylised versions of the *Eve 1* and *Next Step* flew nose to nose over Kerbin's horizon. The word CORDS was emblazoned at the top of the patch, and her name at the bottom. The other four kerbonaut's names were written around the sides.

"How very appropriate - thank you, Jondun! We brought a souvenir for you and Kerke too."

Calzer reached under his couch and retrieved a small, engraved silver plaque, mounted on a disc of polished Kerm wood. "Kerm wood for good luck," he said, handing it over to Kerke.

Kerke looked at the plaque closely. Like the mission patches it depicted the two spacecraft flying nose to nose over Kerbin. Both capsules were picked out in fine detail, and Kerke ran his fingers gently over the delicate cross-hatched shadow around the *Next Step's* engine bell.

"This is beautifully done. Who made it?"

"Uh, Bill made it I think. That's right isn't it, Ribory?"

"Yup, all Bill's work."

Kerke's eyes widened. "What - *the* Bill?"

"Well, there's only one Bill on the team, so I guess so."

"Bill, as in the *Kerbal 1*, Bill?"

Calzer's face cleared. "Sure - and his ears are gonna be *burning* right about now!"

It was Kerke's turn to look confused.

"He's down at Mission Control on the Guidance console," explained Calzer. "Probably listening to everything we're saying."

Kerke blinked at him. "How many jobs do you guys all *do*?" he said.

"We'll tell you all about it later," said Ribory, "But right now I figure the flight plan probably has a meal break in it. See if you can dig out the good rations would you, Calzer? And we should probably switch the camera on too, for the good folks back home."

Ademone leaned against the balcony rail and smiled to herself as she watched the main monitor screen. All five kerbonauts were busy swapping rations and stories amongst themselves. Kerke and Roncott disappeared off-camera for a moment, talking animatedly about the technicalities of their respective guidance computers.

She turned and raised her eyebrows at the five Rockomax board members, standing by the rail next to her. One by one, they all slowly nodded.

Ademone's heart leapt. *Time for you, me and Jebediah to have a little chat, Geneney. I just hope your plan is a good one.*

Chapter 36

Pioneering Spirit

Jeb pushed the last thumbtack into the wall and stepped back to check his work. Fortunately, the cluster of pinholes around each corner of the poster section weren't visible from a distance, although the corners were starting to look a little worn. The fluorescent tubes high above him cast pools of light and oddly angled shadows across the vehicle assembly building; lending a stark immediacy to the finished mural.

Jeb walked around the half assembled *Eve* capsule to get a better view. Behind him, Geneney emerged from his office, carrying an armful of fabric. He stopped, letting the moment linger. *Jeb, a half built spacecraft and an outlandish plan in front of them both. If Bill was here now, he could capture the entire Kerbin Interplanetary Society in one photograph.* Quietly, he joined Jeb by the capsule.

"It doesn't seem real does it, Genie?" said Jeb softly.

Geneney squeezed his friend's shoulder. "Hard to believe," he agreed. "Did you manage to get the nameplate finished?"

"It's right under that dust sheet," Jeb said, "Not as neat as Bill's work, but I think it'll do."

Geneney lifted up a corner of the sheet and peered underneath. A small, polished copper plaque twinkled at him; secured to the spacecraft hull by four gleaming, round headed rivets. The letters KIS were engraved on one corner, alongside the familiar tilted rocket logo but the rest of the foil was taken up by one word and a single digit. Geneney brushed his fingers gently over them.

"I think it'll do very well, Jeb," he said quietly.

Jeb stifled a yawn. "Doubt anyone will be looking at it too closely anyway," he said. "C'mon, Genie, let's get those screens hung up."

The mill shut down with a heavy clunk and a rapidly fading whirr of high speed cutting tools coming to rest. Pneumatic actuators hissed, snapping the tool-changer out and back, and swapping the cutter for a slender steel wand, tipped with a polished ceramic ball. Wernher watched the touch probe begin its pre-programmed dance over the newly machined injector, flitting over the gleaming alloy, darting towards it, backing off, then approaching more cautiously.

Satisfied that the measurement program was working, he removed his goggles, hung his protective gear on its peg, and jogged over to the vehicle assembly building in search of breakfast.

By the time Wernher emerged from the canteen, clutching an egg-and-greenleaf wrap, a crowd of kerbals had gathered around the ropes surrounding the *Eve* capsule. Wernher blinked, *Since when did we starting roping off parts of the VAB?* He took a bite of his wrap and went over to investigate.

"Any idea what this is about, Wernher?" asked Ribory.

Wernher shrugged. "No idea," he said, "Jeb mentioned something about an RCS test last night though - maybe there was a leak?"

Ribory sniffed. "Doesn't smell like it," she said. She pointed at the drapes hanging from the wall. "Monoprop would have made a right mess of those too. Besides, nobody told the capsule team about any testing."

"Looks like it's been mothballed," said Ordrie gloomily, "Reckon we finally ran out of money."

Bob shook his head. "Geneney's been pretty chipper lately," he said. "And trust me - it's just not Jeb's style to mothball a perfectly good capsule whilst there's even half a rocket to launch it with."

"And we've got a lot more than that," said Wernher, "Last of the T-thirty injectors is on its inspection cycle, Bob."

The babble of anxious speculation died away before Wernher's matter of fact tone, leaving a lot of very puzzled kerbals staring at the shrouded capsule and muttering amongst themselves. Wernher left them to it and went over to inspect the hanging drapes more closely. *Hmm, why bother stapling them in place?* He hooked a finger under the edge of the sheet and prised it carefully away from the wall. *Hang on - there's something underneath these. Looks like a poster...*

Wernher's pulse began to race. *I think you've got a little announcement to make haven't you, Jeb? And I doubt you'd go to all this trouble if it was bad news. Which means...*

"Don't suppose you left me any greenleaf, Wernher?"

Startled, Wernher jumped back, nearly bumping into his grinning friend. "Uhh, plenty in the fridge, Jeb." He gestured at the crowd gathered around the shrouded capsule. "I'd get it before someone sees you though."

"So what do you think, Wernher?" Ribory turned her head and realised that she'd been talking to herself for the last two minutes. "Wernh... JEB!"

Everyone's head snapped round.

"Jeb!"

"Hey boss!"

"What happened, boss?"

"What's with the sheets over everything?"

Jeb raised his hands to fend off the jostling throng of kerbals. "Woah, woaaah - everyone take it easy. There's been a little change of plan that's all."

"What plan, Jeb?"

"What do you mean - change of plan?"

"Are we mothballing the ship, boss?"

Jeb gestured for silence. "I'll tell you all about it in a minute folks, once the rest of the team are here."

The clock ticked over to 8:30, just as Edsen pushed open the door to the vehicle assembly building. He was promptly greeted by a clamour of voices from the entire Kerbin Interplanetary Society, all gathered round a fabric draped shape. He hurried over to them.

"Hey guys - what happened to the capsule?"

"It's right there, Edsen."

"What's it doing under those covers?"

Jeb cleared his throat. "I was just getting to that, Edsen."

He stared solemnly at everyone. "As I was saying, there's been a little change of plan. We're still going to launch Eve 2 but after that, Project Eve is cancelled." He hooked a thumb over his shoulder. "Eve 3 isn't going to fly."

There was a stunned silence.

"You might have told us earlier, Jeb," said Ornie quietly, "Propulsion team have been workin' round the clock on that booster."

"That's right," said Ordrie, "Wernher's been up since dawn, working on the last engine! Waste of effort that was."

Everyone looked at Wernher, who was leaning casually against a wall and not looking at all perturbed by Jeb's bombshell. "On the contrary, Ordrie, I don't think it was wasted at all. Right, Jeb."

Jeb grinned at the bewildered faces staring back at him. "There's no fooling you, Wernher. You got my scissors, Genie?"

"Right here, Jeb," replied Geneney.

"Excellent," said Jeb and stepped up to the wall drapes. "Give a kerbal a hand here?"

Geneney reached up with his own scissors.

"Project Eve is no more," Jeb said. "But now good kerbals, we give you..."

Two pairs of blades snipped shut and the dust sheets plummeted to the floor.

"....the Pioneer Program!"

Edsen gaped at the mural spread out behind the shrouded capsule. On one side, the familiar cloud streaked sphere of Kerbin glowed amidst the star speckled blackness of space. On the other side, the cratered, plaster-grey Mün provided a stark contrast. White lines, arrows and a whole flotilla of different spacecraft decorated the space between and around the two orbs. *Looks like a flight plan but where...* His heart leapt. One of the spacecraft had been drawn right on the edge of the largest Munar crater. And, right beside it, somebody had drawn two kerbonauts and a flag.

"They went for it. Great Kerm, they went for it!"

Ornie blushed as everyone turned to stare at him.

"That they did, Ornie," laughed Jeb, "That they did!" He whisked the dust covers off the capsule, revealing the gleaming plaque underneath. "Eve 3 isn't going to fly, my friends - but Pioneer 1 *is*." He raised his hands. "And I can see that everyone is busting with questions, so before we get to those, how about I run you all through the flight plan first?"

A buzz of excited assent ran through the crowd. Jeb picked up a spare piece of antenna from the workbench next to him and waved it at the mural.

"OK, the basic plan isn't much more complicated than the ones we used for the Muna 2 and Muna 3 flights. From low Kerbin orbit we do a trans-Munar injection burn, coast, and then do an insertion burn into Munar orbit. Powered descent to the surface." Jeb's eyes gleamed. "Then we launch from the Munar surface, rendezvous, and prep for trans-Kerbin injection. Aerobraking re-entry and parachutes to splashdown as usual."

Ornie whistled, "That's a lot of flying, Jeb. Gonna take one helluva booster to lift all that fuel."

Jeb nodded. "Yep. Genie and I went through the numbers with the folks at Rockomax, and doing the round trip with a single ship needs a much bigger rocket than either of us can put together any time soon. Likewise for a couple of the other flight plans we thought up. So eventually we came up with this."

Jeb jabbed his piece of antenna at the image of Kerbin. "It's a bit easier to go through the flight in reverse. We use an Eve... sorry, a *Pioneer* capsule for re-entry and splashdown. The

service module provides the juice for trans-Kerbin injection." The antenna traced a path back to the Mün. "The lander is a separate craft. It goes out to the Mün docked to the front of the capsule. We undock, fly it down to the surface and back, re-dock, and then jettison it.

Jeb pointed at a larger spacecraft in the middle of the mural. "The capsule, service module, and lander are boosted towards the Mün by a disposable Kerbin departure stage. That stage is jettisoned during the coast phase and we use the service module engine for Munar orbit insertion." Jeb tapped the mural. "Ademone reckons that Rockomax have the heavy lift capacity to get the lander and Kerbin departure stage to orbit from Foxham. We launch the Pioneer capsule and service module from Barkton on the usual booster, and put everything together on orbit. We'll be launching to an inclined orbit of course; Rockomax can't launch directly to an equatorial orbit and they'll be pushing their systems just to *get* to orbit; changing planes isn't an option."

Jeb put his antenna down and looked expectantly at the crowd of kerbals. He wasn't disappointed; the questions came thick and fast.

"Fraid not, Camrie. Launching everything on a single booster would make things easier for sure, but it would take a crazy amount of engine clustering to pull off, even with Skipper engines."

"Yeah, the telemetry and control linkages between the spacecraft and the departure stage are going to be tricky. I figured you might have some ideas there, Bill?"

"The guidance systems were accurate enough for the Muna 2 and Muna 3 trajectories, Neling. We should be OK."

"We think so, Lucan. We worked the numbers twice and the service module should have enough delta-V for both manoeuvres."

"Almost like somebody planned it that way," said Geneney dryly.

"Just thinking ahead, Genie; just thinking ahead," said Jeb airily. "What's that, Bob? Oh right, yeah that's the missing piece for sure. To be honest, I was kinda hoping you could handle that? The lander is probably gonna be a joint project and you get on pretty well with the Rockomax folks."

"Ahh - now *that* is an excellent question, Ornie. Nope, we're not going be shooting straight for the Mün. You want to take this one, Genie?"

"Sure," Geneney said calmly. "OK people, we've got a lot of hardware to build for this. Then we have even more training to fit in for the crews and flight control teams." He retrieved a piece of chalk from his pocket and began to sketch out a timeline on the wall. Jeb slipped away unnoticed, closing the canteen door behind him.

"The current plan is for a three stage program. Stage One is ground team integration; Stage Two is flight hardware construction and qualification; Stage Three is gonna be bootprints on the Mün time.

He smiled faintly at the disappointed looks on some faces. "Don't worry folks - there's going to be plenty of flying before we get to Stage Three. First up is the Rockomax crewed flight - and we're going to lend them a hand. Two hands actually; we're going to build them a target, and we're going to lend them a flight control team."

"Target, Gene?" asked Wernher

"Rendezvous target, Wernher. Modified Moho booster with a docking adaptor on top instead of a capsule. We're gonna need all the docking practice we can get because, without docking, we're not even getting out of Kerbin orbit. Communications during the CORDS flight were also pretty rough in places, and we need to straighten that *right* out. Plus the Rockomax pilots need to get used to working with *our* flight control team."

"The second Stage 1 flight will be Eve 2. More joint flight control operations, this time to get our pilots used to working with Rockomax controllers." Geneney's eyes flicked from Ornie to Ordrie to Edsen. "The flight objectives have also been substantially upgraded. Assuming you guys are up for it, Eve 2 will be a full duration shakedown of the capsule and service module systems."

Edsen raised his hand. "Does that include engine tests, Gene?"

"Yes," said Geneney, "Simulated Munar orbit insertion and trans-Kerbin injection burns; both at periapsis. Total delta-v is a little under two kilometres per second. Not quite enough for kerbostationary transfer but you'll still be busting the Moho altitude records."

"What about the heat shield, Gene?" said Ornie

"The heat shield will be fine," replied Geneney. "All the ground tests were positive, ablation on the recovered Moho capsules was in line with predictions, and we're building in a healthy margin on top of that."

Ornie looked dubious, "I don't know, Gene. I don't mind taking the risk that something will go wrong but I *do* want to know that we'll get home if everything goes right. Isn't there some way we can test the shield at Munar return velocities?"

Geneney scratched his head. "I'll have a think," he said, "We could probably do something sub-orbital with one of the Mohos."

"Put an RT-5 under it," said Bob cheerfully. "Launch 'em straight up, flip 'em over and light the Trashcan on the way down."

"And hope we hit the sea and not our own heads," said Geneney dryly. "Like I said - I'll have a think."

"So what's the plan for Stage 2?" said Wernher.

"Glad you asked," said Geneney. "At the moment we're thinking it's going to be a minimum of three test flights, probably more if we don't hit all our objectives the first time out. First up will be a shakedown test of the Kerbin departure stage. Then we prove out the lander in Kerbin orbit. Full Munar flight duration, docking and undocking with the Pioneer capsule,

flight testing of all RCS and guidance systems, simulated Munar descent burns - everything we can think of." He nodded at the expression on Wernher's face. "Yep. I think we'll need more than one flight for all that too, but we'll give it our best shot."

"And the third flight?" said Wernher quietly.

"All-up rehearsal for the landing," said Geneney simply. "Everything bar the final powered descent, and launch from the Munar surface.

Camrie raised a hand. "Why bother with a rehearsal?" she said, "Seems like a long way to go to not bother landing."

"Probably because we'll have our hands full just getting to the Mün for the first time," said Ornie. "No sense overloading everyone with the landing too."

Geneney coughed. "Second time actually, " he said. "How else did you think we were going to test the Kerbin departure stage?"

A broad grin split Camrie's face. "Now, *that's* more like it!" she said. "Don't suppose you've picked the crew yet?"

"Not yet," said Geneney, "Not all of them anyway. The plan for the Stage 2 and Stage 3 crews is to have one pilot each from us and Rockomax. I've no idea how Rockomax intend to pick theirs, but we'll be going with our usual method. The third slot is for the commander though - and we'll be picking them from kerbonauts that have already flown."

There was a rumble of discontent.

"I know, I know, it's not the way we run things, but Ademone insisted - and just so everybody is quite clear - I agree with her. These are gonna be big, complicated flights, people, and I want a bit of experience on board. We'll still be picking our commanders from the basket so don't worry about that."

"So who goes first?" said Ornie, "I assume we're takin' turns with Rockomax?"

"They do," said Geneney, "First flight to the Mün will launch with two Rockomax crew on board." He surveyed the crowd patiently.

Wilford was the first to get it. "Hang on, Gene. Does that mean...?"

"It does indeed," said Geneney. "We only get one seat on the first Munar flight people, but if everything goes to plan, we get two for the first Munar *landing*!"

The smell of fresh coffee filled the air. Jeb wheeled in a large trolley, and was promptly mobbed by excited kerbals. Lucan's voice rose above the din.

"So who *gets* that first seat, Gene?!"

"Already sorted, Luco!" Jeb called out. "Eve 3 is changing her name but she's not changing her *pilot*!"

Wernher's stomach lurched. He was dimly aware that Jeb was still talking and that everyone around him had suddenly fallen silent. Somehow, neither fact seemed particularly important.

The Mün... I'm going to the Mün.

Jeb just smiled at him. "You set us all on this road in the first place, old friend. You ready to make a little history?"

Chapter 37

With a little help...

The chunky pencil zig-zagged erratically over the page, filling in the kerbal's head with enthusiastic green scribble. Joenie's tongue poked out of the corner of her mouth as she discarded the green pencil and picked up a brown one instead. The kerbal rapidly acquired a thick shock of hair and a pair of eyebrows, that in another era, would have been the height of fashion.

Gerselle watched her daughter proudly. *Almost all in between the lines now, especially around the eyes. It's funny how she never scribbles over those..*

"That's very good, Joenie. What colour do you want to make her dress?"

Joenie regarded the scattered colouring pencils thoughtfully. "Blue!" she exclaimed brightly, grabbing the nearest one to her.

"That's the yellow one, sweetheart. This is the blue, look - just like her boat."

Joenie set to work with the blue pencil. "Can I have milk, Mummy?"

"Of course you can, my love. Do you want it in the blue cup?"

"Blue cup!"

Gerselle decided that that probably meant yes. She took the jug out of the cooler, filled the lurid blue container that was Joenie's current favourite cup, and pushed the lid on. *Running out of milk again. Can't keep up at the moment.*

"Look, Mummy. Spotty leaves."

Milk sprayed across the floor as the cup clattered away into a corner. Gerselle skidded around the kitchen bench and rushed over to the table where Joenie was sitting. Her daughter pointed out of the window. "Green spots, Mummy."

Gerselle sagged into her chair, heart pounding. *Green... yes definitely green. Not black. No black anywhere.* She composed herself with an effort. "That's right clever girl - they *are* green spots." Her brow wrinkled. *Green... green...water? Surely not after all that rain yesterday?* Then her face cleared. *Of course - Jonton!*

"I think Daddy wants a drink too, sweetheart," she said, "Shall we take him a glass of water?"

Joenie clambered down from her chair and scampered over to her cupboard.

"In a minute, sweetheart - let Mummy clean up the..."

Resignedly, Gerselle watched the brightly coloured plates, bowls, and cups clatter across the floor.

"...milk first." She reached for the mop, nudging an errant plastic tumbler out of the way with her toe. Joenie rummaged happily through the cupboard, emerging triumphantly with a worn, and rather faded animal patterned beaker, complete with curly straw.

"This one, Mummy!"

"Well, isn't he a lucky Daddy, getting the curly straw cup. Let Mummy fill that up for you."

Icy water splashed into the beaker. Gerselle turned off the tap and screwed the lid on tightly. *Who on Kerbin decided that a screw-fit lid with a straw was a good idea.* She bent down to offer it to her daughter.

"Can you carry the cup for Daddy?"

Joenie nodded solemnly, took the beaker in both hands and trotted off towards the sleep room. Gerselle followed her, keeping a watchful eye out for abandoned toys or other clutter lying in wait for an oblivious kerblet to stumble over. She opened the door, smiling as Joenie marched up to Jonton, holding the beaker out stiffly in front of her.

"Water, Daddy!"

Jonton looked puzzled for a moment, then shrugged minutely and smiled.

"Just what I wanted - thank you sweetheart. *And* I get the curly straw cup too!"

Joenie beamed at him. "Spotty leaves, Daddy. Mummy said Daddy want water!"

"Mummy was right," said Jonton. He took a long drink to hide his confusion. "but how did Mummy know I was thirsty?"

"Spotty leaves," repeated Joenie.

"Your leaves gave you away, dear," said Gerselle, "You'll be happy to know that you seem to be getting plenty of nitrates and minerals though."

Jonton threw up his arms. "What in the world are you..." Then his eyes widened, "Ohh - the *leaf* spots?"

Gerselle nodded, laughter dancing behind her eyes. "Good thing they only signal for water or nutrient conditions - I'm not sure I want to know if my husband is thinking lascivious thoughts about butterflies!"

Joenie looked up, "More butterflies, Daddy?" she said hopefully.

"No, no more butterflies, popkin," said Jonton, "It's too hot for them in summer." He looked at Gerselle. "Do my leaf spots really respond to my kerbal body too?"

Gerselle knelt down beside her sulky looking daughter. "Why don't you get your picture for Daddy?" She glanced up at Jonton. "It looks like it," she said, "Green spots for lack of water - but we just had rain enough to last a week, so it couldn't be the Kerm." She was interrupted by a loud knock at the door.

Joenie immediately perked up. "Adbas!"

Gerselle shook her head, "It's three more sleeps before you go to Adbas's house, sweetheart," but Joenie had already disappeared. She sighed and made her way to the kitchen, where she found Joenie bouncing up and down, frantically trying to open the front door.

"I don't think it's going to be Adbas, my love. Let Mummy open the door."

As soon as the door opened, Joenie dashed out to meet her friend, only to career into a bemused looking kerbal, and land on her bottom with a thump. Gravely, the kerbal bent down and offered her his hand.

"Hello, Joenie."

Joenie blinked at him, and let herself be pulled gently to her feet before scuttling behind Gerselle's legs. Gerselle ruffled her hair. "Don't be silly, sweetheart - you know Ferry." She looked apologetically at her visitor. "Sorry, Ferry - she was expecting somebody else."

Ferry chuckled. "Was it Adbas you were looking for then, Joenie?" He reached into his pack, and produced a large glass bottle full of pale golden liquid. "I'm a bit big to be Adbas, but I did bring some juice for your daddy. Would you like some too?" He grinned at Gerselle's raised eyebrow. "Fresh prickleberry juice - nothing stronger than that. First pressing was a mite late this year, but we still laid down a good cellar-full. Is Jonton in then?"

Joenie's eyes lit up. "Daddy had spotty leaves, and water in my curly cup," she said brightly, "I carried it and didn't spill *any*." She scuttled back inside calling out, "Daddy juice, Daddy juice!" at the top of her voice.

Ferry looked nonplussed. "Spotty *leaves*?" he said, "Is Jonton all right, Gerselle? Me and Fred haven't seen him for an age, and some of the other boys were saying much the same at the Pressing."

Gerselle stared at him wordlessly. "I think so," she said at last. "You'd better come in, Ferry."

Ferry's nose twitched as he followed her into the kitchen. *Cinnamon. Like Kerm wood but stronger.* A thought struck him. *Something wrong with the Kerm maybe - that'd explain why*

Jonton's been out of sight. It's a tough old tree though, can't be much it...A cold worm of doubt began to gnaw at him. Blighted fields, berries ripening late - and it is a very old Kerm. Pillars preserve me - what if... He shook his head firmly. *Jonton's a good Keeper - he'll take care of it.*

Gerselle saw his nose wrinkling. "Don't worry," she said, "the Kerm is safe. Jonton made sure of that." There was an odd catch in her voice. "It took a lot out of him. Please, Ferry - we'll explain later - just don't say anything in front of Joenie."

Ferry looked at her. *I don't like the sound of this.* "Of course I won't" he said carefully. "No sense in getting her all het up too."

Gerselle turned away, took three plain glasses out of a cupboard and arranged them on a tray. They rattled briefly as she picked it up. Silently, Ferry held the door open for her.

The overpowering scent of cinnamon in the sleep room brought Ferry up short. *What in the world?* Hurriedly, he covered his mouth, barely managing to contain a colossal sneeze. Gerselle put her tray down and offered him a cloth.

"Thaaa...AAACCHOOO... thank you, Gerselle," He wiped his eyes with the back of his hand, before blowing his nose. Joenie giggled at the loud trumpeting noise but Jonton looked at his friend in alarm.

"Are you going to be all right, Ferry?" he said, "I know it's a bit heavy but it doesn't usually take people this badly."

Ferry dabbed at his eyes with the one remaining dry corner of cloth. "I think so," he replied thickly. "Never known the Kerm to be this strong though." He smiled weakly. "Reckon a drop of pricklesberry juice would go down a treat about now."

Jonton's eyes lit up. "First pressing?" he asked.

Ferry nodded. "Berries were late this season so the raw juice is a bit sharp. Interesting notes though - should be a good year once its aged." Carefully, he popped the lid off the bottle, and poured a generous measure into each glass.

Joenie waved her empty cup. "Can I have juice, Mummy?"

"Not the blue cup, sweetheart," said Gerselle, "it's had milk in. Why don't you go and choose another one?"

All three adult kerbals smiled as Joenie hurtled out of the door. Then Jonton coughed apologetically. "You couldn't bring a glass over here could you, Ferry? I'm a bit...encumbered."

Ferry opened his mouth to speak, and then blinked at the look on Jonton's face. "Sure," he said quietly, "I did wonder why you were half buried in Kerm leaves." He took a glass over to Jonton. "You can hold this, right?"

Jonton smiled. "Fortunately, yes." His hand emerged from the foliage and grasped the proffered glass. "A bit sharp you said?" He took a sip of the golden liquid and swirled it round his mouth thoughtfully.

Hmmm, yes. Stronger tannins than usual, good flavour balance, little bit chalky. Definite tang of...Oh dear - looks like I'd better do something about the soil borers.

Jonton held the juice in his mouth and inhaled deeply. His eyes widened.

Not just soil borers, rock worms too. And something else. He frowned, trying to tease out the delicate wisps of aroma. Some kind of fungus? I think those flavours are anti-fungals. Great Kerm, there's a whole history in this stuff.

Ferry saw the frown. "I told you it was a bit sharp," he said.

Jonton shook himself out of his reverie. "It is," he agreed, "but I think you're right about the ageing."

Ferry looked at him cautiously. "I don't mean to pry, Jonton, but...well something's not right here, and Gerselle said you'd been having a tough time with the Kerm?"

Jonton sighed. "I suppose it wasn't going to stay secret forever," he said reluctantly. "And for what it's worth, I'm glad you're the first to know, Ferry."

The Kerm leaves flicked to one side. Startled, Ferry jumped backwards and then went very pale.

Pillars preserve me! Wrapped around him...nonono - growing into him! What in the name of sanity?

He screwed his eyes shut, waited, and opened them again. *They're still there. Kerm help me but they're still there!* The room began to sway around him.

"Ferry? Look at me, Ferry!"

Ferry looked at him muzzily.

"Stay with us, Ferry. Stay for dinner, and we can talk about this later, once Joenie's gone to bed."

The leaves snapped back into place, just before Joenie dashed in waving a cup. Ferry took a deep breath, pasted a smile onto his face, and retrieved the bottle of prickleberry juice.

All in all, thought Ferry, it had been a very pleasant evening. Gerselle's cooking was still as good as ever, and Joenie had been happily chattering away to everybody, and wanting to taste everything that the adult kerbals were eating. He smiled to himself; even the spicier dips hadn't fazed her, although the greenleaf and chicory puree had turned out to be a strictly one-taste dish.

Judging by the giggles and splashing from next door, bath time was going well too; perhaps a little too well if Gerselle's suddenly raised voice was anything to go by.

Their conversation was studiously light hearted, flitting from village news, to the current progress of the space programme, to the latest sporting events. Privately, Ferry thought that Jonton's talk of a Mün landing was rather far-fetched, although they both agreed that the Mün would be a fine place to host the Net-Ball Cup.

"Andbo Kerman had best look out," chuckled Ferry. "That kerbal can get some serious speed off the nets - he'd probably launch himself straight back into space if he was trying for a four-point-hang on the Mün!

Jonton snorted laughter into his coffee cup. "You'd need a net over the nets to catch him," he said.

"Oh yeh!," said Ferry, "Call it a six-point-hang if you manage to score from there!"

The door swung open, and a fluffy-haired, pyjama-clad Joenie scampered in, followed by a decidedly damp looking Gerselle.

"Night, night, Daddy!"

Smiling, Jonton leaned forward, "Night, night, sweetheart. Does Daddy get a kiss?"

Joenie stretched up on her tiptoes. "Mummy, help?"

Gerselle scooped up her daughter and held her out for Jonton to kiss goodnight.

"Night, night, Joenie."

As the door closed, Ferry could just make out Gerselle's resigned voice. "Wouldn't you like another book, sweetheart? We read Treebie's Tricycle last night." He glanced at Jonton out of the corner of his eye and wasn't at all surprised by the wistful look on his Keeper's face. *Bet he doesn't get to read many bedtime stories from here.* After a tactful minute or two, he cleared his throat.

"So...what happened, Jonton?"

"It's a long story," said Jonton sombrely. Donman's voice echoed in his memory: *You may consider your unreserved cooperation to be a mandate from the Council* "I'm not too sure where to start to be honest." He straightened up. "Do you remember the sunfruit field, Ferry?"

Ferry shuddered. "Not ever going to forget it," he replied, "Never saw anything like it in me life, and I hope I never do again."

Jonton nodded. "I'd never seen anything like it either," he said. "But as soon as I did, I knew that that's what the matter was." He paused. "Sorry, Ferry - that wouldn't make much sense. In the weeks before the sunfruit harvest, the Kerm seemed be getting worried about something, but I didn't know what. I spent long nights Communing, but it wouldn't - or couldn't - tell me what was wrong."

"Too many nights I'd say," said Ferry. He finished his coffee. "I remember that part too - you looked like you hadn't slept for a month when I came to get you that morning."

"*I felt* like I hadn't slept for a month," said Jonton. His leaves rustled agitatedly. "The Kerm was *scared*, Ferry. I tried asking it about the sunfruit, but even thinking about them just sent it into a blind panic. No matter what I tried, I just couldn't get it to understand what I was asking."

He bowed his head. "Thirty-seven Kerm couldn't understand - but I thought that thirty-eight might be able to."

Ferry choked. "You thought *what*?" he spluttered. "Tell me you didn't do it, Jonton, Please tell me you didn't!"

Slowly, Jonton shook his head, "I wish I could," he whispered. "I planted one more tree, Ferry. Just one more - but that was enough."

Ferry listened in revulsion, and then a mounting horror, to Jonton's description of the black-spotted leaves, the shattered Kerm, and his desperate attempt to save it. The horror grudgingly gave way to a feigned, and then a genuine pity, as Jonton recounted the struggle to hold onto his sanity, and the realisation that surrender was the only way to ensure the survival of Kerm and village alike.

"Well that part worked at any rate," said Ferry lamely. "The village I mean."

"It's getting better," agreed Jonton, "but it's going to take an awful long time yet before I have everything worked out."

"Before *you* have everything worked out?" said Ferry, "I thought the Kerm looked after the fields, not the Keeper?"

"But that's what I was trying to tell you," said Jonton patiently, "There's no difference any more - it's just me." He pinched the bridge of his nose. "If it helps, think of me as a Kerm of thirty eight trees and one kerbal."

Ferry stared at him. "How does that feel?" he said at last. *Kerm, but you're coming out with the cliches here, Ferry.* he thought sardonically.

"Old," said Jonton. "Like a lily pad floating on a deep pond. Like an ancient kerbal on a raft, in the middle of a stormy sea. Like one of those pictures of Kerbin drifting in space." He rubbed his eyes. "I'm not explaining this very well am I?"

"Not really," admitted Ferry.

Jonton sighed. "I'm old, Ferry. Or, if you like, the Kerm *was* old and now I *am* old. Vast wells of memories, the experience of hundreds and hundreds of years spent tending the land, not to mention shared memories from all the Keepers before me. The memories are all mine, or they will be once I can make some sense of them. The experience...well I'm trying to absorb that as quickly as I can for the sake of this year's harvest!"

He looked at his friend thoughtfully. "I think I can give you some idea of what it's like. How do you walk, Ferry?"

Ferry paced up and down. "Like this," he said.

Jonton smiled. "Yes, but what makes you walk. *How* do you walk?"

Ferry frowned. "Leg muscles pulling on tendons, pulling on bones, making my legs move," he said at last. "If you're being picky, my brain passes nerve impulses to my muscles to make them move."

"And how does *that* work? Where do those nerve impulses start. How do *you* decide to start them?"

Ferry's mouth opened and closed as he grappled with the question. "I don't know," he said, "I just do."

"Exactly." said Jonton, "You just do. Now imagine that instead of just getting up and walking, you have to consciously control every single step - if you'll excuse the pun - of moving one muscle of one leg. Now think about moving the whole leg, then both legs together in harmony. Not to mention the hundreds of other tiny posture changes and shifts of weight that keep you balanced while you're doing all this."

He looked at his friend wryly. "That just *begins* to describe what it feels like to look after the fields. Thousands of little tweaks and balances that were instinctive for the Kerm - and that I'm learning from scratch. Some of it's starting to get a bit easier, but I don't really have much of a muscle memory for it all yet - so to speak."

The door creaked open and Gerselle padded into the room. She caught Jonton's eye and raised a finger to her lips. Jonton smiled. "How many Treebies did it take tonight?"

Gerselle laughed softly. "Only three tonight. It was the extra drink of water, the second moss room stop and all the toys wanting to say goodnight to Mummy that took all the time. Sorry, Ferry - kerblet talk."

Ferry shook his head. "Not a problem, Gerselle - I was kilometres away anyway."

Gerselle nodded in understanding. "Jonton explained everything then?"

"He certainly tried to," said Ferry. "I still haven't made up my mind whether he's a hero, an idiot, or just plain criminally reckless." He looked at them both. "I'm not the only one wondering where he's been for the last few weeks either."

Jonton glanced at Gerselle. "I know," he said quietly.

"They're going to ask me."

"I know that too - and I don't want you to cover for me, Ferry."

The early morning sun shone through the Kerm leaves outside, dappling the kitchen wall with shifting blotches of light. Fragrant djeng steam mingled with the smell of wildflowers from the garden and the sweetly aromatic scent of stewed fruit cooling on the stove, lulling Gerselle into a half doze. She smiled at the distant clatter of blocks from the sleep room that heralded the collapse of another masterpiece of kerblet architecture.

All this, and an evening off too. A whole evening free from kerblet and Kerm. Her eyes crinkled. *Free from my little Kerm anyway.*

The quiet was broken by a sudden knock at the door and almost immediately afterwards by the patter of kerblet feet and the all too familiar cry of "Adbas! Adbas!" Gerselle groaned, put her book down, and went to investigate.

"No, sweetheart. you're going to see Adbas *tonight*. Please let Mummy through." She picked Joenie up, and opened the door.

"Morning, Gerselle. We're here to see Jonton."

Gerselle stared at the crowd of kerbals on her doorstep. All of them seemed to be carrying something, including Fredlorf, who was holding a large and efficient looking saw. Her eyes widened.

"No! You can't. Whatever you do to him, you can't cut him loose!" Frantically, she searched for Ferry in the sea of faces. "Tell them, Ferry! If you cut him loose, he'll die!"

Fredlorf stared at her, dumbfounded. "What in the world are you babblin' about, girl? We aint about to do any cuttin' on Jonton."

Gerselle gaped at him. "B...but the saw?" She gestured feebly over his shoulder. "And everything else?"

"Figgered we'd help him with a little building work is all," said Fredlorf, "Least we could do for the kerbal - world needs more Keepers like that."

"Oh," said Gerselle faintly, cheeks flushing dark green.

"Aye," said Fredlorf, "Told us everything, Ferry did. Yer Jonton's a damn hero, if you're askin' me."

There was a general murmur of agreement.

Gerselle blinked. "Um, you'd all better come in then. I shall let Jonton know you're here to see him.

The rest of the morning whirled past in a blur of kerbals, sawdust and noise. Under the watchful eye of the village joiner, two serious looking young kerbals measured up Jonton and Gerselle's sleep room, before setting up a pair of workbenches outside and setting to work with saws and planes. After a brief consultation with Gerselle, Fredlorf led another pair of kerbals outside, all three equipped with spades, pry bars and other tools. Meanwhile, a steady stream of volunteers trudged up their garden path, carrying pieces of timber, rolls of fabric, tins, sections of pipe and much else.

Gerselle spent most of the morning chasing Joenie from room to room, trying to keep the over-excited kerblet out from under everyone's feet. Eventually, she gave up, and after a hasty conference with Jonton, went to fetch Joenie's coat.

"Come on, sweetheart. Let's go for a walk and leave these nice kerbals to their work."

The younger of the two joiner's apprentices looked a little disappointed at that. Joenie glanced at her mother, and then carried on playing with the long curly wood shavings piling up around her. Gerselle counted to five under her breath.

"Joenie - if you put your coat on like a good girl, we can have honey crackers from the shop."

For a moment she was roundly ignored, but then Joenie looked up inquisitively.

"Crackers?"

"That's right," said Gerselle, "Honey crackers from the shop. And then, if you're a really good girl, we can go find your favourite place by the river before we go to Adbas's house for tea."

Joenie's face brightened at the mention of her friend. "Sticks, Mummy?"

"Of course we can play stick races - but only if you're a good girl."

Joenie grabbed a handful of shavings and bounced to her feet, holding her arms out. Deftly, Gerselle slipped her daughter's coat on and buttoned it up.

"Why don't you let Mummy carry the shavings?" she said.

Joenie shook her head firmly. "Mine!"

"Fine," sighed Gerselle, "Come on then, sweetheart. Let's go."

By the time Gerselle came home later that afternoon, most of the volunteers had left. She found Fredlorf, Ferry and the older crafts-kerbals sitting around Jonton, sipping mugs of djeng and looking quietly pleased with themselves. Gerselle stared around in delight. The afternoon sun shone through a pair of sturdy looking sliding doors, which opened onto a spacious verandah. Inside, a slender pedestal supported a shallow stone bowl within convenient reach of Jonton. A tap arched over the bowl, and the pedestal had been cunningly shaped to include a shelf for storing mugs.

Ferry got to his feet. "C'mon lads. Time to let these two have the place to themselves for a bit."

Gerselle shook her head, "Don't be silly - we're not in a hurry and you're all welcome to stay for dinner - it's the least we can do for all this work!"

"It's kind of yeh, Gerselle," said Fredlorf, "but we was jus' finishing up. Can't speak fer the rest of these loafers, but my Enny will be wonderin' where I've got to anyhow." He grinned. "Jonton'll jus' have to show yeh his new toys all by himsel' "

Ferry saw Gerselle's uncertain look. "Anlie and Gildas will be expecting me too," he said. "Besides, I owe you two a dinner as it is!"

One by one, the other kerbals made their excuses and filed out. Gerselle politely showed them to the door, thanking them again for all their work. As Ferry left, Gerselle caught his eye and flashed him a brief, wordless look of gratitude. Ferry glanced around and then quickly dipped his head in acknowledgement. As the last of her unexpected guests disappeared around the bend in the path, Gerselle closed the door and went back to her new sleep room.

Jonton watched her examine the new doors, run a finger around the edge of his water bowl and then stare out at the new verandah, rocking back and forth on her heels.

"They even motorised the doors for me," he offered quietly. He thumbed a button on the pedestal and the doors rumbled softly open. Gerselle nodded.

"It's...I don't know what to say," she said.

"Beautiful work?"

"Yes."

"Just blends into the old room?"

"It does."

"Makes you feel like a fraud?"

Gerselle looked at him. "That more than anything," she said. "How much did you tell Ferry?"

"Everything," said Jonton heavily. "Apart from the bit about our warring Kerm, the bit about our history, and the bit about Donman's visit."

Gerselle nodded slowly. "That certainly explains Fred's attitude. As far as they're all concerned, you're the hero Keeper that would have sacrificed himself for the village."

"And not the idiot that caused it all in the first place," said Jonton bitterly. "I bet Ferry glossed over the Rule of Thirty-Seven breaking too."

"Jonton?"

"Hmm?"

"What did you mean by 'our history?'"

Jonton frowned. "Kerbal history. Everything I showed Donman." He buried his face in his hands. "Oh *hells*. The night that Donman came - I promised I'd show you everything." He looked up, red eyed.

Gerselle blinked. "I remember you and Donman talking a lot about Kerm memories. The shards of course, and 'your kerbals'..." She frowned. "You never did explain that part."

Jonton took a deep breath. "Do you trust me, Gerselle? After all this - do you still trust me?"

Gerselle stared at him. "Yes," she said at last, "Even after all this - I do trust you."

"Enough to Commune with me?"

Vivid memories flashed before her eyes, of Jonton thrashing and screaming. "Will it hurt?" she asked.

"I don't know," said Jonton quietly. "All I can do is promise to make it as painless as possible."

Gerselle nodded. She walked over to the bed, lay down and braced herself. She heard the doors rumble closed and then sensed the faint rustling of leaves behind her. Tentatively Jonton lowered them towards the back of her head, brushing them gently over her hair.

Instinct took over.

Hundreds of tiny hairs rippled outward from the leaf surfaces. Tiny trains of electrical impulses raced along them, triggering elaborate biochemical cascades deep within. At their tips, microvesicles burst open, spilling out complex molecular keys to unlock the way through skin and membranes. Glycoprotein chains twisted about each other, tightening, contracting, steering the leaf hairs through microchannels in bone and brain.

Hair after hair slipped into place. A fleeting connection formed, wavered and then rapidly strengthened.

Steady...steady...

A soothing white light filled Gerselle's mind instead of the expected barrage of scents and sounds. Emotional currents churned the light into nebulous tendrils, like morning mist in the forest. A fleeting fear, reassurance, then a growing confidence. And suffusing them all..."

Love.

Unconditional love.

Tears flowed un-noticed over her cheeks and dripped onto the sheets. *Oh, Jonton... it's still you. Kerm or kerbal, it's still you..* For a moment she wondered what Jonton was feeling and then, joyfully, she realised that she *knew*. And she knew that he knew that she knew.

The bond intensified.

The mists brightened, swirling away into darkness. Briefly, they flowed along *edges* and Gerselle felt the pain of barely healed mental scars -and then, faintly, the poignant ache of scars long gone and buried. The darkness rippled around her, swiftly replaced by a grainy, washed out grey. A picture formed, faded by age, of a tree and a group of strangely coarse looking kerbals.

Chapter 38

Stormclouds

The vivid images of Barkton faded back to soft white light, and then to the familiar green canopy of the sleep room ceiling. The leaf hairs retreated, leaving faint biochemical trails behind them. Repair cells crawled blindly towards the trails, spinning out a scaffold of protein filaments as they went. Cells in nearby tissues began to spring back into place, migrating towards the growing scaffold, plugging the breach.

Gerselle sat up, scratching her head. *Big Kerm or little Kerm - they both itch just the same.* She walked over to Jonton's water bowl, poured herself a mug of water and emptied it in one long swallow. Refilling the mug, she sat down on their bed and gazed wonderingly at her husband.

That was...incredible. Although if it wasn't for the Communion...

Jonton smiled. "Just telling you wouldn't have been the same would it?"

She wasn't sure if Jonton had seen the question in her eyes, or whether he was listening to some last lingering echo of their mental bond.

"I'm not sure I would have believed you," she answered. "Some parts maybe, but memories of the Stone Age?" She shook her head. "But I could *feel* it's truth." She sipped her water and then turned to Jonton, a sober expression on her face.

"How long have we got, Jonton?"

"I don't know," said Jonton. "I can remember the order and flow of events very clearly, but the *time* between them is hard to judge." He held his hands up helplessly. "I'm trying to pin it down, love. Years I think, decades I hope, but beyond that..."

Gerselle pinched the bridge of her nose. "The last Kerm crisis was the driving force behind the Age of Sail," she noted, "but we don't have anywhere else to run to this time." She snorted, "Not on Kerbin anyway, but we're not leaving anytime soon."

"Probably not," Jonton agreed, "It would surely be something though - kerbals truly taking the Kerm to new lands." For a moment he looked wistful. "An Age of Fire to match the Age of Sail." Then, he shook his head. "No - I think you're right, love. If there is a way out of this, it needs to be on Kerbin."

Gerselle nodded. "It does. We're going to need a plan - and that's going to be up to you, Jonton Kermol."

The fishing boat rode at anchor, rocking gently on the evening tide. The placid water rippled like a sheet of oiled silk, mirroring the setting sun in a glowing orange streak that stretched away to the horizon.

Inland, the mountains of Humilisia were silhouetted against the flaming sky. Dusk lent a false perspective to the landscape, hiding the rocky beach and the scrubland behind it, and masking the woodlands in the shadows. Instead, the jagged peaks seemed to enfold the cove on all three sides.

On deck, willing hands unrolled nets, rigged block and tackle, and readied the winches. Below decks, their shipmates heaved barrels and other, much larger containers up from the hold. Some of them were painted a bright phosphorescent green and knocked hollowly against bulkheads and gangways alike. Once on deck, the containers were carefully laid out on the nets, before being strung together into a loose raft. Finally, a gang of sweating kerbals deposited the spare anchor onto the net and made the end of its chain fast.

The first mate inspected the couplings. Satisfied, he called out an order. The winches whined, pulling cables taut over pulleys, gathering the net into a mighty sling and swinging it out over the rail. Another terse order and the sling descended rapidly towards the water, slowed as it broke the surface and then stopped.

The winch operator released a cable. The sling sagged, spilling its contents into the sea in a great splashing rumble. The anchor sank without trace, swiftly dragging the containers beneath the surface. The mate peered over the side, nodded and held up one finger. The winch thrummed, pulling the dripping net back on deck.

All that could be seen of the raft were the green barrels, soaking up the rays from the setting sun, and bobbing gently on the evening tide.

Lodan gazed around the grassy hollow. The control tower was still visible over the hedge, but that was the only sign of the busy airfield nearby. Birds chirped and whistled in the stillness and thin streaks of cloud were the only thing to mar the perfect blue sky.

At the bottom of the dip stood a row of tall wooden poles. Some of them were wrapped in a dense profusion of neatly trimmed sweetblossom vines. On others, the vines had only started to take hold and the underlying trellises could be seen, winding their way upwards.

The one nearest to him was bare - dark brown latticework standing stark against the stripped white pole. A loose semicircle of benches had been arranged around it.

Here and there, small knots of soberly dressed kerbals stood talking amongst themselves, their murmured words barely audible even in the hush. Others sat on the benches, staring at the ground, lost in their thoughts. Lodan sat down on an empty bench, well away from everyone else. A few of the bystanders looked at him curiously, but mercifully, none of them showed any signs of recognising the KSA director.

One by one, a steady trickle of other kerbals made their way down into the hollow and took their places on the benches. Lodan looked up at a sudden clinking noise, and saw two of them carrying a small casket, followed by a third dressed in formal robes and carrying a pair of spades, crossed in front of her chest. Lodan sat up straight, eyes fixed on the small procession as they made their way to the pole. Silently, the last few groups dispersed and took their seats.

The robed officiant cleared her throat.

"Good kerbals. We are gathered here today to celebrate the life and mourn the passing of Enley Kerman. He was kerbal, and as he came forth from his Grove, so in the presence of us all, shall he return to his Grove."

The officiant knelt and presented the spades to the two casket bearers. Solemnly, they began to dig out a small trench at the foot of the trellised pole. Slowly, the officiant got to her feet. She withdrew a carved wooden figurine from inside her robes and held it up to the crowd.

"Like us all, Enley was a child of the Kerm. And though his body was not returned to us, this poor marker shall stand in its stead. For it too is of the Kerm, and also of Enley's Grove."

The two casket bearers put down their spades. The officiant stepped forward, knelt, and gently placed the figurine into the trench. The two bearers opened the casket lid and tipped out its contents. A cascade of rich, red soil tumbled out, a splash of colour against the darker earth of the hollow. All three kerbals stepped back and bowed.

Everyone on the benches, Lodan included, lowered their eyes. The rhythmic thudding of spade against earth punctuated the silence.

"Thank you."

"Enley meant many things to each of us. He was a dear colleague, an inspirational instructor, a beloved friend. If anyone here today wishes to speak, to share their memories of him, we would be honoured to hear your words."

A tall, sandy haired kerbal stepped forward. The officiant smiled at him, and handed him a round, waxy seed. Silently, the kerbal planted the seed beneath the trellised pole, then turned to face everyone.

"Good kerbals. My name is Lars, and I am Enley's brother."

"Ever since he was a kerblet, Enley was fascinated by making things fly. Paper darts, kites, model airplanes, anything he could get his hands on. His sleep room always used to smell of glue, wood shavings and something else that I could never identify. I just remember that it tickled my throat and made me cough."

"We all knew that Enley would go kerman, and we were enormously proud - and not at all surprised - when he won his place at the Institute and went on to earn his first pilot's license. I still remember that day - and the first time he took me flying..."

Lodan watched as family members, fellow pilots and the occasional manager or other colleague from C7, all stepped up to plant a sweetblossom seed and share their recollections of Enley. There was a final minute of silence, and then, one by one, everyone filed out of the graveyard, leaving him alone on the bench.

He jumped at the tap on his shoulder.

"Director?"

Lodan peered up at a stern faced, grey haired kerbal.

"Al Kerman, head of C7 Special Projects division."

Lodan stood up and offered his hand. The two kerbals studied each other for a moment. Involuntarily, Lodan's eyes dropped to the lapel pin on Al's jacket. Al followed his gaze.

"Aye, Director," he said, "I'm too slow for modern aircraft but I tested my share back in the day. Walk with me, sir?"

More of an order than a request thought Lodan. "Of course," he said aloud. "Please - lead on."

Silently, they climbed the shallow rise leading out of the graveyard. Lodan glanced at Al's set expression and felt uncharacteristically nervous. *Better say something Lodan. This happened on your orders.*

"We lost a good kerbal today," he offered quietly.

Al didn't look at him. "You didn't lose anyone," he said, "but C7 lost a damn fine pilot."

"How did Enley die?" asked Lodan, "If you don't mind talking about it?"

"Loss of command authority during RCS transition, engine flameout, flat spin, airframe compromised under aerodynamic load," said Al flatly. "Neither pilot nor aircraft recovered."

"I'm sorry," said Lodan. He grimaced in disgust. *Thought you were better with words than this, Lodan.* "Truly sorry," he said at last.

Al's expression was blank. "We know the risks," he said, "Days like today are the worst, but you can never fool yourself they're not going to happen." He glanced sideways at Lodan. "And you can spare me the canned speeches, Director. Enley knew exactly what he was getting into - as far as he was concerned, the risks were worth it too. He competed *hard* for

that assignment, and believe me, the C7 test pilots ain't easy competitors. *Especially* the Skyhawk pilots."

The two kerbals crested the rise and set out across the airfield towards the main hanger.

"Enley had ambitions far beyond the Skyhawk programme," Al continued. Sub-orbital is one thing, but everyone here knows that being the first kerbal to fly into *orbit* is the real prize."

Lodan blinked. "But kerbals have already flown into orbit," he said.

"No," said Al, "They haven't." He held up a hand. "Not disparaging the kerbonauts, Director. They do good work once they're up there, and there ain't a one of them that wouldn't be welcome on this airfield. But being fired into space on top of a stack of fuel tanks is not flying."

"I presume," said Lodan carefully, "that piloting the Steadler Lifting Body wouldn't be flying either?"

Al snorted, "Not even if they get it to work," he said. "That...vehicle, is a long string of accidents waiting to happen, and it still needs a rocket to get it off the ground. No, Director. Runway to orbit and back - *that* is the only proper way to fly into space."

"A tall order," said Lodan.

"It is," agreed Al, "but possible." He unclipped his name card from his jacket and pushed it into a slot in the hanger door. Lodan heard the distinctive clunk of heavy locking bolts withdrawing and the door swung open a centimetre. Al led the way inside, pulling it closed behind him, with an equally solid clunk. A pair of red lights on the door frame winked out.

Inside was a bare, concrete block corridor, harshly lit by fluorescent strip lights. The far end was blocked by another security door, which opened to Al's name card.

To Lodan's surprise, the door led out into an enclosed yard, which was largely occupied by an extremely heavy looking test stand. An jet engine was mounted on it, its nozzle shrouded by a long, tapered steel drum. Heavily insulated pipes connected the drum to a nearby cryogenic stand. An equally heavy duty fuel lines emerged from a concrete wall near the stand and connected to an opening in the engine casing.

Al was watching him. "So what do you think, Director?"

"I'm not entirely sure," said Lodan slowly. "It looks like a jet engine - which I suppose makes sense - but why are you injecting cryogens into the exhaust?"

"We're not," said Al. "The jet is just a convenient way of producing a lot of very fast, very hot gas. The cryogens are for cooling the heat exchanger. Tell me, Director - have you heard of the Wernher cycle?"

Lodan shook his head. "I recognise the name of course," he said, "but I suspect I'm thinking of a different kerbal."

For the first time that afternoon, Al allowed himself a faint smile. "Actually, I don't think you are," he said. "Before he turned his attention to rockets, your Wernher was an Institute expert in high altitude, hypersonic propulsion. The Wernher cycle was his proposed design for an extremely high performance, dual mode hydrogen engine. At low to medium altitudes it was a normal air breather, but at high altitudes it would switch to an onboard liquid oxygen supply. Wernher designed it for extreme range, extreme altitude flight - effectively the same sub-orbital regime that we're pursuing with *Skyhawk* - but theoretically it was capable of orbital velocities."

"Theoretically?" said Lodan.

Al nodded. "It was an elegant design, but the practicalities of building it...were substantial. The main problem was that to make the engine light - and efficient - enough, the intake air had to be cooled. And nobody could ever figure out a way of doing *that* without making the engine unworkably complex or impracticably heavy. So the Wernher Engine joined the long and dusty list of Institute designs that only worked on paper."

Lodan knew a prompt when he heard one. "Until now I presume," he said dryly.

"Until now," agreed Al. "We've got a long way to go, but the hard part - the intake cooler - works! We can fire that jet engine directly into our heat exchanger - and what we get out is cold enough to freeze your hand solid." He motioned Lodan over to an inspection hatch in the side of the drum. Lodan peered in, and could just make out an elaborately shaped block of fine tubing.

"Ice build up was a huge problem," said Al. "We need the tubes narrow to give us enough surface area, but it doesn't take much to block something that size. Figuring out how keep them clear was the key breakthrough." He kept his face carefully neutral. "A confidential breakthrough."

Lodan shrugged. "Naturally," he said. "But you'll pardon me for not getting too excited about your supposed solution to a problem that has so far eluded the Institute's finest."

Al's face darkened briefly, but his voice remained even. "You're very welcome to view our test footage, Director. It should be convincing enough."

The streamlined metal forms looked sleek, deadly and, to Neilbin's eyes, deeply and profoundly ugly. The heavily modified vessel in the dry dock was only marginally less ugly; a fishing boat with pretensions to being a warship. The newly armoured hull squatted sullenly on its supporting blocks, whilst kerbal work crews swarmed over it, loading supplies, painting the outboard weapon tubes and working on the newly installed fore and aft mounted deck guns.

Neilbin shook his head. *Doesn't matter how much sauce you add - you'll never turn herring into bluefish. But it's not like we have much of a choice.*

Beside him, Gusden sighed. "We've refitted the engines too," he said, "but she's never going to be the fastest thing afloat." He gestured at the shells on their rack. "I just hope those will swing it, if it does come to a fight."

"The fingrillin," murmured Neilbin, "A fitting name."

"The Fingrillin Mk2 torpedo," corrected Gusden. "Modern take on a very old design. And just like the fish they're named after, they can swim off and defend their slow, lumbering old mother." He shook his head. "Short of building something new from scratch, it's the best we can do."

Neilbin grimaced. "Coastal cutters and re-jigged fishing boats," he said. "It's not much of a defence if Doren decides it does want Humilisia."

"It'll have to do," said Gusden grimly. "We do have one advantage, Envoy - we got there first. There aren't too many places to land on those blasted islands, and a fingrillin or two should handle any landing craft nicely."

"Let's hope it doesn't come to that," said Neilbin sadly.

"Agreed," said Gusden, "We're stepping up the supply runs though, just in case. Luckily for us, the albacore are shoaling at the moment, so the Doreni shouldn't notice a couple of extra fishing boats around Humilisia. Using that cove as a harbour shouldn't raise any eyebrows either, although the skippers still keep both eyes on the horizon when dropping off the goods."

Neilbin shuddered. "And then the colonists retrieve them after dark."

"That they do," said Gusden heavily, "Cold, wet, hard work, but there's no other way I can think of doing it without getting the Doreni all curious." He grinned savagely. "If it's any comfort, I've issued a standing order to hang a couple of barrels of something suitably warming on the supply rafts."

Kilometre after kilometre of fields rolled steadily past, and Gusemy began to wonder just how large the Berelgan really was. Most of the fields were carefully laid out grids, tiled with hundreds of variations of a single crop. As far as Gusemy could see, there were fields devoted to every food plant he knew - and a good few that he had never seen in his life.

Some of the tiles were obviously different to their neighbours, even seen from a speeding car. Others were apparently identical, although Gusemy presumed that the differences would be more obvious from up close.

Hmph - or maybe not, he thought. Hard to tell what a tuber looks like unless you go digging. Even harder to tell what it tastes like.

Interspersed between the grids were other, more normal looking fields. Others had seemingly been left to fallow, if the proliferation of weeds and wildflowers were anything to go by. Still others had obviously been deliberately planted, but not with any sort of rhyme or

reason that Gusemy could see. Small copses of trees and the occasional low roofed building broke the monotony, and hedgerows large and small festooned the landscape, marking out roads and separating one field from the next.

Not many Kerm though for somewhere this size.

The glint of sun on glass caught his eye. *About time! Hmmm, next right, then first left.*

The turning to the left was marked by a large brick archway, turreted and crenelated, although Gusemy suspected that they were intended for decoration rather than defence. The old fashioned wrought iron gates were open and the gatehouse was empty. Gusemy drove through unchallenged.

The road twisted and turned through a patch of woodland, before emerging into open pasture. Long horned creva stared placidly at him as he passed by, the soft purr of his car not loud enough to startle them. Ahead of him was a cluster of grand old buildings, built in the same style as the gate and surrounded by elaborate formal gardens and incongruously modern glasshouses.

Huh - no Kerm at all here.

A drystone marker post pointed the way to the car park. Gusemy shrugged inwardly, pulled up in the nearest space and got out of the car. His nose wrinkled at the earthy smell of creva dung, and other less identifiable rural smells. *I guess you get used to it in time.* Checking his map, he locked the car door and set off towards the largest of the brick buildings.

Erlin was waiting for him on the steps. "Ambassador Gusemy - welcome to the Berelgan."

Gusemy grinned. "Don't you Ambassador me, Erlin - or should I say Professor Erlin! Congratulations on the new post." He flicked his fingers at the glasshouses and surrounding gardens. "Quite a place you've wound up in. I had no idea it was so *big*."

Erlin chuckled. "Most of it is agricultural research, crop development, that sort of thing. Different world entirely. Us poor lab scientists are mostly confined to the house and gardens."

"I feel for your suffering," laughed Gusemy, "But what's a botanist doing stuck up here? I thought agricultural research was your department?"

"Oh it is," said Erlin, "but there's a limit to what you can do in the field. Most of my work is in Kerm micro-ecology these days, trying to unpick exactly how they direct and control their soil environment." He grinned. "I'm more a chemist than a botanist these days - and you remember how good I was at chemistry."

Gusemy stared around in mock horror. "I'm surprised to see everything still in one piece," he said.

Erlin laughed good-naturedly. "Can't do too much damage with LC preps or a gas chromatograph," he said. "Making coffee is about the closest I get to wet chemistry."

Speaking of which, you look like a kerbal in need of coffee, especially after that drive. Come on in."

As he followed Erlin through the maze of corridors, Gusemy reflected that the old fashioned manor house buildings were concealing very modern - and extremely well equipped - laboratories. *For all Erlin's talk of chemistry, I'm not seeing many glassware-and-bottle labs either.*

"I was wondering about that on the way up," he said, "The Kerm I mean. There didn't seem to be very many around for a place this size?"

Erlin looked at him. "There aren't," he said. "This *is* the Berelgan after all." He raised his eyebrows at Gusemy's puzzled look. "The original Institute was intended as a place to study botany away from the Kerm. Started in the Age of Sail, I believe, although there's nothing left from that era. Fortunately - from a scientific point of view - it's remained largely Kerm free ever since, making it one of the few places on Kerbin where we can study them properly."

Gusemy's expression cleared. "I suppose that makes sense," he said, "Negative controls and all that."

Erlin pushed open his office door. "Precisely," he said. "Now - on to more important matters. Black or white?"

Erlin put down his empty cup with a happy sigh. "That's better," he said, "Nothing like a little caffeine to get the brain moving." He eyed Gusemy thoughtfully. "And that little conundrum you sent me, took a whole lot of coffee to work through."

Gusemy sat bolt upright. "You found an answer?!" he exclaimed.

"Of sorts," said Erlin, "The last Seeding was several hundred years ago after all, and even the Berelgan archives get rather patchy when you go that far back. But, as far as I can work out - thirty to forty years."

Gusemy's mouth dropped open. "From beginning to end?" he asked faintly.

Erlin nodded. "I'd expect a normal distribution," he said. "Slow ramp up, exponential growth, hitting a peak about 20 years in, then tailing off. Probably some outliers still seeding after forty years but not many." He studied Gusemy's suddenly bloodless face curiously, and then comprehension dawned.

"You've found one haven't you?"

Gusemy couldn't speak for a moment. "More than one," he muttered hoarsely. "That is, definitely one, and - we think - proof of more." His voice shook. "Have you been following news of the Blight?"

"We have," said Erlin, "and *that* is a whole other conundrum. Frankly, we've no idea what's behind it."

"Other Kerm," said Gusemy harshly. "We had one of our accident investigation teams sent out to the first Blighted village. They found fragments of seed casing and a new Kerm sapling, smack in the middle of the worst of the Blight. The village Kerm was still alive - after a fashion. According to the team Keeper, it's mind was smashed - utterly insane."

Erlin stared at him in horror. "Oh hells," he said, "That would explain all the dire warnings. The archives are *very* definite about keeping Kerm apart, but I couldn't find out why. And if we're seeing this much Blight this early..."

Two terrified pairs of eyes met over the table.

"Oh *hells*."

The image froze. Lodan re-wound the tape and hit the play button. Once again, the screen displayed a view of fog streaming through a maze of tubing. Lodan watched the lower left corner of the screen intently. *No glitch. I'll get somebody to take a proper look at it before we go any further, but it looks genuine to me.* He paused the tape again and turned to face Al.

"Consider me convinced," he said. "What happens now?"

"Prototype engine construction and testing," said Al. "Then I prepare a dossier for the C7 Board, setting out the case for *Skyhawk* airframe integration and sub-orbital flight testing. After that we wait and see if the Board see fit to authorise the project."

"And if they do?" said Lodan.

"If the sub-orbital testing works, I prepare a second dossier, making the case for orbital airframe prototyping."

Lodan retrieved a card from his pocket. "Give me a call if the time comes to prepare that first dossier," he said. "The Kerbin Space Agency would be extremely interested in the practical applications of an air-breathing rocket engine."

Chapter 39

Second Mün

Starlight shone through the glass, impinging on a delicate grid of photodiodes, and triggering minute bursts of current deep within the underlying circuitry. Amplification and processing swiftly followed. Patterns were identified, compared with stored data, encoded on a burst of radio waves and transmitted back to the waiting antenna. The journey took seconds, the response much longer.

Then it arrived. An answering burst of radio waves, subtly different to the first, encoding commands instead of data. Relays tripped, valves opened, fire burst forth. The starlight shifted minutely over the sensor grid, and this time the data matched the expected values. A second, far simpler message blasted out and the reply was far swifter. The main engine fired, altering the probe velocity by a tiny fraction. Searing gases froze almost instantly in the unforgiving vacuum, leaving nothing but an invisibly faint crystalline trail, drifting away along a divergent vector.

"Midcourse correction confirmed!" Bobrie called out. "Estimated time to Minmus encounter, 4 days, 18 hours."

"Propulsion telemetry looking good," added Ferlan. "Valves, line heaters and helium pressure are all Go."

Of all the KIS's spaceflight firsts, Germore reflected, defining the *language* of spaceflight had to be their most pervasive. Listen to coverage of any launch, watch any spaceflight documentary, and the argot of Mission Control was exactly the same. Understood, Standing By, Go for this, No-Go for the other. *Then again*, she thought, *it works. Fast, precise, no wasted words. Of course any newcomer to spaceflight also feels that they need to speak the jargon to be taken seriously.* Ruefully, she glanced around the modestly sized Deep Space Operations Centre. *That would be us then.*

"Understood," she replied, "PV array status?"

She watched Ferlan work his console. *We certainly picked a grandiose name for our little room. But then again - why on Kerbin not. Minmus Explorer is already far beyond the reach of the crewed programmes - and Minmus is just the start.* She shivered. *Plus we have the first genuine mission in spaceflight history. We're not just in this for curiosity and wanderlust - what we're doing may - literally - save the world.* She sat up straight, thumping her chair off the wall behind her. *Besides it's impossible to be grandiose in this broom cupboard!*

Originally set up as Communications Room Number 4, and hastily enlarged by knocking through a wall into the adjacent room, the Deep Space Operations Centre had a distinctly cobbled together feel. Raw steel girders held up what was left of the dividing wall and nobody had yet had the time to plaster over the brickwork, let alone paint it. The floor around the flight consoles was badly scuffed and the whiff of cleaning fluids in the air mingled harshly with the metallic tang of hot electronics and ionised dust. Bundles of cables trailed everywhere, neatly corralled under black rubber floor protectors.

"PVs are Go," reported Ferlan. "Main bus looking good, reserve bus online. Not a twitch in the voltage, even under thrust."

The room was dominated by a large wall mounted screen, which flickered briefly before displaying a, by now familiar, view of a star field with one small, blue dot in the middle. Bobrie glanced at the screen worriedly.

"We're getting blurring again. I thought we were using the new camera setup this time?"

"We are," said Ferlan. "Look at the background, Bob - the stars are all fine, it's just Minmus that's a bit fuzzy."

Bobrie waved dismissively, "Point sources," she said, "There's nothing there to blur." She looked over at Germore. "We should re-orient to Kerbin, or the Mün and get a comparison shot."

Germore shook her head. "I want to keep manoeuvres to a minimum," she said. "Better to keep everything pointed at Minmus and get *something* to show for this, than get a couple of long distance shots of the Mün - and nothing else." She paused, "Besides, there's no need."

"Oh come on," said Ferlan, "You're not still holding to the cometary theory?"

"I still think it fits the data better than the mineral theory," Germore replied. "Inclined orbit, apoapsis barely inside the Lemney Sphere..."

"Yeah but that doesn't explain the *colour*," said Ferlan impatiently. "And Melvey's latest analysis of Kerbin-Mün perturbations found any number of solutions for the inclined orbit."

Germore shrugged. "We'll find out in four days," she said. "Anyway, decision made - we're not re-orienting."

Ferlan gave her a mutinous look and pointedly turned back to his console.

The aircraft nose dipped, slowing its meteoric rate of ascent. The pilot checked his instruments, one finger sliding over the throttle levers towards a small toggle switch, seemingly oblivious to the screaming kerbal sitting behind him. Lodan pounded on the pilot's seat, on his flight helmet, on the cockpit canopy next to him, desperately trying to get his attention.

It didn't help. It never did.

The toggle switch flicked over in slow motion. The pilot frowned as the aircraft wings twitched, and nudged the control stick to compensate. Lodan watched the puffs of gas lazily expand from the wing mounted rocket control nozzles, and drift away on the slipstream. The aircraft began to roll, its nose creeping upward centimetre by centimetre.

Time reasserted itself.

Instantly the pilot snapped the toggle switch back, wrestling with the controls as he tried to return the aircraft to level flight. The nose pitched sharply up, far past its rated angle of attack at this altitude, disrupting the precariously stable airflow over the wings. The starboard wing abruptly stalled, slamming the aircraft into a spin. Lodan's head smashed against the cockpit canopy, warning lights lighting up around him. Calmly, the pilot pulled the throttles back to shutdown, snuffing out the twin rocket engines that had been hurling them skyward. Fighting against the mounting G forces, he pulled a lever, dumping the remaining propellant overboard, trying to shift the nose down.

The plane plummeted towards the ground, still spinning furiously. The airframe shrieked and groaned, juddering violently in the thicker air. The pilot lowered the undercarriage in a last ditch effort to regain control, but by now, every warning light in the cockpit was glowing a solid red. He braced his head and neck against the back of his seat, tucked his legs in and pulled the ejection handle. Pyrotechnic bolts fired, and promptly jammed, wrenching the cockpit canopy free but failing to detach it. A fraction of a second later, tiny rocket engines exploded under their seats, slamming the pilot and Lodan through the flapping mass of aluminium and polycarbonate.

The cockpit alarms shrilled in Lodan's ears. The last thing he saw before everything turned black was Enley's screaming face, lacerated and streaming blood as he tumbled away towards the waiting clouds.

Lodan jerked awake, his alarm clock warbling in his ears. Automatically he reached out to switch it off, only to bark his knuckles against the wall. The sudden explosion of pain woke him all the way up, sweaty, dishevelled and twisted around in his bed covers. He squeezed his eyes closed for a minute, trying to block out the nightmare then, resignedly, set to work disentangling himself.

Four in the morning. Not that I was going to get much more sleep anyway. And at least it wasn't the one about the Kerm.

The small, sparsely furnished apartment did at least come with its own moss room. The freezing cold water was a welcome tonic, sluicing away the dried sweat on his skin and chilling the fading fire of the nightmare down to its familiar dull ache. By the time, Lodan emerged, his black mood had lifted to the merely bleak. A scalding cup of KSA tar masquerading as coffee, and a warmed over bowl of crispy noodles later, he began to feel marginally kerbal again. *As Jebediah would say - the recommended breakfast of rocket scientists everywhere.* He grabbed a redfruit from the bowl and set out into the dark.

Dark purple streamers of cloud huddled around the mountain tops, glowing faintly in the first light of dawn. Across the grounds, much brighter light spilled out from a row of ground floor windows in the main communications wing, and away to the right, the familiar bulk of Tracking Station Two was lit up against the sky. Lodan checked his watch. *Nearly time for a shift change. Hope the Eve 2 crew managed to get more sleep than me.*

The soothing smells of wild sage and mountain parsley filled his nostrils, as he strode towards the main wing. He tossed his redfruit core into the bin by the door, wiping his fingers on his handkerchief as he went. Before he could grasp the handle, a bleary eyed kerbal stumbled through, holding it open for a second, equally tired looking kerbal pushing a large urn of coffee on a trolley.

"Morning, Director," he yawned.

"Good morning," said Lodan quietly. "A busy night I take it?"

Adney rubbed his eyes. "Just a long one," he said, "Nothing to report really - barely a glitch or a gurgle from the spacecraft systems, and the crew were asleep for most of the night. Just gotta take this for the next shift, and then I'll be catching a couple of hours myself."

"Good to hear that it's been so uneventful," said Lodan, "I won't hold you up any longer."

Adney nodded gratefully. "Appreciate that," he said, "Thank you, Director."

Lodan strode down the corridor, following the distant babble of voices. He turned the corner and then stopped dead at the Deep Space Operations Centre window. To his astonishment the room was crammed to bursting with kerbals: Probodyne staff, off-duty controllers from the *Eve 2* flight, KSA workers, and a number of others that he didn't even recognise. Dunney's voice boomed cheerfully over the crowd as Lodan pushed open the door.

"Impeccable timing as usual, Director! We're just setting up for what-do-you-call-it... ahh yes - Minmus orbit insertion!" He gestured expansively, narrowly missing Germore's head. "Or so the experts here tell me!"

Lodan glanced at the main screen which was showing an image of deep space. The familiar constellations glowed steadily in the distance but otherwise, there was nothing to distinguish it from any other patch of sky. *Can't tell anything from that. Not pointing at the Mün though, which is a good sign.* Behind Lunney, Bobrie and Ferlan tapped away at their consoles, consulting with each other in murmured undertones. Finally Bobrie looked up at the screen, finger poised over a button on her keyboard. Lodan glanced over at them and

saw Ferlan's fingers firmly crossed behind his back. He could almost hear the soft click as the button depressed and rebounded.

A light blinked on on Bobrie's console and data began to scroll past on a small screen. She studied the flickering lines of code intently, although they were far too fast for Lodan to follow. The significance of the second, green light though, was clear to everybody in the room. Bobrie smiled tightly as she swivelled to face Germore.

"MOI program confirmed and loaded. Ignition at T minus nine minutes," she checked her console, "twenty-two seconds."

The probe glided silently through space. Two long photovoltaic panels and an unfurled dish antenna protruded from an ungainly collection of propellant tanks, thrusters and instrument boxes. The antenna pointed unerringly at the small blue-green disc of Kerbin, a jewelled ornament floating silently in the void, basking in the life-giving electromagnetic fields from distant Kerbol.

Waiting.

Now, electromagnetic fields of a different timbre reached into space. Incomparably fainter than the torrent of energy blazing from the nearby star, the ripple of radio waves raced out past the moons of Kerbin, stuttering out their coded message to anything or anyone that could understand it. The antenna swivelled on its boom; tracking, seeking, locking on. Swiftly, the message was decoded and acknowledged, triggering new instructions for the probe systems.

Thrusters twitched into life, making final, tiny attitude corrections. Then a pause, a near eternity on the scale of the flickering digital pulses that controlled the probe, but longer still for its kerbal builders. Then, a flurry of activity. Once again, valves opened, grudgingly releasing a precisely metered trickle of liquid onto a catalytic mesh. Once again, fire exploded from the engine, no mere course correction this, but a long, steady braking burn.

The stuttering radio pulses fell silent, hidden in the shadows of the second moon. The moon's feeble gravity tugged on the speeding visitor, slowing it, pulling it round onto a new trajectory.

The probe raced onwards, skimming mere hundreds of kilometres above the surface before soaring back out into space. It emerged from the shadow, antenna swivelling, broadcasting a short string of numbers on a continuous loop.

Bobrie punched the air in triumph. "We got it! One-nine-five by five-two-eight by fifteen dot three!"

"Splendid work!" Dunney boomed over the cheering crowd, "Quite, quite splendid!"

Germore sagged into her chair. "Let's see *what* we've got," she said. "Re-orient the probe, Bobrie. Ferlan, instrument check please." Both controllers nodded and bent over their consoles. Bobrie was the first to speak.

"Program loaded. Starting pitch and yaw manoeuvre."

"All systems are Go," Ferlan added. There was a long pause and then it was his turn to punch the air. "Picking up image data! Ten minutes to go, folks!"

Lodan quietly opened the door, the sudden cooling draft earning him grateful looks from everyone around him. A ripple of activity flowed through the room, as the waiting kerbals stretched stiff limbs, bent over to relieve tired backs and grimaced at the taste of coffee long since gone cold. Then the main screen flickered, instantly drawing everyone's attention. Static rippled over the blocky image, which steadied, and then sharpened rapidly as it decompressed. Dozens of puzzled faces stared at it.

"Are you guys using the colour filters?" asked Sidbo.

Germore nodded, just as another voice spoke up from the far wall.

"I thought Minmus was blue?"

Lodan stared. *I thought it was too - apparently not.*

Seen from orbit, most of Minmus was a coal black shadow blocking out the stars. Only the nebulous haze surrounding it and the blotches and whorls of lighter material spattered over the surface, provided any sort of guidance to its true shape or size. Lodan made his way over to the Probodyne team gathering around Ferlan's console.

Ferlan looked at Germore apologetically. "Sorry, boss. Looks like you were right after all."

"So we've knocked the mineral theory on the head, once and for all?" said Dunney.

Germore's nod was matter of fact. "We should wait for the spectrometry results first, but I believe so."

Sidbo sighed. "My poor old mum will be disappointed," he said sadly. "The Mün wasn't a giant *djan* after all, and now we find out that Minmus isn't made of blueberry ice-cream either." He grunted as Jernie elbowed him sharply in the ribs.

"I dare say we'll also discover that Duna isn't actually a large frosted redfruit," said Lodan dryly. "Perhaps one of you good kerbals could enlighten me about the mineral theory?"

Dunney shot a quelling look at both of his colleagues. "Certainly, Director," he said. "It *was* a leading theory to explain Minmus's blue colour by assuming that its surface was composed of certain characteristic minerals." He waved at the screen. "Clearly that's no longer supportable."

Lodan shook his head. "It certainly doesn't look like it. I presume there were rival theories?"

"Indeed," replied Dunney. "The cometary theory proposed that Minmus was just that - a comet. A number of variations were proposed, but a consensus developed that it was

probably a temporary Joolian satellite which got too close to either Laythe or Tylo - maybe both - and was kicked in-system. That explains Minmus's orbit rather well actually, but it *doesn't* easily explain its colour."

He scratched his head. "I'm still at a loss there myself to be perfectly honest."

Ferlan grinned. "I'm not," he said. "Diffuse dipole scattering would do it - right Germore?"

Dunney frowned, "But you only get that with..." He looked closely at the probe image and his eyes widened. "Well, I'll be..." His sudden guffaws startled everybody else in the room.

"Oh that's priceless! Likely too sparse to be useful for anything of course, but the *Astronomical Proceedings* editors are going to have a fit when they get this one!"

He wiped his eyes and slapped Ferlan and Germore on the back exuberantly. "What do you two say to: "The Minmusian atmosphere: composition and dynamics," as a working title for our paper?"

Chapter 40

Training Days

James lifted his bag off the rack with a grunt and stepped to one side to let in the next kerbal in the queue. The arrival hall echoed with shrieking kerblets, free to run around at last after too many hours cooped up in an airplane. Their parents stood resignedly in line, keeping half an eye on their hurtling offspring, and listening to the steady thump, thump, thump of luggage dropping onto the collection racks. A slowly moving stream of passengers marked the way to the exit, shuffling one by one past a row of placard carrying kerbals and out through the revolving door.

Sherfel had managed to commandeer one of the few remaining trolleys. James dropped his bag onto it and looked around. "They did say they'd send someone to meet us didn't they?" he asked. Sherfel nodded. "By the door I thought," she said. "Hopefully somebody we'll recognise."

James squinted at the row of placards. "Not so you'd notice," he said. "Lets go anyway - this place is giving me a headache."

"James? Sherfel?"

A cheerful looking kerbal waved at them from amidst the placards. James watched him take something from one of the throng of kerbals surrounding him, quickly scribble something on it, and hand it back with a smile. The rest of the crowd looked around, trying to see who was attracting his attention. By the time he and Sherfel made their way to the door, a disconcerting number of kerbals were waving pieces of card, notebooks, and what appeared to be three ring binders, at them.

"Steady on, folks! Give them room to breathe!"

The kerbal thrust out a hand. "Pleased to meet ya both. I'm Ornie."

James shook it. "Ornie...Eve 2, yes?"

Ornie grinned. "Yep. No need to introduce you two. Reckon everyone here knows about..."

"Endurance!" A burly, heavysset kerbal pushed his way through the crowd, clutching a binder. Suddenly tongue-tied, he riffled through its pages before shyly offering it to James. The bemused kerbonaut, was astonished to see a picture of himself and Sherfel floating inside *Endurance's* habitation module. An elaborate, and as far as he could see, surprisingly accurate, cutaway diagram of the module took up most of the opposite page. He blinked as Ornie handed him a pen.

"Hope you don't mind signing an autograph or two?"

"Uh, no. Not at all," said James, "Er - what's your name?"

"Eldrin," came the mumbled reply.

James thought for a moment, then wrote a short message under his picture. He signed it neatly and passed it over to Sherfel.

Eldrin stared at his feet. "That spacewalk - Kerm, that was... I mean, climbing out and just fixing the PV panels, *in space*." He looked up at Sherfel hopefully. "I don't suppose...pictures? Even just one or two?"

Sherfel shook her head. "Afraid not," she said gently. "Not on that EVA - we didn't really have time to unstow the camera." She signed the picture and handed it back. "I'll get our PR department to send over a couple of our flight packs though - they've got some pretty good photos in."

"Oh I already ordered one of those," said Eldrin. "Jus' thought...never mind - sorry to trouble you."

"No trouble," said Sherfel easily. "Good to meet you, Eldrin."

Eldrin nodded sadly, and stepped back into the crowd.

As quickly as James and Sherfel could sign one of the multitude of pictures, albums and other items of space memorabilia being thrust at them, another one took its place. Ornie saw Sherfel's jaw clench around a stifled yawn and clapped his hands for attention.

"OK, OK folks. We need to be gettin' back to the Space Centre, so I'll tell yeh what we're gonna do here. Everyone who's already had somethin' signed, take a step back. Everyone else - pick out whatever you want signed, and scribble yer name and address on the back. I'll make sure everyone gets their gear back in a day or two."

Some of the more eager autograph hunters took him at his word and handed over large stacks of material to be signed, only to take most of it back after one look at his raised eyebrow. Ornie gathered the rest together into a neat bundle, and retrieved his, now rather battered, placard, which he hoisted in a polite farewell to the crowd.

"Thank yeh, everybody. Like I said, I'll make sure you get all of this back. Reckon I'll be seeing some of yeh at the next lecture, and I'll mebbe see you all at the next launch!"

"Next lecture?" asked Sherfel, as they left the airport terminal and crossed the car park.

Ornie nodded. "We run them a couple of times a month at the Space Centre," he said. "Bob's idea, but they turned out to be more popular than he expected, so he pulled a bunch of us in to help. We tend to do 'em in pairs, general stuff the first week, getting more technical in the second week."

"What do you talk about?" asked James.

"Bit of everything," said Ornie, fishing his keys out of his pocket. "Basic engine design, orbital mechanics, tracking and astrogation, overview of Mission Control, sometimes we get one of the pilots to come along and do a kerbonaut's diary slideshow for one of the flights." Ornie grinned. "Those are always popular. Climb in folks."

Sherfel clambered up into the truck cabin, closely followed by James. Ornie slammed the door behind them, before jogging round and swinging himself up into the driver's seat. He touched the starter button and the motor purred into life.

James frowned. "I remember Bob," he said, "Flew on the Kerbal 1 obviously, one of your heads of engineering?"

Ornie nodded, both eyes on the road. "Yup. And heading up the lander project with your fella Danfen."

"That's what I thought," said James cautiously. "Isn't he a little bit, well - *busy* for lecturing too?"

"His idea," said Ornie calmly. "Guess he finds the time from somewhere." Across the junction, another truck flashed its headlamps. Ornie waved at the driver and pulled out onto the main road. "Good idea if yeh ask me. Anyone in the team who can't stand up and talk for an hour about basic stuff that they should know back to front and upside down..." Ornie shrugged. "It hasn't happened yet is all I'll say. Plus we get a load of goodwill from the good people of Barkton - seems only fair to give somethin' back."

Cars and other vehicles whirled past them on either side, many of them sporting long, fluttering pennants, adorned with a tilted rocket trailing a stream of flame behind it. Sherfel stared in astonishment at an old fashioned camper van decorated with a mural of Kerbin floating in space. Another, more modern, van lumbered past, flanks painted to resemble a *Moho* capsule on its booster, driver waving frantically at them. Sherfel saw his beaming face glance in their direction, a red cap perched jauntily on his head. Ornie flashed him a thumbs-up as he drove past.

"That's a new one," he said cheerfully. "Reckon he could do an Eve paint job for me?"

James shook his head. "How many lectures have you *given*?" he asked.

Ornie smiled. "A couple, " he said, "We do guided tours too, but most of it is down to Jeb. Back before the Kerbal 1, him and the rest of the KIS would do their flight planning in a local bar. Anyone could listen in, or come and watch the tests, even if most of 'em thought he was crazy. These days, old Jorfurt gives us a private room for the planning meetings, but

you'll still find a good few of the team down in the bar afterwards, talking to folks, answering questions..."

"Signing autographs?" said Sherfel.

"That too," agreed Ornie. "Point is though, that Jeb hasn't changed much since he was running his junkyard. Goes to the same places, mixes with the same folks. He's pretty good for business these days too, which doesn't hurt."

Ornie put on a local accent. "Sure, when do you need them for? Oh right. That could be tricky I'm afraid - we've got a big job on for Gene at the Space Centre. We could do the first third now...Yes, that Gene. Jebediah - you mean Jeb? Quite well actually. Look, we've got a guest box at the Space Centre for next week. Why don't you come over, we can sort something out over lunch, watch the launch, maybe have a word with Jeb afterwards..."

Ornie checked his mirrors. "If we've got any room in the training schedule, Jeb sometimes runs private tours, complete with a ride in one of the Whirligigs." He saw James's puzzled look. "Sorry - our name for the simulators. He'll usually leave an RCS unit on the test stand too." Ornie grinned. "Most folks like to fire a real, honest-to-Kerm rocket engine, even if it's only a small one. And riding in a genuine spacecraft trainer next to the first kerbal in space - well I reckon more than one major deal has been sealed in a Whirligig cockpit."

The truck rumbled down a side road past a row of warehouses. Clusters of clean, new, wood-and-brick housing stood in neat rows, conspicuous against the older, squarer industrial buildings. Here and there, Sherfel saw more pennants fluttering in the breeze, their bright colours vibrant against the domed, slate rooftops.

Inside the cab, James was puzzled. "But why?" he asked, "I get the need for good PR - and the pennants and paint jobs are very neat - but you're all putting in a *lot* of effort here. More than Rockomax's PR department, and that's saying something."

Ornie gestured at the rows of houses. "Because we owe them," he said quietly. "Those new places out there? All for KIS workers and they didn't cost us a thing. Richlin and me joined right after Kerbal 1. We were there when Bill showed the rest of them his pictures from the flight. I went home to pick up some parts - by the time I got back, the place was overrun. Folks putting together new workshops, scraping the rust off old equipment, sorting through the oily, greasy depths of Jeb's old stock bins. Even more than most big projects, our space program depends on volunteers."

"Too many other kerbals to mention from the great town of Barkton," said Sherfel suddenly.

Ornie looked at her. "Exactly," he said. "Anyway - we're here. Welcome to the Kerbin Interplanetary Society."

James climbed out of the cab. Sherfel leapt down after him and looked around curiously at the nearby warehouses. She blinked at the sign boards on the roof and their, now familiar, tilted rocket logo. James read the boards and rolled his eyes. *Seriously? We're planning to launch a spacecraft to the Mün, but they're still calling themselves a junkyard and spacecraft parts company?*

Two kerbals stood deep in conversation by the door to the nearest warehouse, both sipping from large tin mugs. One of them looked vaguely familiar, although Sherfel couldn't quite remember where she'd seen him before. Behind her, Ornie slammed the cab door, whistling to himself as he locked up. The second kerbal glanced up at the noise and suddenly James and Sherfel were staring at the most recognisable face on Kerbin.

Jebediah Kerman...

An unwelcome flutter tickled the back of Sherfel's ribs. *Steady girl - he's just a kerbonaut like you. Nothing he's done that you haven't done too - and you've done a lot more on top of that.* Beside her, James had frozen in place.

Yeah. Except that he was the first. And he got there in a rocket built right here by a junkyard and spare parts company.

Ornie coughed tactfully. "Expect you two could use a coffee too?" he said. "Water too if you're anythin' like me. Flying passenger class always dries me right out."

James nodded gratefully. "Both sound good," he said. Sherfel shook herself mentally. "Yes please, Ornie," she said. "To both."

"We can do that," said Jeb cheerfully. "I'm Jeb Kerman by the way, and this here is Wernher. Welcome aboard."

Wernher smiled. "Looking forward to flying with you," he said. He eyed the stack of autograph books in Ornie's arms. "We were starting to think Ornie had gotten lost, but I guess he just got waylaid."

"The rocket-spotters struck it lucky today," said Ornie equably. "Had to rescue James and Sherfel from the eager mob. You left enough coffee for three, Jeb?"

"Just about," said Jeb, leading the way around the side of the warehouse. "Jug's in my office."

More of a den than an office, thought Sherfel as she took in the scuffed chairs, the low, shop-worn table, and the refrigerator under the desk. She stared at the picture of the Mün rising over Kerbin, a shiver running up her spine. *Except for that. Surely that has to be the original, and dear Kerm, being the first ones to see that view out of your window."*

"Take a seat, folks, and help yourselves to whatever you want."

The table was laden with fruit, a full jug of very fresh-smelling coffee, a tray of hot rolls, and a plate of bite sized, mud coloured cubes. Sherfel stared at them curiously as she bit into a roll. Ornie noticed them too.

"More of Dorny's experiments, Jeb?"

Jeb helped himself to a roll. "Yep. SRCs, version...whatever number he's up to now. Not quite as good as version six, but I'd still pack 'em for the journey." He gestured at James. "Go ahead - they taste a lot better than they look."

James took a cautious bite from his cube. A surprised look crossed his face, and he took another one from the plate. "Hey - these are pretty good - but what are they?"

"Savoury Ration Cubes," said Ornie. "Space rations. Derny figured that giving 'em letters would make them sound more like proper kerbonaut supplies. Not to be confused with Sweet Ration Cubes, Spare Ration Cubes or Surprise Ration Cubes - Derny hasn't really got the hang of acronyms yet."

"And never, ever to be confused with Spicy Ration Cubes," added Jeb. He winced. "The snack that only Lucan could love - and he's been destroying his palate with smoky sapwood for Kerm knows how long."

Ornie lifted his hands defensively. "Don't blame me," he said. "I just told him that food can taste a bit bland in zero-g. I didn't know he'd take it as a personal challenge."

"We noticed that too," said Sherfel. "Herbs help a lot." She coughed. "Smoky sapwood doesn't taste too bad in space either, but you never really get the full flavour."

Ornie laughed at the dismayed expression on Jeb's face. "You'll definitely have to have a word with Lucan," he said, "He's got a collection of smokes from different Groves, probably different years too."

James chose a slice of redfruit. "I think I'll stick to spicy SRCs," he said dryly. He raised an eyebrow at Sherfel. "We should ask Ademone to hire a chef for the Rockomax crews though."

"Oh, Derny's not really a chef," said Wernher. "He was one of the rocket-spotters as a matter of fact. Until he managed to talk Jeb into giving him a job."

"Hard to turn down somebody who actively volunteered to mop floors and make coffee," said Jeb. "I still remember him telling me that he didn't know much about all those rocket engineers but that he was betting that none of them knew one end of a mop from the other. He probably wasn't far wrong and besides, having somebody to keep up with Bob's caffeine habit has been a *real* help."

Ornie smiled. "Turned out he's also a real fine cook, with a knack for making snacks that hold together in zero-g. We'll head down to the kitchen later - he'll want to know what sort of things you folks like."

Jeb rubbed his hands together. "Thought I'd take you on a general tour of the place this afternoon," he said, "Show you around, introduce you to everyone. Then, if you're still awake, we can run through the training schedule over dinner. I gather that Genie's been talking to Nelton, so he should have some idea of how you run things at Rockomax. We can figure out the rest at Jorfurt's tonight."

The young breadfruit vines were looking healthier than they had for weeks. Row after row of neatly staked, green striped stems rustled in the light breeze, dotted with newly sprouted buds and thick with tightly wound clusters of waxy leaves that gleamed in the afternoon sun.

Under the vines though it was very different. Knotweed ran riot, sprawling across the soil in a tangled, stringy mat. Hookwort clawed its way up the breadfruit stems like curly strands of barbed wire. Star poppies, yellowjackets and rustbells erupted from the soil in bright rafts of unwanted colour. Butterflies swarmed in droves, as if the rafts were fraying at the edges and blowing away on the wind. Their larvae infested the breadfruit leaves, leaving them ragged and brown edged.

Gerselle carefully dug around the base of the nearest green striped stem, exposing the root system. The coarse, stunted fibres were still black and rotted at the tips but, to her relief, rot near the tips was finally being balanced by new growth near the main root. She scooped the soil back into place and gently tamped it down.

Joenie bounced happily around the vines, chasing the butterflies, scuffing at the knotweed, chattering to herself all the while. Gerselle watched her peering at one of the leaf clusters, pleased to see her keeping her hands clear of whatever had caught her attention. She got to her feet, brushing the loose soil off her poncho and called to her daughter.

"Joenie! Joenie! Come and help Mummy with the flowers!"

Joenie raced over, flinging her arms around Gerselle's knees in an enthusiastic kerblet hug. She reached up, proudly displaying both muddy palms. Gerselle kissed the ugly, ridged weal still scored across her daughter's fingers, a fading testimony to an encounter with a particularly nasty species of caterpillar. "Good girl," she said. "You were a good girl and didn't touch them!"

"Where are the flowers, Mummy?"

"They're by the gate, sweetheart." Gerselle tapped Joenie on the shoulder and jogged away. "Tag!"

Joenie giggled and ran after her.

The carefully geometric, relentlessly monochrome flower beds stood in stark contrast to the anarchic exuberance of plant life under the vines. Each bed was fenced in by a low wooden palisade hammered into the soil. Gerselle surveyed them with satisfaction.

Star poppies, rustbells, cornshakes, yellowjackets. Hookwort, knotweed, damsonwire, clover... She pulled a notebook out of her pocket and flipped it open. *Kerblets fingers, gingergrass, broadweed. Hmmm, the springfern is looking a bit bedraggled, but the rest of them are growing - well, like weeds.*

Whilst Joenie amused herself by leaping over the planks, or pulling up handfuls of flowers, Gerselle slowly worked over each bed, carefully uprooting the occasional windblown intruder and tossing it to one side. *Hmph. Weeding the weeds.*

It didn't take too long for fence jumping to lose its appeal. Joenie flopped onto the ground disconsolately, and began to kick the nearest plank. Gerselle picked a large handful of the thick-stemmed star poppies and sat down beside her.

"I tell you what. Why don't we make a pretty necklace for my pretty girl." She showed Joenie how to split the poppy stem with a fingernail and thread the another stem through the gap. Before long, Joenie was sitting cross-legged on the grass, tongue poked out in concentration and a ragged chain of flowers slowly piling up in her lap.

"Look Mummy!"

Gerselle looked up and smiled. Joenie sat amidst a ring of petals and torn flower heads, the finished chain draped round her neck. "That's beautiful, sweetheart. Come over here and let Mummy finish it for you." She tied the ends of the flower chain together, and held up the finished garland for Joenie to see. "There you go, sweetheart. Can you play with your necklace for two more minutes while Mummy finishes the weeding? Then we can go to Adbas's house for tea."

Gerselle pushed open the gazebo door and stepped into the cinnamon scented gloom. The canvas roof rattled in the wind, the thick padded collar at its peak creaking as it shifted about the slender young Kerm trunk that poked out through the top of the small enclosure. She lay down on her bed, wrapped herself snugly in her heavy woolen cloak and propped a pillow under her head. The Kerm leaves barely even tickled as they brushed against her scalp.

<kerbal back> <pleasure> <happiness> <good-right>

Gerselle smiled, letting the familiar cascade of aromas wash through her mind. Deftly, she rode the torrent of sensations, artfully placed mental stones diverting the raging flood into well practiced channels. The channels contained the torrent, letting the individual threads of meaning swirl through her mind, buffeting her but not sweeping her away.

Buffeting...slowing...seeking...

...allowed to find.

Gerselle twitched under her cloak as her awareness exploded. Her vision shrank down to a pinprick, senses of hearing, touch, taste and, smell expanding exponentially to compensate. In a discomforting wrench of perspective, the proprioception evolved for one small, bipedal body was suddenly stretched vertiginously through hundreds of cubic metres of soil. Before she could pause for breath the pinprick yawned open over a vast, ever-shifting landscape of colours. A vista of Kerm perceptions filtered through kerbal sight to create a single, sanity-saving perspective for her to view its world from.

Gerselle soared over the mindscape, searching for the breadfruit field. It didn't take long. The grid of flower beds was as distinctive here as it was to the naked eye, each bed a bold

splash of colour against the dappled complexity of the surrounding soil. She sensed her Kerm's curiosity, felt it tentatively probing the tiny monocultures.

<puzzled> <many-things-all-the-same>

Here goes...

Gerselle stared intently at the first bed, holding its hues in her mind, memorising their patterns and subtle shades before turning her attention to the bewildering riot of colour that marked the breadfruit field. Slowly but surely, she began to make sense of the apparently random swirls of clashing colour that gradually revealed themselves as intricately cross-linked mosaics. Methodically, she began to isolate the mosaics, disentangling them in her mind's eye, picking out the dominant pattern, searching for one particular set of colours.

Then she found them. A small part of the mindscape snapped into sharp focus, the other colours fading slightly, merging into the background. Gerselle stared in delight at the rainbow fringed dapples scattered over the field.

Star poppies - the Kerm's eye view! But they're not so important. Deal with the knotweed and hookwort first and see how that works out.

On the surface, both weeds were indistinguishable from the background clamour. Gerselle concentrated and *shifted* deeper down, through the noise. Beneath the surface the twisting carpet of knotweed roots tangled with the hookwort roots, both standing in stark relief against the rest of the soil. Gerselle held the image in her mind and reached out to the Kerm.

<curious> <these-things-those-things> <all-the-same>

The mindscape shifted out again and this time Gerselle could pick out the subtle knots of colour blanketing the ground. The image flitted back and forth.

<see> <here-here-same-thing>

Gerselle bit her lip and sent a new image.

<puzzled> <things-gone> <why why why why>

Carefully, visualising each image as clearly as she knew how, Gerselle tried to explain.

The roots appear, accompanied by a picture of a sad kerbal. They disappear and the kerbal smiles. The roots appear - sad kerbal, and disappear - happy kerbal. The image fades out.

A sunlit field, with nothing but row upon row of ripe breadfruit vines as far as the eye can see. Smiling kerbals picking the breadfruit and eating them. Other kerbals carry buckets, watering the vines.

The same field but choked with weeds and stunted vines bearing hard green fruit. Sad kerbals walking between the vines but not picking the fruit.

No roots. Smiling kerbals picking ripe fruit and watering the vines. The roots appear. Weed choked field and sad kerbals.

<sadness.> <things gone. happy kerbals> <sadness> <things gone not right.>

Gerselle frowned. *So now what do I do? Although Jonton's Grove - the fields around his village always...oh. Of course!* Quickly she reached out to the Kerm again.

The field seen from above the mindscape. The roots appear, accompanied by a picture of a sad kernal. They disappear from the middle of the field, leaving a thin border around the edge.

A sunlit field, filled with row upon row of ripe breadfruit vines and fringed with a border of weeds. Smiling kerbals picking the breadfruit and eating them. Other kerbals carry buckets, watering the vines.

<Things there now> <good-right> <happy kerbals and things>

Gerselle smiled. *Happy kerbals indeed if this works. Now what else was I going to show it.*

"What on Kerbin is taking him so long!"

Sherfel shrugged. "No idea," she replied, "Could be almost anything - he *is* their chief engineer after all."

James ground his teeth. "Yes - and he's *our* flight engineer. Not that you'd guess from this farce of a training programme. Checklists changing every week, communications with Foxham flaking out - Kerm's sake, this is the first day they've actually managed to get the simulator working and yet the great Chief Engineer barely deigns to set foot inside it for more than five minutes at a time!"

Sherfel eyed the glowing light on the comms panel but decided not to mention it. *Besides, he has a point.*

"I tell you, Sherf - unless things start shaping up, they can take this flight and shove it in a tree, because right now I trust this lot about as far as I can spit a gronnek."

The hatch swung open. Wernher climbed into the simulator capsule and took his seat at the engineering station. "Sorry to keep you waiting. We were at the pre-staging aborts yes?"

James nodded tersely. Wernher spotted the open comm loop and pulled his headset on. "So, shall we get started?"

The cabin tilted abruptly, pitching up to a simulated launch attitude. Wernher looked bemusedly at the comms panel and tapped his earpiece. "Calzer - can you hear..."

He was interrupted by a sharp explosion from outside, followed by an unpleasantly oily splattering sound. Sherfel looked up and saw a stream of viscous liquid running down the window. The simulator ground to a halt, sagging forlornly in its frame.

Slowly and calmly, James removed his headset, climbed out of the capsule, and walked away. Wernher leapt out of his seat. "It's not a problem, James, we can fix..." Sherfel rested her hand on his shoulder. "Don't" she said quietly. "Give him five minutes, and I'll go and find him."

Jonton put down his mug of water, wrapped his vines a little more securely about his ankles and waist, and relaxed their grip on his calves and upper legs. Yawning, he braced himself against his trunk, and began his morning exercises. As always, the image in the mirror looked slightly ridiculous, a solemn kerbal face peering back at him from out of his leaf clusters, and a pair of kerbal legs twitching and dancing underneath. *I could do with some of those bungee cords that the kerbonauts use.* He stretched, branches rustling in the morning air, droplets of sweet dew tickling his leaves.

The sun crept over the horizon painting the sky with streaks of watery scarlet. Jonton sensed the first faint warmth on his leaves and closed his eyes, letting his consciousness diffuse outwards, along his root fibres, through the soil, up through his many trunks.

The sun rose above the tree line, lifting the Kerm out of the dawn shadows. Jonton drank in the light, tasting it, feeling sweetness build in his leaves and trickle down his branches. *Sunrise there so north is over there, which means the rest of the village is over there. Prickleberry fields over here, breadfruit here, sunfruit there of course. Forest around them all.* He pushed the taste of sunlight and slow tides of rising sap to the back of his mind, letting the rough mental map fill his awareness.

Unbidden, flecks of colour began to appear. Broken trails of orange meandered across his mindscape, fuzzy and faded at the edges. Dense blue specks gathered around a blob of green, each of them trailing out a thin blue thread behind them. Diffuse clouds of iridescent multi-hued flecks, too small to see individually but visible through sheer weight of numbers. The map blurred, zooming in towards a single speck.

No. That's kerbal thinking. Feel, smell, or taste only. Seeing is a crutch - slow and clumsy.

Unnoticed, beads of sweat popped out on the kerbal's face, as Jonton struggled to close his mind's eye. With an effort, he tore his gaze away from the mindscape, pushed its myriad details away and focused on the void around him. Slowly and deliberately he cleared his mind and, relaxing into his old Keeper training, allowed himself to sink into placid receptivity.

One by one, sensations tickled the back of his mind. Tiny threads spun into strands, which twisted into threads. The threads wove themselves into a misty tapestry, perceived for a fleeting second and then gone. Suddenly, Jonton was *aware*. Aware of the kerbal feet and which way they were pointing, without having to look at them. Aware of the *weight* of his branches and the way they bent in the wind. Aware of the worms wriggling through the soil around his roots, following the pheromone trails that he had laid down. Trails to draw them, to guide them to where they were *needed*. Guidance provided subconsciously now, with no more need for thought than his kerbal would require to pick up a pen and start writing.

Finally building some muscle memory here. Hold the balance, Jonton, hold it...

There. That's the problem there. Too many bacteria. Or too many of those bacteria. Those ones are harmless and those other ones are vital. OK, I remember how to deal with this. Release the attractant here, pull in these nematodes to control the bacteria. Not too many though, need these other nematodes too to keep the others in check. Fungi here, here and here to control them both, release this effector to kill those bacteria, to let those ones thrive and release more of that nutrient..."

The tapestry began to swim into view, threads unwinding and acquiring colour.

The kerbal was almost hidden behind a lashing screen of leaves, legs shaking and sweat pouring down its face.

NO! Do. Not. See. Steer the patterns, Jonton - don't unravel them!

The kerbal stared blankly across the room, blinking perspiration out of its eyes. Suddenly it stiffened, limbs clenched, back arched against the Kerm trunk. Then it slumped, like a puppet with cut strings.

Jonton felt the shimmer of changes ripple across the field and sensed the field begin to change in response. It would, he knew, take time to adjust fully, but even now the myriad food webs, the delicate chains of prey and predation were beginning to quiver at the edges, edging towards a new balance.

The kerbal's head lifted. Jonton blinked and reached for his mug of water.

James and Sherfel stood in the doorway and stared. The early morning sun shone in behind them, dispelling the gloom within.

The Whirligig hatch was propped against the nearest wall, surrounded by a stack of spare parts. The projectors and screens that normally stood around the capsule were lined up along the opposite wall. The table in the corner was littered with crumb-strewn plates, a coffee jug and other remnants of a hasty breakfast. Under the table a tottering heap of takeaway cartons threatened to spill across the floor. The room stank of leftover food, stale coffee and the metallic tang of grease and hot hydraulics.

Calzer squatted by the open hatch, toolbox by his side, methodically plugging in cables and closing cable clamps. Tomcas perched on a ladder, screwdriver in hand, peering intently at the main wiring panel fixed atop the capsule roof. Two other kerbals that James didn't recognise, clambered over the simulator frame, checking the hydraulic lines. Meanwhile, Lodan sat in his usual place in the control booth, headset on and eyes on his screens.

"All set?" Jeb emerged from behind the capsule, closely followed by Bob. Both kerbals were dressed in grease-smeared coveralls, Jeb wiping his face with a rag as he walked.

"Yup!" Tomcas scrambled down the ladder and dragged it clear. The two other kerbals jumped down from the framework and joined Jeb and Bob by the control booth door.

"Just a minute guys." Calzer consulted a notebook on the floor in front of him, nodded to himself and picked up a spanner. "Just need to tighten these down. And done." He grabbed his notebook and joined the others.

"OK, Bill - fire it up!"

The capsule jerked, tipped down and then swung smoothly upwards to launch attitude. Jeb watched it start to swivel about its long axis, before walking over to the two Rockomax pilots, oblivious to the streak of oil across his forehead.

"Morning." He gestured at the simulator. "Just need to run the calibration sequence and replace the hatch. By the time Wernher gets here we should be good to go."

Chapter 41

The Best Laid Plans

Jeb scratched his cheek. "In the meantime, I'm heading back to the office. You two want to take a walk?"

James opened his mouth to speak but Sherfel stepped smoothly in. "Sure, Jeb. We're not doing much anyway until Wernher arrives."

Jeb led the way out of Shed 2 and across the road. He shook his head as Sherfel veered towards the main warehouse, "Side door." He unlocked his office door and gestured towards the chairs in the corner. James opened his mouth again but closed it as Sherfel gave a tiny, almost imperceptible shake of her head. They both sat down and waited whilst Jeb peeled off his coveralls and hung them on a peg by the door. He straightened his shirt, pushed his hair back from his forehead, and sank into a chair beside them.

"I don't know about you, but I'm thinking we need to rework this training schedule."

Sherfel nodded cautiously. "I'd say so. I know you run things differently here, Jeb, but we're honestly not going to get anywhere if Wernher keeps being called out of training sessions like he has been. I know he's your chief engineer, but he's Pioneer 1's flight engineer, too."

Jeb closed his eyes, "I'll get Gene and Camrie to talk to with Ordrie and Ornie and have them re-jig the construction schedule to free up Wernher's afternoons. We can push the Pioneer 2 timetable back a month if need be." He laced his fingers behind his head. "We're still going to need Wernher most mornings though - no way around that that I can see."

"So what do we do in the mornings?" asked James bluntly.

Jeb's eyes flicked open, "Whatever you like," he said, "Pick a team you can work with and find something that needs to be done."

James's expression darkened, "Are you trying to tell us..."

"I'm not trying to tell you anything," said Jeb. He sighed. "Look, outside of the training schedule, I can't make you two do anything. But if you'll take a friendly suggestion, it would be *very* good for team morale if you got your hands dirty with everybody else."

James leaned forward angrily, "We're not your employees, Jeb!"

"I know you're not!" snapped Jeb. "Nor is anybody else in this building - and most of them are still waiting to fly!" His voice softened a fraction. "I thought Ornie had explained all this?"

"He mentioned that you depended a lot on volunteers," said Sherfel, "Showed us your new housing and told us about the early days of the KIS. We thought that was the kind of volunteering he meant."

Jeb pinched the bridge of his nose. "That's part of it," he said at last, "but...Kerm. Okay, the original KIS was strictly volunteers only, for the very simple reason that we couldn't *afford* to pay ourselves anything. Any cash we scraped together we put towards the next project - ingenuity and scrap metal will only get you so far." A brief smile flitted across his face. "We gave Genie fits most months, but he usually managed to keep *something* back for bills and food rather than letting us blow it all on rocket fuel."

Jeb pointed at his office window and the factory floor beyond. "We're in much the same place today. Volunteers only, everything we earn gets swallowed up by the next capsule or booster or piece of kit for Mission Control, or... you get the picture." He cocked an eyebrow at James, "The projects have expanded a bit though."

James sat back in his chair, "Everybody working here is a volunteer?" he said skeptically, "I mean, sure - show me a company that doesn't have them, especially at management level. But *everybody*?"

Jeb nodded, "Not all of them full-time of course," he said, "but yep, they get paid in food, lodgings if they need 'em - and the chance to be a part of something extraordinary."

"We all build them, we all fly them," murmured Sherfel.

"Exactly so," agreed Jeb.

Sherfel watched James struggle to absorb Jeb's story. *Oh, Kerm take it - when in Barkton and all that.* "In that case," she said brightly, "I'd say you could use some extra hands with comms and sims maintenance. I can help there."

Jeb winced, "Touché." Then he grinned, "Thanks, Sherfel - Neling'll be more than glad to have you aboard. How about you, James? Any thoughts?"

James looked at him blankly, "Not really. Rockomax hired me as a pilot, not a greas...engineer."

"Not a problem," said Jeb, "The blasting and painting team can always use a good kerbal, Hando and his gang would definitely be glad of a hand lugging gear down to the new VAB, although that's probably..." He snapped his fingers, "Better yet, you could do the rounds

with Derny." He raised a finger warningly at James's apoplectic face. "Trust me, Derny's sharper than he looks. Think of this as the *real* guided tour."

The alarm jangled shrilly in James's ear, jolting him awake. The sleep room was still dark, the single, curtained window barely visible as a dim grey blur against a black background. Yawning, he aimed a vicious swipe at the alarm clock and fumbled for the light switch, screwing up his eyes at the sudden glare. The thick wool rug tickled the soles of his feet as he climbed out of bed, retrieved his poncho from its hook and stumbled off to the moss room.

By the time a scrubbed, refreshed, and far more alert James sat down for breakfast, the conversation had already turned to the day's work. Wilford stood behind the oiled wooden kitchen counter, slicing cold vegetables and pickles. Camrie and Sherfel sat at the matching table, sipping from bowls of steaming hot *djeng*. Sherfel smiled as she passed him the natas pot and turned back to Wilford.

"And if it passes the last round of vibration tests, we should be able to start installing the tanks!" Wilford scooped the choppings into an earthenware bowl, and put it on the table in front of Camrie. "What about you, Sherf?"

"I'll be helping Neling upgrade the data feed to Alpha site," said Sherfel, "Maybe taking a look at the connections to Whirligig 2 if I get a minute."

Wilford nodded, "Yeah, Calzer's been talking about that for a while. Be good to have a spare sim up and running."

Camrie snorted. "You volunteering to scrape the crust off the joints and see what else needs fixing?" she said.

"Might just do that, once I'm done with the tanks," said Wilford cheerfully. "Propulsion won't be finished with the 909 testing until the end of the week anyway."

James added a handful of vegetables to his bowl and ladled the thick grainy natas over the top. "909?" he asked.

"Service module engine," said Wilford. "According to Ornie the main systems passed the stress testing without a hitch, but they're still qualifying the backup plumbing. Vibration, thermal and hot-fire tests next week, once its integrated with the thrust frame and hooked up to the tanks."

Sherfel peeled the rind off a pickle slice. "Full duration hot-fire?"

"Yup," said Wilford. "for both your main burns. Going to be the most thoroughly tested piece of machinery we've ever launched by the time Ornie's done."

"Glad to hear it," said Sherfel neutrally. "Anyway - what about you, Camrie?"

"Just flying a filing cabinet this morning," said Camrie, pouring herself more *djeng*. "Packing up all the blueprints and manuals for taking down to the VAB. Afternoon - more fitting out work at the VAB I'm guessing, now that we've got the crane working."

James ate his breakfast silently. *Sure. Just gonna be another big happy day down at the junkyard.* He looked up as a shadow passed by the window. Wilford stood up just as the doorbell rang.

"Morning! You folks all set?" Edsen poked his head round the door.

"Just about," replied Camrie, lifting the *djeng* jug. "Bowl while you're waiting?"

"Don't mind if I do," said Edsen. "Cold out there this morning."

Edsen threaded his car expertly into the parking bay and switched off the motor. His four passengers scrambled out, Sherfel bending over to massage her cramped calves, her breath steaming in the crisp morning air. Kerbals milled around outside the gates, chatting and greeting friends as they arrived. Periodically, small groups broke away from the crowd and headed towards the main warehouse. James checked his watch. *This is ridiculous - it's only eight in the morning for Kerm's sake!*

"See you all later!" Edsen locked his car and hurried over to Bill and Neling, waving at three more kerbals who had just arrived.

"I'd better go too," said Sherfel. "I'm supposed to be with Neling's team. She squeezed James's shoulder, and with a murmured "good luck", strode away after Edsen.

Wilford loosened his scarf. "I don't know about you," he said to James, "but I could do with a coffee to get me started. Coming?" He hugged Camrie. "See you at lunch, love."

He and James made their way through the crowd, angling towards the staff canteen where they were greeted by a cloud of steam and a very peculiar odour. Derny lifted a pot off the stove and set it down on a chopping board. Frowning, he prodded at it's contents, absently scratching his head.

"Morning, Derny," said Wilford. He eyed the cluttered worktop curiously. "We can come back later if you're still making breakfast."

"You're welcome to this horrible slop, Wilford," Derny replied, "I wouldn't bother though. Freeze-dried tuber sounded like a *great* idea but it tastes like wet plaster and I just can't figure the consistency out at all." He brightened up. "Anyhow - what can I do for you and James?"

"I'm just here to grab a coffee," said Wilford. "but James'll be standing in for Jeb this morning."

"Starting at the top are you?" said Derny. He gestured at the two water heaters fixed to the wall. "Those should be boiling by now, urns are on that trolley over there, everything else is in that cupboard to your left. Biggest urn is for coffee, you'll be surprised to hear, other two

are for *djeng* and greenleaf. If you could crack on with that, I'll dump this mess in the bin and clean up. Kettle's all yours, Wilford."

"Thanks." Wilford flicked the kettle on and began rummaging around for a mug. James stared at him expressionlessly, and walked over to the trolley.

By the time Derny put his drying cloth down, steam was rising from the three urns and James was waiting for him, expressionless look still fixed in place. Derny lifted the lid on the coffee urn and sniffed appreciatively. "That'll do it," he announced. "Machine shop first, while it's still fresh, Assembly and Fitting next, then a refill, then Propulsion. The tank teams prefer their coffee with a bit more character, so we'll leave them till later. Could you get the doors? Cheers."

The machine shop was crowded, noisy and redolent of cutting oil, hot metal and overheated kerbals. The smell of hot drinks and the squeak of trolley wheels on concrete still managed to cut through the din with ease. One by one the machines spun down, their operators hanging up their goggles, grabbing a mug from the rack and joining the queue at Derny's trolley.

Bob...Ordrie...Adelan...Richlin... James realised he was staring blankly at the first kerbal in line. "Sorry?"

"Coffee for me please."

"Uh, sure." James took the proffered mug, filled it and handed it back to its owner.

"Thanks, James. Catch you later!"

"A *djeng* please, James. Is Jeb busy then? Bob handed over his mug. Eyes narrowing, James filled it with the fragrant brew. "Milk?" he managed.

"Not for me." Bob sipped his drink, "Ahhhh, that's a good cup. Thanks, James."

James glanced suspiciously at Bob's cheerfully guileless face. Beside him, Derny was chatting away to Adelan about the previous night's net-ball scores. He blinked, automatically taking the next mug being thrust at him and filling it with coffee.

On their way out, Derny snapped his fingers. "Nearly forgot about Roncott." He swung the trolley round and set off up a narrow corridor of concrete block wall and echoing metal ducts. "Next door on the right, James but for Kerm's sake knock first. I never know what's going on in here."

Cautiously, James rapped on the plain steel door.

"One minute!"

There was a heavy, trolley-shaking thud, followed by a rattle of chains. The door creaked open and a long haired kerbal peered out, face hidden by a heavy welding mask.

"Oh. Hi, James, hi, Derny. Come on in."

James followed him into a long corrugated iron shed. An unwieldy collection of tubing and hydraulic cylinders squatted on a test stand which had been set up at a discreet distance from the door. A large, tattered diagram was taped to the opposite wall and a motley heap of spare parts occupied most of one corner.

"How's the new gadget working out, Roncott?" asked Derny, handing him a mug of greenleaf tea.

Roncott sighed. "Well it's working after a fashion," he said, "but it's still far too complicated." He noticed James's curious look and gestured at the test stand. "It's supposed to be a hydraulic separator. In theory it should be more reliable and safer than explosive decoupling." He sipped his tea. "In theory. I've made some improvements to the original design but I'm starting to see why they gave it up as a bad job before Kerbal 1." He looked at James hopefully. "Have you got any ideas?"

Me. What on Kerbin do I know about hydraulics? James shook his head. "Not at the moment," he said carefully, "but I'll have a think." His heart sank at the happy look on Roncott's face.

"That would be great! We should have everything we need here to build any prototypes. Hey, Derny - could I get a top-up before you go?"

Derny looked at James sidelong as they walked back along the narrow corridor. "You could ask around at lunch," he said. "Somebody can probably think of a way to help the poor lad out and I doubt they'd mind if you pinched the odd idea."

The bustling main assembly area provided a welcome distraction. The nearly completed *Pioneer 1* capsule nestled snugly in its protective scaffolding. The surrounding bench tops resembled a high technology slaughterhouse, the electronic and mechanical guts of the spacecraft spread out for all to see. Two kerbals were perched on the scaffolding, installing subsystems in the nose assembly. Others were working at the benches or carrying finished components over to the open capsule hatch.

Nearby, another team of workers were busy applying insulation to *Pioneer 2*'s crew compartment, the raw metal and exposed frameworks a stark contrast to *Pioneer 1*'s streamlined exterior. Some distance away, a skeletal cylinder was beginning to take shape, fuel tanks and other systems stacked up on the surrounding storage racks.

Derny tapped James on the shoulder. "I'll do the trolley work here. You'll be wanting to have a look around I expect."

James just nodded, his attention already caught by an immense dish, placed well away from the two capsules. Closer to, it resembled a giant piece of honeycomb, the very centre of which was inexplicably decorated with a shaggy fur disc.

"Resin."

James spun round and found himself face to face with yet another familiar face. *Oh come off it. Point made Jeb, point made. No need to wheel out every last kerbonaut on the roster!* He blinked. "Sorry - Ribory isn't it?"

Ribory grinned "That's me. And it does look furry doesn't it? More spiky actually - we fill the cells under pressure and the resin tends to spurt out the top. We machine it down of course, before fitting it to the capsule."

"How do you do the filling?" said James curiously.

"By hand," said Ribory, "Well sort of. Electric caulking gun, twin reservoir, fixed stroke."

James knelt down to inspect the heat shield. *Kerm - they do all this by hand?* He sighed to himself. *Better than serving coffee for the next umpteen weeks.* "That's still a big job," he offered quietly. "I could lend a hand if you've got a spare gun?"

Jerfun stamped the snow off his boots and hung his heavy, fur-lined jacket on the nearest peg. He tossed his gloves onto a chair and hurried through to the sleep room. The Kerm branches overhead rustled listlessly at his approach, leaves hanging limp in the gloom. He shivered, neither the fur mosaics decorating the walls, nor the thick drapes across the window helping to dispel the chill.

"Ambassador."

The sour, layered scent of dried sweat clung to the shapeless figure on the bed. Bloodshot eyes gazed steadily at him from a mound of blankets, matted brown hair so entangled with Kerm leaves that it was impossible to tell where Kerm ended and kerbal began.

"Keeper," he replied, "You have news?"

"Truly, Ambassador."

An unwelcome chill swept through Jerfun. "Tell me."

The figure sagged. "Another Kerm, Ambassador. Near the Valley, perhaps further. It is hard to tell."

"You are sure?"

The eyes glared at him. "Truly. The patterns are recognisable - twisted, mark you - but recognisable. More to the point, the intruder observes and *learns*. Unless you know of another learning tree on Kerbin, Ambassador?"

"I do not. I mean no offence, Keeper, but I will need to verify this."

The blankets lifted briefly. "Of course, Ambassador. And what then?"

"If you are correct, I see only one possibility," said Jerfun, "Even were I minded to ignore the violation of our borders, my duty is clear." He scowled. "Neither am I inclined to entrust this

to the interminable deliberations of Conclave. No, Keeper - if needs must I shall claim the ancient right of all kerbals."

The figure nodded. "Truly, Ambassador. I would join you were I not so...required."

The wind howled around the ridge, driving thick flurries of snow before it. Jerfun stopped to tighten the drawstrings on his hood. He reached under the lip of his goggles with one gloved finger, scratched his cheek, and settled them back into place. *So much for tracking.* His rifle bumped awkwardly against his back. *And so much for lugging that around. Any scallan, on this hill or the next, will be den-bound by now.*

He scowled. *Which means that the nearest caves are probably occupied. Which means that I'm stuck in this Kerm-forsaken snow unless I'm minded to gamble with finding shelter. Which I am not.* He looked around to get his bearings then, head down, he plodded on, his skis alternately scraping over packed ice and digging into loose drifts of snow with a knee-jolting jerk. Behind him, the snow was already hiding all traces of his passage.

A large boulder marked a fork in the trail although by now the path ahead in either direction was completely hidden. Jerfun retrieved a handful of trail mix from his pocket and chewed on it thoughtfully, weighing up his options. To the left, the upper slopes of the ridge stretched out before him, bleak and exposed against the skyline. To the right the path narrowed as it wound down and around the side of the hill.

No choice really. Doubt that anybody's watching but the tops will be too exposed anyway in this wind. He bent down and fumbled with his skis, kicking the toes of his boots out of their bindings before lashing the skis together and slinging them over his back. He unhooked a set of crampons from his belt, leaning against the boulder for support as he tied them on. Then he set off down the path, leaning on one ski pole as he went and cautiously probing at the ground with the other.

The deepening snow lay like a bedspread over the village, deadening all sound. Low slung buildings, built from greystone and slate, hugged the valley floor, thick walls impervious to the inclement weather, heavily shuttered windows keeping in the warmth and the light. Terraced rows of dwellings had been dug into the hillside, front doors protected by stout overhanging eaves. Lamp-posts dotted the terraces, their warm yellow light all but swallowed by the billowing flakes tumbling from the leaden sky. Spindly trees dotted the landscape, skeletally thin branches standing stark against the grey.

On the hillside above, Jerfun lay flat on his stomach, sweeping the valley with his binoculars. *Thought they looked too regular. She was right - that's a new village for sure. An ugly, blocky, Kolan village to boot.* He clenched his jaw *Breaking our borders, stealing our land and despoiling what few fields we have!*

That last thought brought him up short. *Need to prove that first. Although I cannot conceive of a new village without a new Kerm.* He panned back across the valley, looking out beyond the village buildings. Then he stopped, fingers tightening in a death grip.

No. She was right about that too. Painstakingly he scoured the valley, searching for more saplings. *Twenty six...twenty eight...hirty two...one over there makes thirty three, and three more in a line over there.* The binoculars tilted down, focusing on the village. *And one last one in the middle.*

Jerfun got to his feet. Coldly and deliberately he put his binoculars back in their case, brushed the snow off his jacket and started back up the path.

James wiped his cloth over the section of composite and peered critically at the oily film it left behind. He pressed the snub-barrelled ultrasound probe against the surface and squeezed the trigger.

A warning buzzer sounded, accompanied by the usual flashing red light. James swore to himself, marked the faulty cell with a vicious swipe of his pen, and moved on to the next one. The buzzer sounded again and James threw down the probe in disgust.

"Ribory! This Kerm blighted probe is on the blink!"

Ribory hurried over. You sure, James? I only calibrated them this morning. Let me try mine." She unhooked a spare probe from her belt and plugged it into James's analyser box. "Coupling film looks OK." She pushed the probe against the panel and pulled the trigger.

Bzzzzzz.

Ribory studied the grainy black and white image on the analyser screen. "Ahh - there's your problem. She pointed at the screen. "Got a bubble in the middle there. Not a big one, but big enough." She gave James a sympathetic look. "Drill time I'm afraid. Don't worry about it - it gets easier with practice." She grinned. "Reckon I wasted at least a year's worth of bad language on the Moho 1 shield, but Eve 1 was OK."

James frowned. "You built your own heat shield?"

Ribory looked at him strangely. "I built - or helped to build - *all* of them, James, from Moho 1 upward. Why would I skip over Eve 1? Building your own shield certainly keeps your mind focused on the job, I'll grant you that, but building one for your best friend or your boss does that too."

James digested her words. "Must have been reassuring to have the quality control team checking over it," he said at last.

Ribory blinked. "What quality control team?" She waved her ultrasound probe in front of James's face. "Why do you think we're messing about with these? I suppose I could run a probe over your panel once you're done - and if your probe spits out any readings that you're not sure about then give me a shout. Apart from that though." She shrugged, "You're checked out on the gear, your test piece was fine and you know what you're doing. You wouldn't be on the team if I thought I needed to watch over your shoulder the whole time."

A cold lump settled in the pit of James's stomach as Ribory picked up her caulking gun and went back to work. *Tommall - he's first in line for Pioneer 2.*

He stared unseeingly at the analyser screen picturing the superheated plasma hammering at the ablative resin. Just under the surface, the bubble swells, bursts, weakened fragments of resin torn away by the hypersonic slipstream. More plasma rushing in, carving out larger chunks of heat shield, melting the underlying bulkhead. Tommal's horrified expression as the window buckles, shatters, rips free. The capsule tumbling out of control, breaking up..."

At least I'm not working on the aft shield. Not that it would make much difference.

James swallowed hard, carefully marked the defective cell and picked up his probe.

Well now - there's something you don't see too often.

Dondrin stepped out from under the sheltered portico that guarded the entrance to the Capital building. *Northern Wakiran ceremonial garb I would say, and very traditional it looks too.* He inspected the ornate fur collar more closely. *Poor fellow must be melting under all that.*

"Good afternoon, Ambassador. Dondrin Kerman, Capital News. May I have a moment of your time?"

Jerfun narrowed his eyes and kept walking. "You may not."

Dondrin blinked. *Surly fellow aren't you.*

"I have an audience with the Twelve Pillars," Jerfun continued. "Which I intend to put on the public record. For the benefit of all news outlets," he added sardonically. He strode towards the reception desk and, after a brief exchange with the receptionist, marched briskly out of the lobby with Dondrin following at a discreet distance.

Once he'd assured himself that the aloof ambassador was indeed heading for the Council chamber, Dondrin took off for the press gallery at a run. He burst through the door and threw himself into a chair as the Chamber doors thudded shut below. Chief Ambassador Burvis waited at the podium, the remaining Pillars sitting silently around the Council table. Jerfun stood impassively by the door.

"Misters President, mesdames President, honoured chief Ambassadors. We are assembled here today to grant the ancient Right of Conclave. I have answered the petitioner and I deem his request worthy and to be made in sound mind." Burvis inclined her head towards Jerfun, "Let the record note that Ambassador Jerfun stands alone, and that I, Burvis Kermol, beg that the Twelve Pillars give his petition all due consideration and support."

"I now call Jerfun Kermol to the podium."

Burvis took her place at the table, facing the empty podium. Jerfun walked to the front of the room, bowed to the assembled Pillars and stepped up to the lectern. Burvis cleared her throat.

"Do you, Jerfun Kermol, wish to place your petition on the public record?"

"Madame President, I do."

The twelve kerbals at the table sat up a little straighter. One or two of them exchanged brief looks. Up in the press gallery, Dondrin leaned forward intently. Burvis kept her face carefully impassive.

"By order of this Council, a petition so placed shall be deemed accurate and inviolable. Any false statement made therein, whether purposeful or inadvertent, does constitute a betrayal of these Twelve Pillars, punishable consecutively, to the fullest extent possible by law, in each of the Six Regionalities of Kerbin."

"Does now the Petitioner, in full and complete knowledge of the consequences of his actions, wish to place his petition on the public record?"

Jerfun didn't hesitate. "Madame President, I do."

There was a sudden silence. Twelve pairs of eyes stared unblinkingly at Jerfun.

Unseen, Burvis's hands trembled. "Then we beg the Petitioner to speak."

Jerfun bowed. "Madame President, Mesdames President, Misters President, honoured Chief Ambassadors. I, Jerfun Kermol, thank you for granting this Right of Conclave."

He gripped the edge of the lectern. "I claim this right that I may bring the gravest of news to this Council. I For I have witnessed a breach of the sovereign borders of the Regionality of Wakira, and a breach of Grove Law." Jerfun paused. I refer specifically to the Law of Territory..."

"Anyway, g'night, guys. Try and get some sleep - Gene'll get nervous if you yawn your way through the countdown."

The door clicked shut, leaving James and Sherfel alone. James stared into the lamplight, his chair creaking as he rocked back and forth. Sherfel scrunched herself deeper into the couch and picked up her book. She stared unseeingly at her page for a long moment and then put it down again. James's head tilted towards her.

"Wonder if anyone else is still awake?"

Sherfel didn't need to ask where. "Jeb will be," she answered. "According to Wilford he never sleeps the night before a flight. Gene too probably and I doubt they're the only ones. What about you, Jim? Restless night ahead?"

James propped his chin on his hands. "If you'd asked me that a couple of months ago... but right now I've got a pretty good feeling about it. I still think Jeb runs a strange crew and they can still be..."

"Haphazard?" suggested Sherfel.

"Infuriating was the word I was looking for." James was silent for a moment. "After working on Tommal's heat shield though - yeah, I don't have any worries about their engineering."

Sherfel laughed softly. "You get used to it don't you?" She chuckled at James's questioning look. "*Tomm*'s heat shield you said, Jim. Not Pioneer 2's."

James looked at her thoughtfully. "I did, didn't I? That personal touch sure makes all the difference though." He shook his head. "That's what their whole program depends on when you get right down to it."

Sherfel rolled her eyes. "I thought pilots were supposed to be observant. You missed the part where every kerbonaut they've launched either works in Mission Control, or builds part of their spacecraft or does something else in the program..."

"Including making coffee and mopping the floors," said James. "That *really* threw me that first day. Nobody seemed the slightest bit amused - or even surprised - that I was trailing along behind Derny with the coffee trolley."

"Speaking of Derny," said Sherfel, "I think I've finally figured out what to do with his freeze-dried tubers. Remind me to tell him next week."

James grinned. "You get used to that too, don't you? That's one thing I do like about being here - if you've got a problem, you can guarantee that somebody else is working on it too - and won't stop until it's fixed. Not that Rockomax is any different of course, but it's something else that feels more personal here." He leaned back in his chair. "Which is probably why I'm *not* worried about sleeping tonight."

"... and we'll be bringing you more on this story as it develops. This is Capital News at Ten."

Jeb switched off the television and stared wide-eyed at Geneney. "So what do we do now, Genie?"

Geneney ran his fingers through his hair. "I don't know," he said at last, "If this *is* what they think...it could get ugly, Jeb. Really, really ugly."

"And then some," said Jeb, "It'll be the end of the program, Genie, if things get that bad. Who's going to care about spaceflight if their Groves are going up in flames or down with the Blight, or..." His voice tailed away.

"Oh I think plenty of people will, Jeb," said Geneney grimly. "Except that the rockets won't be going very far - and they won't have capsules on top either."

Jeb sat bolt upright. "Well they can pillage *those* rockets from some other spaceship parts company," he said flatly. "Decision made, Gene. I'll ring Ademone now. If Rockomax are still in, we call a general meeting first thing tomorrow morning. Anybody that wants to go back to their Groves, or bail out for any other reason, goes with our sincere thanks and best wishes. If enough of the team are left - we launch! Too bad we never got to build the lander but if this ends up being our final flight, then let's give them all a glimpse of what should have been."

Chapter 42

A Voyage for the Ages

Apart from the last minute furore, thought Wernher, the launch preparations had been surprisingly similar to *Kerbal 2*. The lines of KIS members outside the warehouse to see them off; the ride to the Space Centre in Ornie's truck; climbing onto the back of the truck out of sight of the crowds; waving to those same crowds as they drove past the stands and out to the launch pad.

And here I am again, standing on the gantry outside a three kerbal capsule, waiting for Bob to give the word.

He stared down over the gantry rail at *Pioneer 1*'s gleaming white flanks, which as usual were resplendent with sponsor's logos. From this height, only the chunky blue R and stylised silver engine nozzle of Rockomax's new logo were visible, proudly emblazoned on each lateral booster. The remaining letters and the tail end of their "Think Better - Think Bigger!" slogan were hidden by perspective and distance. Far below that the engines waited.

In the distance, the Space Centre buildings stood silhouetted against the cloudless morning sky. Sunlight twinkled off the corrugated steel cladding of the Vehicle Assembly Building, squat and blocky at the end of the newly laid strip of asphalt linking it to the launch pad. The pad itself was deathly silent. By now, most of the engineers were safely ensconced within the launch bunker, and even the flocks of birds that usually made the gantries their home were nowhere to be seen, or heard.

I wonder if they know something I don't.

The ring of work boots on steel brought him back to the present, as Bob climbed out of the hatch and joined him by the rail. The rest of the pad team stood back at a respectful distance. For a moment the two friends gazed silently across the deserted launch site.

Bob cleared his throat, "Wernher?"

Wernher gestured at the nose cone far beneath them. "There are three LV-T20s down there, Bob. The breakthrough that launched Jeb into orbit and we'll be discarding them less than three minutes into the flight." The chief engineer stared down at the distant launch pad. "You know the LV-T30 is more powerful than the entire Moho stack?"

Bob nodded patiently. "And Pioneer needs three of them just to get off the ground. I know, Wernher." He grinned at a sudden memory, "I'd rather be sitting on top of three LV-T30s than one LV-15 and a pile of Trashcans though."

Wernher snorted. "Indeed." He shook his head. "Dear Kerm - what were we *thinking*? Putting you, Bill, and Jeb inside that contraption."

Bob squeezed his shoulder. "Or you, Lucan, and Gene, for that matter." He tapped his headset. "Jim and Sherf are all set, Wernher. Time to go join them."

Wernher nodded resolutely, handed his spacesuit helmet to Bob, and strode over to the open hatch. Gripping the hand rails tightly, he swung himself down into the capsule, manoeuvring his bulky spacesuit through the narrow gap. Sherfel grinned at him through her transparent helmet. James turned his head, nodded briefly, then turned his attention back to the instrument panel.

As soon as he'd settled into his acceleration couch, Bob climbed into the capsule after him. Wernher watched him work, quietly shifting from side to side in his seat to let him reach all the assorted ports, plugs and sockets of the life-support and communication systems. He grunted as Bob tightened the couch harness, checking that the straps were all lying flat. Satisfied, Bob lifted Wernher's helmet into place, and locked it in place against the neck ring of his suit. He rapped on the transparent bubble for luck, flashed Wernher a quick grin, and plugged his headset into the auxiliary comms port on the side of capsule instrument panel.

"You're looking good, folks. Wave at the Mün for me, and we'll see you all back here next week."

"We'll write you a postcard, Bob," said Sherfel cheerfully, "Can't guarantee it'll get to you before we get home though."

Bob laughed. "Sending it *Pioneer* class will be fine," he said, "I'm closing the hatch now. Good luck."

The hatch swung shut and locked with a clunk. Wernher switched his headset on and surveyed the profusion of switches, buttons, dials and other readouts laid out in front of him. Defining a logical structure and arrangement for the myriad controls had been the hardest part of designing the *Eve* capsule that *Pioneer* was based on. *Even so*, Wernher thought, *the pilots and the capsule systems team managed to hammer out the basic layout remarkably quickly. Another point in favour of Jeb's management style.*

He stretched his legs out, nodding in satisfaction as his boots hit the capsule bulkhead. *Good legroom. Compared to Kerbal 2 at any rate.* A sudden draft from the capsule fans riffled the pages of his checklist book, as the environmental systems kicked in, purging the cabin atmosphere and replacing it with a flight ready, oxygen-nitrogen mix.

He clicked his microphone on. "Flight, Pioneer 1. Purge complete, atmosphere composition is good. Monitoring capsule pressure."

Gene's voice was as matter-of-fact as always. "Copy, Wernher. CapSys reports clean contact on all hatch bolts - please confirm."

Wernher's eyes flicked to the hatch and back to the control panel. "Confirmed, Flight."

"Thanks, Wernher. Sherfel, please go to Loop Two and give me a Go/No-Go on the SAS and guidance platform."

At the commander's station, set after set of warning lights flashed up on James's indicator panel. Wernher saw his lips moving behind his bubble helmet as he paged through his checklist. The main air to ground loop cut in with a burst of static.

"Advisory panels one through three are good, Flight. Standing by for pre-staging and abort-to-orbit checks."

"Understood, Pioneer," Geneney replied. "Wernher, please go to Loop Three, and confirm engine telemetry status. CapSys is on-loop."

"Copy, Flight."

Bob's voice broke in over the main loop. "Capsule pressure is Go, Flight. Pad team proceeding with boost cover closure."

"Thank you, Pad Team."

Page by page, the *Pioneer 1* commander and navigator worked through their checklists, whilst Wernher monitored the booster status indicators. The capsule was quiet, his acceleration couch had moulded itself comfortably around his suit, and the droning fans of the environmental system were almost soporific.

Wernher shook his head sharply, hoping that Sherfel and James hadn't seen him. *I'm sure Jeb would be highly amused if I fell asleep atop of a fully fuelled Mün rocket, but I doubt that my two colleagues here would be too impressed. Nor Gene for that matter.*

"Pioneer 1, Flight. CapSys says we're Go for the reentry battery test."

Wernher sighed inwardly at the undercurrent of dry amusement in Gene's voice. *The joy of suits with medical sensors.*

"Understood, Flight," he replied. "Buses A and B transferred to batteries. Ready for external power off."

The fans stuttered, and the capsule lighting flickered briefly before settling down again. Wernher scanned his system readouts - beside him, James and Sherfel checked their own sections of the control panel. All three kerbonauts reported a successful test.

"We see it too, Pioneer. Reconnecting external power. Guidance is ready for the SME gimbal test."

Wernher flipped a pair of switches, disconnecting the reentry batteries from the capsule power systems, turned to the Service Module Engine panel and threw another set of switches.

"Gimbal motors drawing power. Confirm hand controllers to TEST?"

James gripped the two controllers. "Controllers to TEST, SAS override ON." He carefully tested their range of movement, watching his nav-ball tilt and roll in response. After each deflection, he waited whilst Pioneer 1's onboard computer attempted to re-centre the gimbals.

"Yaw gimbal tracking confirmed...pitch tracking is good...roll tracking confirmed."

"Copy, Pioneer," said Geneney. "OK guys, break until KDS confirmation from Foxham. Moving gantry systems to standby and holding countdown at T minus thirty minutes."

Geneney drummed his fingers on the edge of his console, willing the phone to ring. Around him, fidgeting flight controllers flicked through logbooks and swung back and forth on their chairs, sneaking surreptitious glances at his console. The open communication loop to *Pioneer 1* filled the room with a faint hiss of static, the crew as quiet as their controllers. Above their heads, the countdown clock was poised at T minus thirty minutes.

A controller coughed. Geneney paged his headset from one loop to the next, eventually settling on the public link from the KBS commentary box. Leland was busy running through the countdown, explaining the current hold to the crowds in the stands and, Geneney noted, describing the Rockomax payload as a docking target. *We did a good job keeping this flight quiet but Leland is pretty sharp. Maybe he's just playing along.* He clicked his headset back onto the air-to-ground loop. *Still nothing from the capsule unless you count heavy breathing.* He switched over to the Life Support console.

"Life Support, Flight. Everything OK in there, Ribory?"

"They're fine, Flight. Picking up elevated heartbeat readings for Wernher - nothing serious - but the other two could be tucked up in bed."

"Yeah, Jim and Sherf are pretty level headed. Keep an eye on Wernher though - he'll be fretting about his engines. Thanks, Ribory."

"No problem, Flight."

A shrill jangle jerked everyone's attention back to their consoles. Heart hammering, Geneney picked up the phone.

"Barkton Control. Gene here. Yes, we wondered what the delay was. No open tickets now, though? Understood - we'll hold until then and pick up our countdown at T minus thirty. Thanks, Nelton - Barkton Control out."

He raised his voice above the sudden babble from the consoles. "We're up, people! Flight Dynamics, Guidance, you're on Loop 2 - lets get that trajectory data updated! Booster, give

me a fuelling status! CapSys, we'll be picking up RCS and SME pressurisation in twenty two minutes!"

Geneney clicked his microphone on. "Pioneer 1, Flight." He paused. "KDS-1 is on orbit, and waiting for a driver. We're Go for countdown restart at T minus thirty."

At the life support console, Ribory watched Wernher's pulse rate jump.

"RCS and SME pressurisation confirmed, Flight!" Wernher called. "Bringing service module batteries online."

"Copy that, Pioneer. APU disconnect, Go."

Wernher scanned his instruments and glanced up at James and Sherfel. Both nodded.

"Looking good, Flight. Capsule on internal power."

"Copy, Pioneer. Pad Team, are you clear?"

"Clear, Flight. Gantry systems at launch positions."

"Understood, Pad Team. Flight Team, status report please. FD?"

Lucan's voice caught in his throat. "We're Go, Flight."

"Guidance?"

"Go, Flight!"

"Booster?"

"Ready, Flight!"

Aboard *Pioneer 1*, Wernher's blood pounded in his ears. Sherfel lifted both hands from her couch, palms facing out. Wernher and James slapped their gloves into hers.

"Spacecraft?"

"GO!"

Now, even Geneney's voice was on edge. "Booster on internal power. First stage gimbals, Go. Primary and backup controllers, Go. Clear for engine start."

Wernher's eyes were fixed on the engine readout panel. He nodded tersely as the final status reports came over the air, thoughts racing over the engine schematics, trying to remember the slightest problem during manufacture.

"Sixty seconds, Pioneer. Guidance is internal. Auto-sequencer, Go."

Ludicrously, it occurred to Wernher that none of them had sent a launch message for the crowd. *Leland will take care of it. He's heard enough of them by now.*

"Forty seconds, Pioneer. Go for launch."

"T minus thirty."

Wernher swallowed hard, sweat beading on his brow.

"T minus twenty."

His mind was back at the main test stand, LV-T30 fixed in place, a complex assembly of pipes, valves and turbo-pumps that suddenly seemed far too fragile for what was about to be asked of them.

"T minus twelve...eleven...ten...nine...eight..."

Ignition sequence starts.

"Six...five...four..."

The six first stage engines lit with an earsplitting roar, almost drowning out Geneney's voice. Green lights flicked on across the control panel, the entire rocket shaking with barely leashed fury.

"Two...one...and Liftoff! All engines running!"

"Clock started!"

"Tower clear!"

The engines thundered out a throbbing two tone disharmony; the deep bellow of the LV-T30s beating against the higher pitched bass growl of the smaller LV-T20s. Inside the capsule, Wernher lay flat on his back, swaddled in a discordant, shrieking cocoon of sound.

Now this is what I call a rocket ship!

His head sank back into his acceleration couch, eyes still level with the control panel, which was reassuringly free of warning lights, despite the shaking.

And I can still see the instruments.

Above his head something began to rattle. The broad grin on his face slipped a notch and he reflexively searched the capsule for loose equipment. Then the engine noise abruptly shifted pitch, before everything went suddenly quiet. James's unperturbed voice filled his ears.

"Flight, Pioneer 1. Vehicle is supersonic, lateral boosters throttled back."

"Copy, Pioneer. We read you through max Q. Guidance is green, pitch and roll is Go."

Wernher heard the couch frame creak and grunted under the growing weight on his chest, squinting at the blurred displays on the vibrating instrument panel. The flight clock clicked past the two minute mark, and he slowly lifted one arm, fighting to hold it steady against the g forces, finger aimed at the LB-JETT button.

"Decouplers A through C armed. Go for T20 shutdown and detach."

The LV-T20s flamed out. Wernher's stomach lurched as the sudden drop in acceleration flung him against his harness. Three lights blinked out in front of him, a curiously muffled bang marking the departure of the lateral boosters. Relieved, Wernher let his arm drop back onto his couch. The capsule was still shaking but now the vibrations were smoother, a deep seated, soothing rumble replacing than the bone jarring discord of launch. A distant part of his mind noticed that the mysterious rattling hadn't returned, and was glad.

The velocity and altitude displays on the instrument panel raced upwards. Wernher felt his weight shift, harness straps pulling on his shoulders as *Pioneer 1* gradually heeled over along its pre-programmed flight path. Then his heart soared at the sudden announcement from Mission Control.

"Thirty-six kilometres. Pioneer 1 - your trajectory and guidance are Go!"

If James was surprised at the unexpected altitude check, it didn't show in his voice. "Flight, Pioneer 1. Go, at thirty-six kilometres." Out of the corner of her eye, Sherfel saw Wernher's head jerk upwards. She glanced at him and smiled at his exultant expression.

Shadows slowly drifted over the Kerbal 2as it coasted onwards, lit from beneath by the bright glow of Kerbin's atmosphere. It rocked slightly as it reached the top of its thirty-five kilometre high arc and started the long descent. Wernher could hear a gradually increasing thrumming noise from outside the capsule as it dropped back into thicker air.

"Not today we don't"

Wernher snapped out of his reverie thankful that neither the rest of the crew, nor Mission Control chose to comment on his outburst. Flushing, he checked the instrument panel, nodding in satisfaction as he keyed his microphone.

"Flight, Pioneer 1. Tank pressures nominal, upper stage chilldown started."

"Copy, Pioneer. Decoupler D armed. Go, for staging."

The main engines shut down, sending waves of flame rolling up the booster. Seconds later, the spent first stage and interstage detached and tumbled slowly away.

"Second stage ignition confirmed!"

Pioneer 1 exploded out of the fire, accelerating hard on its way to orbit.

"KDS-1 acquired. Range five-zero dot two kilometres and closing. Requesting braking burn check."

Heart still pounding with adrenalin, Wernher forced himself to breath in through his nose. Raw, unfiltered sunlight washed through the capsule side window and over the legs of his spacesuit. The view through the smaller rendezvous window above his head was a uniform inky black, and for a moment he wished he was in James's seat and able to snatch a glimpse of Kerbin outside. Experimentally, he lifted his arm and grinned in delight as it hung effortlessly in front of him.

"Good burn, Pioneer. Go for plane alignment at FET five four dot three zero."

Wernher glanced at the flight clock, currently showing a flight elapsed time of just over eighteen minutes. Solenoids thumped open and the sunlight drifted slowly over his legs as James manoeuvred *Pioneer 1* into position.

Plane matching on the first orbit. These guys aren't just good in a simulator. Suits me - the quicker we hook up with the departure stage the better.

Pioneer 1's thrusters spat a long burst of fire, tilting its orbital plane by a tiny fraction. Shorter bursts of flame tipped it back over, pointing its nose along its direction of flight and aiming it squarely at a shining point of light in the distance. The point drifted closer, first becoming a disc and then gradually resolving itself into a slender, gleaming tube. *Pioneer 1* slowed, thrusters flickering as they delicately edged the capsule into position.

"Pioneer 1, Flight. Go for docking."

James nudged his hand controllers. Outside the window, the immense silver tube drifted towards them. There was a faint bump, followed by the staccato rattle of docking clamps slamming shut. Readouts lit up across the instrument panel and James sighed with relief.

"Flight, Pioneer 1. Hard dock and connection to KDS systems confirmed." He toggled his headset to their private communication loop.

"OK, we've got two orbits in our TMI window. Plenty of time, so let's take it steady and do this right first time."

Sherfel nodded, fingers tapping away at the flight computer keyboard. Wernher grunted in reply, already busy at the engineering station. Satisfied, James turned to his own section of the instrument panel and flipped his checklist over to the next page.

Wernher looked up from his instruments and glanced at his fellow crew members. Sherfel stared straight ahead through the rendezvous windows. James glanced back at him and nodded fractionally. For a moment, there was silence, each kerbonaut all too aware of what that silence meant. Then Wernher cleared his throat.

"Everything looks good from here."

"Guidance platform is Go," replied Sherfel quietly.

James simply leaned forward and clicked a single switch. "Flight, Pioneer 1. Our board is green; requesting telemetry check."

The response from Mission Control was similarly subdued. "Understood, Pioneer. Stand by."

Everyone in the bunker silently watched Geneney push back his chair and beckon Jeb over to the console. He stood up, took off his headset and handed it over.

"This one's all yours, Flight."

Jeb raised one eyebrow. Geneney just dipped his head and deliberately stepped back from his console. Jeb nodded in quiet thanks, and took his place.

"Pioneer, this is Jeb. We copy your board is green. Standing by for controller checks."

Aboard, *Pioneer 1*, James ground his teeth in frustration. *This is really not the time for more KIS surprises..* He looked over at Wernher, and was surprised to see the engineer staring calmly back at him. *As if he'd been expecting this all along?*

Jeb gazed slowly around Mission Control, locking eyes briefly with each controller. One by one, each of them raised a thumb. He braced himself, made a note on Geneney's flight log, and clicked his microphone on.

"OK, Pioneer, I've got a roomful of kerbals here telling me you're looking good." Jeb paused, shifting into Geneney's formal flight director's tones.

"Pioneer 1, you are Go for TMI."

"Copy, Flight. Go for TMI. KDS ignition in twelve minutes and counting."

Jeb began to work the flight director's console, pulling up engine telemetry in preparation for the long burn out of Kerbin orbit. Behind him, Geneney wasn't at all surprised by the two ink-rimmed blotches spattered across the page of his logbook.

"Eight dot two kps. KDS tank pressures holding steady, guidance is nominal. Clear telemetry links through primary and backup channels."

"Pioneer copies, Flight."

Fercan looked up from her terminal, frowned briefly, and returned to the lines of code filling the screen. She tapped a key, waited a moment for the compiler to run, and then swore under her breath at the screenful of error messages. *It'd be quicker to re-write this myself than spend any more time untangling this mess. Yeah, yeah, keep it compact, but overflow loops in this day and age? Give me strength! Someone should tell Corvan to comment this junk, too.*

"Ten dot one kps. Ten dot two, Ten dot... and shutdown! We're running the numbers, Pioneer but that looks like a good burn."

Fercan's head jerked towards the radio. *Ten point two kilometres per second? What the...?* Her fingers rattled across the keyboard, clearing the compiler report and starting up an orbit analysis program. *OK, assume a circular starting orbit, call it three hundred kilometres, final velocity, ten thousand two hundred metres per second.* "Her eyes widened. *That can't be right. That apoapsis would put them way beyond...Oh sweet Kerm.*" She grabbed the phone and dialled Corvan's number, fingers stumbling over each other in her haste.

"Beta Station. Corvan here."

"Corvan - it's Fercan! Are you following this?"

"Fraid not, Fercan," said Corvan glumly, "Yeh know how it works during a flight - tracking stations are full of Rockomax or KIS controllers."

"Have you not got a radio?"

"Aye, but I switched it off," replied Corvan, "Sounded like that KBS fella had it right - just another docking and rendezvous practice."

"Corvan - I think they finally got around to joining stuff to the capsules in orbit."

Corvan's voice was suddenly, studiously casual. "Oh aye? What d'yeh reckon they stuck on it?"

"Another rocket," said Fercan simply, "Unless you can think of any other way they could boost up to ten kps."

"What?!"

"No joke," said Fercan, "I'm going to rough out a trajectory before calling him, but I think the Director needs to know about this."

"Och, come on," said Corvan, "There's only one place they're going."

"I know," said Fercan softly, "Still want the rough numbers before going to Lodan though. We've got their final speed, launch time, and when they started the burn. That should be enough to tell us whether we're both reading too much into this."

"Hmph. Time to call in that favour from Germore's team I reckon. A bit of time on their dish should help you firm up those numbers."

Fercan stared at the plots on her screen. *Too many unknowns for a proper calculation, but yeah - there's only one place they're going.* She grinned, as she picked up the phone and started to dial. *And I've wanted to do this for a long, long time!*

The phone rang.

"Lodan."

"Fercan here, Director. We're tracking an outbound spacecraft from low Kerbin orbit."

Lodan sat up straight. "*Outbound?*"

"Yessir. Trans-Munar trajectory." A pause. "We're picking up voice comms, sir - it's Pioneer 1."

Lodan took a deep breath. "Thank you, Fercan. I shall be down at Tracking shortly. Please keep me informed of any developments in the meantime."

"Absolutely, sir!"

The phone dropped onto its cradle with a faint click. Lodan looked at it curiously for a second then slammed both fists down onto his desk.

"Dammit, Ademone! I gave you that funding to keep those KIS idiots in check: stop them pulling any more damn-fool stunts!"

The waste paper basket ricocheted off the wall, scattering its contents across the carpet. Lodan threw himself back in his chair, making it creak in protest, "I hope to all the Kerm that you bring your ship of happy fools home in one piece, Ademone! Kerbin *needs* this program and sending three corpses around the Mün is not going to help!"

Leland frowned. *Why switch flight directors before a burn? That doesn't make any sense.* He watched all the controllers slowly give Jeb the thumbs up. *And neither does that. What on Kerbin is going on here?*

"Pioneer 1, you are Go for TMI."

Leland frowned. Something about that sounded familiar. Then his jaw dropped. He shoved his microphone at his astonished camera operator and bolted for the press room door.

"Get this, Don! If you love your job, get every last minute of this!"

The press room was empty: no smell of day old coffee from the stove, nobody asleep on the threadbare couches, nobody on the phones or sitting writing up their articles. Leland hurled himself across the room, grabbed the nearest phone and punched in a number.

The phone rang.

"KBS News. Jonbo here."

"Jon - it's Leland! No time to talk - need to get back to Mission Control, but I'm gonna need a second crew here! And send another one over to Foxham - get them to Rockomax before anybody else does! And a research team on those kerbonauts - we'll want the family interest angle!"

Jonbo's voice sounded dangerously calm. "And why would I want to do that, Leland? You don't think that maybe, just maybe, we've got other news to cover right now?"

"Jon - have you been watching my broadcast? Didn't you hear what Jeb said?!" Leland's voice cracked. "We've got a hero story here, Jon - and that's *exactly* what everyone needs right now!"

Jonbo sighed. "I'm watching you, Leland, but for one damn moment, just pretend that I haven't been following the space program, and that I have no idea what Jebediah was talking about. It shouldn't be too hard. Now for the love of your mother's Grove, will you please tell me what on Kerbin is going on?"

"That's just the point, Jon. This isn't anything to do with Kerbin." Leland paused. "TMI. Trans-Munar Injection. The Mün, Jon - they're going to the Mün."

Chapter 43

Mün

Flight Elapsed Time: 2 days, 6 hours, 22 minutes.
274,000 kilometres from Kerbin.
On board *Pioneer 1*.

Wernher tapped the gauge. "Secondary evaporators holding," he reported. "Coolant flow through main evaporator A stopped. Thanks, Flight - looks like that's fixed it."

"Understood, Pioneer. Please give me a reserve coolant level check."

"I'm seeing a 20 percent margin, Flight."

In the couch beside him, Sherfel wiped her forehead and grinned. Over at the commander's station, James's face remained carefully impassive, but even in zero-gravity, the set of his shoulders told their own story. The drop in tension over the air to ground loop was palpable.

"That's about what we're seeing too, Pioneer." Geneney paused, and Wernher heard a mutter of background conversation. "OK, team, the bad news is that CapSys isn't too happy about that leaked coolant."

"And the good news, Flight?" said James quietly.

"Is that the Systems team have just dropped the answer off at my console. It's a bit...homely - .but it should do the job. Wernher, I want you to head down into the lower bay and retrieve that roll of sealant tape. Jim, Sherf, we're going to need the covers from your checklists and a couple of empty ration packs - the cleaner the better."

"On it, Flight." Wernher eased himself over the edge of his couch and swung himself gingerly into the space under the crew seating. Small and cramped back on Kerbin, the lower equipment bay felt much roomier in free fall. Wernher squeezed past the sanitation

facility and twisted round to face the tool storage bin. *Contents may have shifted in transit.* Carefully, he slid it open, retrieved a roll of silvery tape, and just as carefully, slid it closed.

"Got the tape, Flight."

"Good. Pass it up to Sherf. CapSys is coming on loop to take her and Jim through the next part. In the meantime, I want you to unscrew the main hose from the sanitation bowl. Sherf - please confirm waste valves A and B are closed."

Wernher heard shuffling overhead.

"Closed, Flight."

The sanitation facility was designed to be repairable in flight. Wernher braced himself awkwardly against the bulkhead and fumbled with the first of two large butterfly nuts securing the outflow hose to the bowl. Above his head he could hear ripping noises and the squeaky rasp of sealant tape peeling off its roll. Grunting with effort, he leaned on the nut as best he could, and felt it shift slightly in his hands.

Must remember...to tell the capsule team... to grease these things before flight.

Muttering under his breath, Wernher managed to loosen the first nut. The second one was more tractable. He spun it free, carefully leaving it on its bolt and easing the two halves of the locking clamp apart. He held his breath, and carefully pulled on the outflow hose.

"Hose is free, Flight."

"Good work. Now I need you to tape the nozzle to the open end."

Sherfel popped her head over the edge of her couch and passed him the roll of tape and a creased cardboard cone with a ragged fringe of plastic bag poking from one end. "Tape the liner to the hose first, " she said, "Then push the nozzle over the top, and tape that on too." She watched Wernher tear off a length of tape. "Here - I'll do that if you stick our space-grade vacuum cleaner together."

Wernher and Sherfel surveyed their handiwork with pride.

"Couldn't have done better if we'd brought the parts with us, Flight," Sherfel said happily.

"What's next?"

"Stow the nozzle in the bowl and strap in for the ullage burns," said Geneney. "FD has the attitude numbers."

Wernher nodded. "Good," he said. "Better than chasing the stuff all over the equipment bay."

"That's what we thought," said Geneney, "We'll try and put it all in range of your hose too."

Wernher waited until Sherfel was back in her own couch before pulling himself into his seat and strapping in. James glanced over at them, nodded, and took hold of the RCS controls.

"Yaw then roll, Flight?"

"That's affirmative, Jim. Yaw, negative-y translation pulse, roll, plus-z translation pulse."

James crisply worked the controls. Wernher felt *Pioneer 1* shift around him, nudged by the fleeting bursts of thrust.

"Manoeuvre completed, Flight."

Wernher was already unbuckling his harness. "Access panel one, Flight?" he asked.

"Access panel one," said Geneney.

Wernher twisted four restraining latches out of the way, and lifted a square metal panel from its frame in the bulkhead. Working slowly in the confined space, he slipped the panel between the panel and the sanitation bowl, and peered inside the maintenance compartment. Shimmering, oily globs of coolant quivered near the bulkhead, but as far as he could see, there weren't any other spills trapped in the maze of plumbing and wiring looms. The globs quivered, rainbows of refracted light scurrying over their translucent surfaces.

"The ullage manoeuvre worked, Flight," he called. "Unstowing suction nozzle." He retrieved the hose and poked it cautiously towards the floating coolant.

"Ready."

Sherfel flipped a switch. "Waste valve A open," she reported.

Wernher reached around the edge of the bulkhead, fingers probing for the waste disposal controls. The button slid into its housing with a firm clunk, followed by a whirr of fans starting up. The quivering mass of liquid trembled, stretched and ruptured into a shower of smaller globules which shot towards the makeshift suction nozzle. Most of them slipped neatly inside, others splashed off the surface, fracturing into yet smaller droplets. Patiently, Wernher chased them down, gently squeezing the cardboard cone to keep it open.

The last rainbow droplet disappeared up the hose. Wernher waited for thirty seconds before switching off the fans. Instantly, Sherfel toggled both switches on her console.

"Waste valve A closed. Venting through waste valve B." She glanced through the side window and was rewarded by the sight of a shower of silvery droplets streaming out from *Pioneer 1*.

"Venting completed. Closing waste valve B."

"Copy, Pioneer. Good work."

Under the couches, Wernher was busy replacing the access panel and reconnecting the suction hose. He stowed the stained and oily cardboard nozzle safely away in a waste storage bin and pulled himself back into his couch.

"Pioneer 1, Flight. FD advises that you may want to check your velocity."

All three kerbonauts automatically looked at the computer readout on the central control panel.

Wernher's eyes shone. After two and half days of steady deceleration, *Pioneer 1* was finally beginning its long fall towards the Mün. James smiled faintly. "We see it, Flight," he said.

"What's our free return status?"

"Free return is Go, Pioneer. Flight dynamics are running the numbers for platform realignment, star sighting checks and MOI. Guidance are prepping your burn data for midcourse correction two."

"Understood, Flight. Standing by."

The RCS valves thumped shut. James released the controls and keyed his microphone.

"Flight, Pioneer 1. Midcourse two executed. Board is green."

"Confirmed, Pioneer. Give us another ten for MOI burn data."

Wernher glanced out of the rendezvous window above his head and abruptly stiffened. "Oh my," he said softly. Sherfel glanced at him curiously, eyebrows lifting as she followed his gaze. "Ohhh. Jim, pull your head out of that checklist for a moment and *look*."

James looked up irritably. Then he caught a glimpse of blue out of the corner of his eye, and snapped his head round reflexively. His frown softened.

"Doesn't look like much from out here, does it?" he said wonderingly.

"Lonely, and terribly, terribly fragile," agreed Sherfel. She clicked her microphone on.

"Flight, Pioneer 1. Be advised that we have a visual on you - and you're looking awfully pretty, but awfully lonely out there."

"Say again, Pioneer?"

"We've got Kerbin, Flight," said Sherfel quietly. "The whole planet framed in one rendezvous window."

There was silence from Mission Control, then Geneney pulled himself together with an audible effort. "You might want to get a picture of that, Pioneer," he said, "I think everyone back here could use a reminder of what they're squabbling over."

Sherfel sighed. "Still no news from the Twelve Pillars then?" she said.

"Not since their appeal for calm," replied Geneney, "But that's not stopping every politician and pundit on Kerbin from weighing in with their opinion. The journalists are having a field day."

"I can imagine," said Sherfel heavily, "Some heated opinions too, I bet."

"Just a few," said Geneney dryly. "Although you'll be happy to know that KBS are running stories on three kerbals who are - and I quote - "a shining example of kerkalkind at its best, that should give us all confidence that we can overcome this greatest of challenges." "

"Sounds like somebody is doing a decent job anyway," said James, "Who are they?"

Geneney chuckled. "I'm talking to them right now," he said, "How does it feel to be a beacon of the kerkal spirit?"

Wernher choked. James merely blinked. "Seriously?" he said.

"Seriously," said Geneney, "I'm guessing Leland found a friendly ear somewhere because KBS are suddenly running a *lot* of stuff on the space program, and especially on you three."

"The right stuff, I hope?" said Sherfel lightly.

"Let's put it this way," said Geneney, "Until yesterday, I'd never seen Jeb blush before."

"That takes some doing," laughed Wernher. "Hope somebody managed to record that, Flight."

"We did," said Geneney, "as well as the 'Engines and Engineers' interview with Hanbal and Ornie."

James's mouth twitched. He struggled for a moment and then burst out laughing too. "They managed to interview *Hanbal*?"

"And they'll be interviewing him again if Ademone has any say in it," said Geneney. "Once somebody at KBS had the bright idea of putting him in front of a chalkboard, he stole the show! The interviewer got so caught up asking his own questions that he barely had time for his script."

"Ademone had better hope the Institute doesn't try to lure him away from Rockomax," laughed Sherfel.

"Funny you should say that," Geneney replied. "Jeb sent them a recording of the interview, marked 'lecturer training material'." He paused. "Anyway - back to business, team. I've got the platform realignment numbers from FD and then we have a service module engine to check over."

"Platform reference set for MOI. Attitude is green, SME is good."

James glanced over at Wernher, who responded with a terse nod.

"Copy, Flight. Burn program loaded, SAS to AUTO. Tank pressures nominal, all valve controllers drawing power."

"We see them, Pioneer. Three minutes to loss of signal."

"Confirm MOI at LOS plus twelve, Flight?"

"That's confirmed, Pioneer. Ignition at FET six eight dot two zero dash one five."

The three kerbonauts checked their instruments. Wernher wriggled his shoulders, trying to dislodge the droplets of cold sweat gathering at the base of his neck. He rolled his head to one side.

"Hey - I've got nothing out here. No stars, just blackness!"

"Copy that, Pioneer," Geneney said calmly, "Looks like you found the Mün. One minute to loss of signal, all systems Go."

"Thanks, Flight." replied James, "We'll see you right back here in a couple of hours."

"We'll hold you to that, Pioneer. Twenty seconds."

Wernher clenched his jaw as Geneney counted down the last few seconds. He sensed Sherfel restlessly scanning the navigation panel beside him.

"Three...two...one..."

The air to ground loop faded into static. James switched off the radio. "Right on time," he said with satisfaction. "Twelve minutes to get squared away for Munar orbit insertion."

Wernher fought to keep the impatience out of his voice as he read off the engine settings for the third time. *He does have a point. We only get one go at this.* Beside him, Sherfel checked and rechecked the navigation panel, fingers shaking on the keyboard.

"Three minutes to ignition. Crew strapped in for burn?"

"Navigation station ready."

"Engineering station ready."

At sixty seconds, a blue light started flashing on Sherfel's panel. She took a deep breath, held it, and pushed the PROCEED button. Beside her, James watched the mission clock intently, hand hovering over the manual ignition controls. The clock clicked over from nineteen to twenty minutes.

"Fifteen seconds."

"Ten seconds."

"Five...four...three...two..."

"One."

The service module engine lit. *Pioneer 1* shuddered briefly and Wernher glanced nervously at the engine displays. James lifted his hand carefully away from the manual controls, slowly and deliberately resting it on the side of his couch.

"Forty seconds in. How are we looking, Wernher?"

"Looking OK. Tank pressures holding, helium drop is on the curve."

"Not getting any more shaking anyway," said Sherfel.

"No," said James, "Gimbal settings from the ground weren't quite right is all. Nothing the computer couldn't handle. Two minutes in."

"Two?" said Wernher. "Feels like double that."

"Longest two minutes of my life," said Sherfel. She grunted. "Heaviest too."

"Only point three two gee," said James. "Three minutes in."

Pioneer 1 soared into the Munar dawn, engine bell glowing a baleful red in the vacuum. Grey light spilled through the capsule windows, adding a ghostly overlay to the cabin lights. Wernher kept his eyes firmly on the engine readouts.

"Minor fluctuations in helium pressure. Propellant levels good."

James reached for the engine shutdown button. "Thirty seconds to go. Twenty..."

Three pairs of eyes watched the mission clock tick upwards.

"Three...two...one..."

"Shutdown!"

Sherfel's fingers raced over her computer keyboard. "Delta-v within predicted limits." A broad smile lit up her face. "and we have a periapsis! Two two five by one six two!"

James blew out his cheeks. "Made it," he murmured, "we actually made it." He shook his head. "Time to safe the SME, then we can take a look outside." He smiled. "Our good flight director has given us the traditional KIS sightseeing orbit, but after that we've got a *lot* of photography to fit in."

Pioneer 1 drifted serenely along its calculated path, a tiny, twinkling outpost flying over the slate grey plains and shadowed craters of the Mün. It's wide eyed crew pressed up against the spacecraft windows, gaping at a vista both familiar and utterly alien.

Viewed from low orbit, Kerbin's ancient satellite was pockmarked with thousands upon thousands of craters; from barely visible cosmic pinpricks, to colossal scars gouged out of the surface and surrounded by great rays of ejecta blasted out from deep within the Munar crust. The landscape was brutally sharp, with no atmosphere to wear down the mountains, blunt the crater rims, or shroud them both behind a blurred veil of gases.

Suddenly the unrelenting grey horizon was broken by a glimmer of azure light. A small blue-green marble climbed into the sky, a radiant jewel hanging in the infinite midnight. Girt with snowy white clouds and cloaked in soft, diffuse sunlight, Kerbin slowly rose above the Munar mountains.

Click...click...click...click...

Geneney sat helplessly at the flight director's console. The flight dynamics team were gathered around Lucan's console studying the data from the abandoned Kerbin departure stage. The other controllers stared at blank displays or screens full of static. The main tracking screen showed a stylised image of the Mün, sitting in one loop of a dotted figure-eight.

Jeb paced up and down behind him, alternately staring at his boots and scowling at the mission clock. At the back of the control room, Leland tapped his microphone, the faint clicking of fingernail on steel a tinny counterpoint to Jeb's footsteps. Don fiddled half-heartedly with his camera, his gaze also fixed on the mission clock.

A muttered word from Lucan sent the rest of his team back to their console. He pulled on his headphones, his microphone picking up the faint rasp of the headset rubbing against his scalp, and broadcasting it throughout the room.

"Flight, FD."

"Go ahead, FD."

"Five minutes to prime reacquisition, Flight."

"Copy, FD."

Geneney picked up his coffee cup, and promptly set it down again. *Empty. Just like the last time I tried.* Leland noticed his fidgeting, put two and two together, and handed his microphone to Don. He disappeared into the Press Room, returning with a steaming mug of thick, elderly coffee. Noses twitched around the room, as he carried the mug over to the flight director's console, and set it down within easy reach. Geneney gave him a grateful thumbs up and turned his attention back to the screens.

"One minute to prime, Flight."

"Thank you, FD."

The seconds trickled away. Then every console in Mission Control lit up amidst a clamour of voices.

"Flight, FD. We have telemetry!"

"CapSys here - they're back, Flight!"

"...best view from Wernher's window. Can you roll..?"

"This is Propulsion - receiving engine status!"

"Kerm but that's pretty! One for Jeb's wall..."

"Flight, Pioneer. We're getting a lot of comm noise here."

Geneney leapt to his feet and punched the air. Unnoticed, his headset cord ripped free of the console, flapping around his neck like a high tech cravat. He grabbed his mug and

hoisted it in a toast to the flight controllers, an ear-to-ear smile lighting up his face. A huge cheer went up as Jeb bounded forward and pulled the flight director into a great bear hug.

Aboard *Pioneer 1*, a series of pops and crackles echoed across the air to ground loop, followed by Geneney's cheerful tones.

"Pioneer 1, Flight. Welcome back guys - how does the Mün look from up there?"

"Big, grey, and beautiful, Flight," Sherfel called out. "Especially with old Kerbin on the horizon over there!"

"Wish I could see that, Pioneer!"

"Wernher's taking the holiday snaps as we speak. We'll make sure to keep one for you!"

"Better make that two - Jeb's already jabbering on about his office wall."

Sherfel grinned. "Copy that, Flight."

"Make that three, Pioneer - KBS are looking excited too."

"I'm pretty sure we can get a couple more on the next orbit," said James dryly. "Flight - what's our SME status?"

"Propulsion team are looking over your telemetry as we speak, James," answered Geneney. "Flight dynamics are checking your TKI update - we'll send you the comparison data once we have it."

"Any updates to MOI-2?"

"Negative. We're still aiming for circularisation on orbit three. The rest of the flight plan is unchanged: press interview on orbit two, photo-reconnaissance on orbits three through five, including plane shifts, TKI on orbit six."

"Understood, Flight. Tell KBS we're sorry about the TV camera."

"Not your fault, Pioneer. We'll have a look at it once you get home."

After the first leisurely orbit of the Mün, the *Pioneer 1* crew settled into a steady routine of monitoring the capsule systems, surface observations, and photography. Looking back on their journey, Wernher would remember their one meal break as 'the most surreal picnic of my life', bobbing against the capsule window, ration pack in one hand, staring out at the Munar surface. James would talk about the relief of completing every orbit with a systems check from Mission Control. Sherfel's lasting memory was of the Far Side. On one side of the Mün, three kerbals in their own tiny world. On the other, and hundreds of thousands of kilometres away, everything and everyone else that she'd ever known.

But all of them spoke of the engine. As Wernher would put it many years later. "None of us ever mentioned it on the flight. Me least of all - I mean, I designed the thing, and helped to build it. What could I say after that? Besides, there wasn't any point - if it fired, it fired. If it

didn't, we had our backup options, and if they failed too, then that was it. I don't think that stopped us *thinking* about it though, and I know I was always pretty relieved to get a good telemetry check from Gene on each orbit. I guess I don't need to say that I was even more relieved when we didn't need the backup options on orbit six."

James squeezed the last of the creva stew out of his ration pack and chewed it thoughtfully. He glanced at the comms panel, checking that the air to ground loop with Mission Control was switched off, then turned to face his crew.

"Wernher," he said at last. "Now that we've finally got some downtime, perhaps you could answer a question for me?"

Wernher looked at him quizzically. "I can try," he replied. "What is it?"

"TMI," said James slowly, "I saw your face when Jeb came on-loop - it looked like you were expecting it?"

Wernher shrugged. "I wasn't told either," he said, "but Jeb's been working towards this flight since he was a student at the Institute. If he wasn't up here himself, not a single kerbal in the KIS would have begrudged him the flight director's seat, Gene least of all."

Sherfel blinked. "How old is Jeb?" she asked.

"He was nearly nine years out of the Institute when we launched the Kerbal 1," Wernher said quietly, "and that wasn't yesterday."

For the first time that Wernher could remember, James looked genuinely impressed. "That's a long time," he said softly. "And when his dream flight came up, he still didn't pull the boss slot."

"No," said Wernher. "We would have given it to him, but Jeb's always been scrupulous about fair crew selection. You wouldn't have guessed it from my tutorial group, but he's grown up to be one hell of a leader. I doubt anybody else could have kept us going long enough to see the Kerbal 1 fly."

"You were Jeb's *tutor*?" exclaimed Sherfel.

Wernher nodded. "And supervisor for his final year project."

Sherfel caught the shift in his voice. "Sounds like there's a story there," she said, checking the flight clock. "And we've got a couple of hours before the next systems check. I could use something to pass the time."

The canteen doors swung shut. Wernher looked curiously at Jeb Kerman, sitting alone at a nearby table, prodding an unappetising mush of tubers, beans and greens around his plate. He walked over and sat down by the younger kerbal.

"Mind if I join you, Jeb?"

Jeb laughed hollowly, "Sure. There might even be some stew left if you're unlucky."

Wernher's face fell as he took in the empty canteen. "Oh well," he said, "Looks like sandwiches again. Anyhow - what's up, Jeb? Not like you to be sitting here on your own."

Jeb looked moodily at his tutor. "Final year project." he said briefly, "Still can't think of anything to do."

"I thought you were helping Bill with his stability augmentation system?" said Wernher.

"Yeah, I thought about that," said Jeb, "but I want to build something, Wernher. Not a mockup for a wind tunnel, not a chunk of circuitry to plug into a test sim. I want to take something outside and see it fly."

"Ahh," said Wernher carefully, "I think I see the problem."

Jeb pushed his plate away. "Yeah. I don't think a hobby shop plane is really going to cut it. What about you, Wernher? How are the jet intakes working?"

Wernher glanced around surreptitiously. "Variable geometry pre-cooling intakes," he said absently, "Theory looks sound, if I can build a light enough heat exchanger." He looked at Jeb thoughtfully. "I've been working on a side project though." He got to his feet. "C'mon. I think you need to see this."

The two kerbals crossed the main quadrangle of the Kerbin Aeronautical Research Institute and headed for the large blocky building of the Jet Propulsion Department. As they walked, Jeb tried to keep up with Wernher's muttered monologue.

"So anyway, I figured that if you can't get enough air through the intake at that altitude, then why not store it onboard. Or if not air, then something that would do the same job. Then I realised that you could power the whole aircraft like that - and with a much simpler engine. Just a pair of turbo-pumps, a combustion chamber and a nozzle really, although getting the details right was tricky. I thought about solids for a bit but they're not very controllable."

Jeb choked. "You seriously thought about propelling an aircraft with fireworks?" he spluttered.

Wernher looked around frantically. "Shhhhh," he whispered, "Yes, fireworks basically, but a bit more refined." He pulled a key out of his pocket and unlocked the side door to the JPD. They hurried down the corridor to Wernher's workshop.

"What's all this whispering and secrecy for?" asked Jeb.

Wernher gave him a sidelong look. "Well partly it's because I'm not really ready to show this to anyone yet," he said, "but also, I've ummm borrowed one or two things from the lab to build the D1."

"D1?" said Jeb.

"Demo 1," said Wernher, stuffing equipment into two large bags. Jeb spotted a pair of gas cylinders and what looked like a tripod stand. "Not a very original name I admit, but nice and anonymous. OK, that's everything - let's go!"

"Wernher - what on Kerbin is wrong with the Institute test range?"

"I told you, Jeb - I'm not ready to show this to anyone yet. You're only getting a sneak peek because you were looking so damn miserable in the canteen. Right - here we are."

Jeb wiped the sweat from his forehead. The Institute buildings were safely out of sight, hidden by the hillside and a small copse of trees. The ground underfoot was hard packed and rocky and Wernher was having trouble setting up his tripod.

"Ooof, OK that's far enough. Test rig next."

Jeb looked at the spindly contraption. "Hold on." he said slowly. "Isn't that..."

"Borrowed!" said Wernher, "And I haven't done anything to it. Well, nothing that I can't undo anyway. Right - propellant tanks next." He hung the gas cylinders on the makeshift test stand. Jeb raised his eyebrows as he recognised the name of a well known brand of camping gas stencilled on the side of one of them.

"Stove gas, Wernher?"

"Yes, yes, stove gas and nitrous oxide. OK, propellant lines are secure, just need to plug in the control box..."

Jeb eyed the finished article skeptically. The D1 seemed to consist of an oddly shaped nozzle attached to a metal ball which was studded with bits and pieces of equipment. Two thin hoses connected the ball to the gas cylinders, and the whole unlikely contrivance hung from the tripod on a rather expensive set of strain gauges. Cables trailed from various points into the control box in Wernher's hands.

"Are you sure about this, Wernher?"

"Perfectly sure. Here we go."

Jeb glanced around for the nearest rock to hide behind as Wernher started mumbling to himself.

"Valves open...gas generator on..."

A small flame appeared at the tip of a tube.

"Pumps spinning up - and ignition!"

Jeb heard a sharp metallic clicking from the depths of Wernher's contraption, jumping backwards as a gust of flame shot out of the nozzle with a whump of exploding gas. With a steadily building roar, the gust quickly focused into a bright blue flame. Jeb laughed.

"It even sounds like a camping stove, Wernher."

Wernher's only response was to point at the strain gauge assembly. Jeb leaned gingerly forward.

Hey - not bad." Then a thought struck him. "Wernher - you designed this for high altitude flight right? How high is high exactly?"

Wernher shrugged. "Whatever you like, provided there's still enough air for the wings."

"What about a vacuum?" Jeb raised his hand. "Yeah, yeah, can't fly in a vacuum I know, but the engine should still work right?"

"It should work better in a vacuum," said Wernher slowly. "but why a.... oh you can't be serious, Jeb?"

Jeb's eyes gleamed. "Oh yes I can, Wernher. I think we need to give your camping stove a new name and I'm thinking that LV-1 has a nice ring to it."

"LV-1?"

"Launch Vehicle One, Wernher. Launch. Vehicle. One!"

Wernher unclipped his water bottle and took a long drink. "And that's how it all started," he said. "By the time Jeb finished his final year project, he'd already founded the Kerbin Interplanetary Society and started work on a new LV-2 engine. He even put together a relatively conservative research proposal - complete with a raft of anticipated benefits for other Institute research programs - for a sounding rocket based on it. Unfortunately, the KIS also had a tendency to be... vocal about critics of our spaceflight ambitions, which the Institute rather took exception to. Eventually of course, we were kicked out for wasting Institute time and resources on "overgrown toys and ridiculous flights of fancy." '

"But you kept going?" said Sherfel quietly.

"We did," said Wernher. "We pooled all our money to start up the junkyard business, partly to fund our experiments, and partly to get hold of some parts and raw materials." He grinned. "Once we were established, Geneney had the bright idea of bidding on the Institute's recycling contract. I'm sure at least one of the senior professors was highly amused to see us reduced to hauling Institute scrap, but most of our best early stock - including our first pressure suits - was basically recovered from Institute dumpsters."

James shook his head. "And you managed to build a crewed sub-orbital spacecraft out of it."

"It took a lot longer than we expected," said Wernher ruefully. "Not surprising really, given what we had to work with. But we made it. The Kerbal 1 flight was a success, Bill had the presence of mind to take his camera, and the rest you know about." He rolled his shoulders. "Anyway, enough storytelling - we should probably check in with Mission Control."

"You're flying straight through the window, Pioneer. Good luck."

"Thank you, Flight. Hope the service module is flying through a different one."

"That's confirmed, Pioneer. No need to check your mirrors."

Pioneer 1 sped towards Kerbin. The booster stages which had lofted it into orbit almost seven days ago were long since gone, as was the Kerbin departure stage which had launched it towards the Mün. Now, shorn of its service module too, kerbalkind's first ever Münship was reduced to its barest essence - a small conical capsule and its three crew.

Inside, Wernher stared back at the thin sliver of Mün still visible through the rendezvous window, the steadily increasing glow from Kerbin's atmosphere making it harder and harder to see.

Odd colour though, I expected it to be bluer somehow.

Sherfel's urgent voice broke into his thoughts. "Jim - we're getting plasma!"

"Already?" James looked up from his instruments. "Kerm! Way earlier than normal. Hang on to your seats - this could get rough!"

The glow intensified. A faint, high pitched scream at the edge of hearing, scraped across Wernher's nerves. *Pioneer 1* plunged onwards, carving a luminous tunnel through the first wispy traces of Kerbin's atmosphere.

The capsule creaked and rattled, the contents of various storage lockers shifting under the building g-forces. Outside, the glowing plasma started to take on a yellowy orange tint. Wernher grunted at the unaccustomed pressure pressing him into his couch.

Oof - only point two gee. Remember the centrifuge, Wernher - remember the centrifuge!

After nearly a week in serene silence, the roar of capsule slamming into atmosphere was painfully loud. Wernher narrowed his eyes and focused on his breathing, shock-heated air casting a ruddy orange glare over the capsule interior. The capsule itself twisted and turned in a precise, computer controlled ballet, lifting slightly to ease the forces crushing the kerbonauts into their couches, then dipping back into the rapidly thickening air. Flames shot past the window, riven with incandescent flakes and chunks of burning heat shield. James glanced at them uneasily. *Hope those aren't as big as they look. Cold sweat pooled under his arms. Hope they don't look that big for Tommal either.* The capsule shook, blurring his view of the instrument panel, and the angry hiss of static filled his ears.

The reentry fires began to recede, fading to a dull orange, shot through with occasional bursts of flame. Wernher watched the altimeter unwinding at tremendous speed as *Pioneer 1* plummeted through the sky. The static in his ears began to fade, replaced by James's voice.

"Flight, Pioneer 1. Come in, Flight."

"Flight, Pioneer 1. Come in, Flight."

Wernher's headphones crackled, broken snatches of words chasing their way through the static, accompanied by what sounded like distant cheering.

"Flight, Pioneer 1. Come in, Flight."

"Pioneer 1, Flight! We're reading you loud and we're reading you clear!"

"Thank Kerm for that. Standing by for drogues."

With a loud crack, the altimeter slowed its frantic spinning, the capsule twisting slowly from side to side. Then a heavy thump signalled the release of the main chutes. *Pioneer 1* jerked and swayed, slowing to a graceful descent as the parachutes unfurled. A huge, unabashed smile of relief spread over Wernher's face at the familiar, but never more welcome, announcement from Mission Control.

"Flight, Pioneer 1. We read you on the mains. Welcome home!"

Chapter 44

Priorities

"... and we'll be bringing you more on this story as it develops. It's ten o' clock and this is Capital Radio."

Finally.

Lodan switched off the radio, turned out the light and burrowed down under his bedcovers. Thirty seconds later he was fast asleep.

He awoke to the sound of birdsong and leaves rustling outside his window. Sunlight stole around a gap in the curtains, casting a narrow white fan across the bed. Blinking muzzily, Lodan sat up and stared at his alarm clock in astonishment. Then he leapt out of bed and dashed for the moss room.

The face peering back at him from the mirror was distinctly careworn around the edges with more new wrinkles around the eyes and corners of its mouth than he cared to contemplate. The eyes though, were brighter and more alert than they had been for weeks. They clouded over briefly, then stared back at him with new resolve.

I'll brief Aldsen first thing. I owe him that much.

Lodan scraped the last of the stubble off his chin. He briefly considered leaving his nascent moustache to grow out but eyed the grey-streaked bristle covering his upper lip and shook his head. *More toothless old kermol than dignified leader.* Two brisk strokes of his razor later it was gone.

The shadow covering most of Aldsen's jaw was only marginally darker than the bags under his eyes. He tapped a button on his keyboard, freezing the scrolling text on his screen, then swivelled to face Lodan.

"You always were a hopeless liar, Director," he said without rancour. "That line about following instructions without asking questions was just a little too casual to be true."

Lodan froze. "You knew?" he asked quietly.

"That you were hiding something? Yes - but I had no idea what." Aldsen scrubbed his eyes with the heels of his hands and looked at Lodan wearily. "It *was* Capital News's little thunderbolt that you were carefully avoiding wasn't it? Please don't tell me it was anything worse."

Lodan laughed humourlessly. "If you had anything worse in mind, I'd hate to hear about it," he said. He lifted a stack of computer printouts off the nearest chair and sat down. "So what brings you into the office this late in the evening?"

"Figuring out a way to fill out the missing numbers on our map data," Aldsen replied, stifling a yawn. He waved at the gridded charts plastered across the walls of the main MIR laboratory. "Bottom right for current Kerm count, bottom left for additional supportable Kerm, I'm guessing?"

"That was the eventual plan," Lodan said. He shook his head in disgust, "Once I was...."

"Allowed to tell everyone by the Twelve?" said Aldsen calmly. He raised his eyebrows at the look on Lodan's face. "Hopeless liar, remember. Only the Council could get you to even try."

Lodan opened his mouth, then closed it again, contenting himself with a terse nod. *Kerm save me from logical subordinates*. "So, what do you have for me?" he asked at last.

In reply, Aldsen tapped another key, waited a moment and then turned his monitor round. Lodan didn't recognise the section of Kerbin filling most of the screen but the terrain was rugged with the edge of a mountain range in the top right corner and a ragged spear of foothills bisecting the rest of the map. Aldsen typed in a command and a contour plot rapidly overlaid the image. Fascinated, Lodan leaned forward, finger hovering over the screen as he traced out the curve of one hilltop.

"Impressive. Are they to scale?"

"They wouldn't be much help if they weren't," said Aldsen. "And to answer your next question - stereo imaging. Took a while to re-orient the satellite properly but once we had, we took a complete backsight image set. The maths isn't too bad - you just need a lot of computer time to extract the elevations - but good image alignment is challenging."

"I can imagine," said Lodan. "Do you have elevation data for the whole map?"

"Not yet," said Aldsen. "Kolus is finished and we did get quite a lot of Firesvar done before Germore's probe arrived at Minmus. Since then we haven't had as much free machine time, although I believe Firesvar is almost finished now."

"I think we're going to need more computers," muttered Lodan.

Aldsen nodded. "That would be helpful. In the meantime." He tapped in another command. There was a noticeable pause and then clusters of grey dots started appearing over the

map. Another pause and each dot expanded, their edges bulging or withdrawing amoeba-like, as they flowed around the contour lines.

"We used a fairly arbitrary Grove size on the original mapping project," said Aldsen. "It seemed like a reasonable short-cut at the time since we were primarily concerned with total numbers rather than area covered. I spent rather a lot of last night finding the proper size to use and calibrating the system to use that size. In the end it wasn't too bad - Groves are actually surprisingly regular."

Lodan studied the map. "This valley here is almost all occupied but there's some space on the other side of that ridge. "He looked at Aldsen hopefully. "I don't suppose...?"

Aldsen smiled faintly and tapped a key. Immediately, a sprinkling of green blobs spattered across the map, blocking out most of the remaining space. The computer beeped and flashed up a depressingly low number in the bottom left corner of the screen.

Lodan looked at it thoughtfully. "You've set it up for zero overlap between Groves?" he said.

"Yes," said Aldsen. "I assumed that any new Groves will be planted to avoid further Blight - and besides, it made the fitting algorithm a lot easier to write."

"But one could set it up for a limited amount of overlap?"

Aldsen looked shocked. "Yes - but the Blight!"

"Not if the overlap zones were properly placed," said Lodan impatiently. "Put them along rivers, on rocky or low grade land. " He poked a finger at the blank spaces around the green blobs. "We're wasting a lot of space here, which we can scarcely afford."

Aldsen tipped his chair back as he considered the problem. "Difficult," he said at last. "Rivers wouldn't be too bad - we can do a feature recognition pass and extract those. I've already built in a contour density filter so picking out cliffs and suchlike is doable. Recognising soil types though." Aldsen looked dubious. "Not sure if that would work. Not reliably anyway. And then cooking up a best fit algorithm to glue it all together?" He shook his head. "Possible, Director but not probable I would say. And we could waste an awful lot of time trying to make it work."

Lodan nodded. "Which we may not have. I think we're going to need a lot more computers *and* a lot more kerbals to use them." He straightened his shoulders. "Until then, the Minmus imaging program is officially on hold. All computing capacity in this lab - and any spare capacity outside the lab - will be allocated to completing the elevation map and populating it with correctly scaled Groves. From there, we'll do this the old-fashioned way."

"How much time do we have?" said Aldsen quietly.

"Nobody knows for sure," replied Lodan grimly. "The best guess we have from the Berelgan team is thirty-five to forty years, with new Seedings peaking at about twenty years from now."

Aldsen's chair lurched forward with a crash. "Forty?!" he exclaimed. "And *all* the Kerm are going to be Seeding?"

Lodan's eyes had lost their early morning shine. "Yes," he said, "Age doesn't seem to be a factor so far as we can tell from the Berelgan records. The Berelgan team are trying to find a way of close-planting new Kerm *without* triggering the Blight but until then we need to know how many new ones we can safely plant and where." He cocked an eyebrow at Aldsen. "No pressure of course."

Aldsen swallowed hard. "And what happens if the Berelgan can't find a way?" he said.

"Then it's Germore's turn," said Lodan. "And we'd better hope that our space program is up to the task of setting up another home on whichever planet she picks for us."

Gerselle watched the line of villagers wind its way up the path, a grim-faced Ferry in the lead, followed by Fredlorf and a host of angry looking kerbals behind him. She stood aside, unable to meet Ferry's eye, as they marched through her front door and through to the sleep room.

The door crashed open. Startled, Jonton looked up, saw the expression on Ferry's face and hung his head. The leaves swaddling his kerbal body drooped in sympathy. Fredlorf was the first to speak, his voice laced with bitterness.

"So yer not much of a hero after all, are yeh."

It wasn't a question. Jonton shook his head mutely.

"Sacrificin' yerself to save the village from the Blight that you started in the firs' place. That ain't heroism - that's payin' yer share."

The villagers around him muttered in angry agreement.

"No choice," murmured Jonton, "Couldn't leave the seed to die on stony ground."

"Better if yeh had," retorted Fredlorf. "We'd have our best fields still and you wouldn't be strung up agains' that damn tree!"

Shocked whispers broke the angry muttter. Ferry cleared his throat. "No need for that, Fred," he said. "What sort of Keeper would leave a Kerm to die?" He shook his head. "No - Jonton did right there - but why he didn't just plant that Kerm someplace else I'll never know." The bitterness crept back into his voice. "And why he couldn't tell his best friends the whole story? I'll never know that either."

"Because he - we - had orders not to," said Gerselle quietly.

"Orders?" scoffed Fredlorf, "Who'd be givin' yeh orders?"

"Chief Ambassador Donman," replied Gerselle. "Representing all the Twelve Pillars."

Ferry's jaw dropped. Fredlorf snorted. "Right. An' how did they get to hearin' about it?"

The Kerm leaves rustled. "Because I told them," said Jonton evenly. "The Chief Ambassador was gracious enough to convey my request for Conclave to the Council." He looked sadly at Ferry. "Do you remember that conversation we had about memories? The one where I told you about sharing memories with the Kerm, Ferry - about *being* the Kerm?"

Ferry nodded hesitantly.

"I shared them with Chief Ambassador Donman too. I think the Council has been looking for an answer ever since."

The village Archivist coughed. "An answer to what, Keeper?" he said.

Jonton opened his mouth to speak but Gerselle interrupted him. "Why don't you just show them?" she said gently. "The same way you showed the Ambassador - and the same way you showed me."

Jonton's leaves pricked up. "Why not?" he murmured. "I used to commune with many kerbals at a time after all."

Gerselle nodded. "Somebody could use the leaf cluster over my bed and there are some low-lying clusters next door that could also be used. I think Ferry and Fred deserve to go first, but who else?"

Jonton gave her a lopsided smile. "That's easy," he said. "Who better to put all this into context than an Archivist."

Gerselle turned to Jerdin. "Would you be willing?"

Jerdin blinked to clear his watering eyes. "I'm not sure what you mean, Gerselle," he said politely. "Willing to do what?"

"To commune with Jonton," said Gerselle, "With Ferry and Fred."

Jerdin's brow wrinkled. "I don't understand," he said. "Jonton is the Keeper surely - not the Kerm. And sharing a Kerm is...rather personal, is it not? In fact, is it even possible for a non-Keeper?"

Gerselle looked at him sympathetically. "It is," she said, "Trust me, it's a *very* long story but Jonton is the best one to tell it... and show it... and make you *feel* it. She thought for a moment then smiled mischievously at Jerdin. "Besides, as an archivist and historian, wouldn't you like to be a part of something that no kermal has experienced since before the Age of Madness?"

Jerdin polished his lorgnettes on his sleeve. "The Age of Madness is a rather old-fashioned name," he noted. "Most of us refer to it as the Age of Myths, since the few remaining Records of that time are little more than a retelling of older myths and legends." He shrugged. "Although a few, otherwise quite respectable, historians *have* advanced the notion that some of the less fanciful remnants are the fragmented legal system of a long gone Empire."

"That's closer than you might think," said Jonton quietly. "In many ways the Age of Madness is *everything*, Archivist - both the key to understanding our past and quite possibly the key to creating our future."

"So what are we waitin' for?" said Fredlorf, rolling his eyes. "If Jonton's goin' ta show us something, lets get on with it."

Gerselle plumped up the pillows on her bed and tapped the bedcovers. "Come and lie down then, Fred." She raised her eyebrows at his suddenly uncertain expression. "Oh, for Kerm's sake."

Fredlorf flushed dark green and lay down on the bed, flinching as the Kerm leaves brushed his forehead. Gerselle studied him for a moment.

"Lift your head up, Fred."

Nervously, Fredlorf obeyed. Gerselle pulled a spare pillow out from under the bed and wedged it under his head. He lowered his head, eyes rolling back into their sockets as he tried to watch the leaves.

"Are yeh sure about this, Gerselle? Thought this was only fer Keepers, like Jerdin was sayin'."

"Not just for Keepers, Fred, " said Jonton. He looked at Jerdin. "That *is* a myth - but one that was spread for a very good reason. Just try and relax - I'll tell you when it's all about to start."

Gerselle hauled a heap of spare bedcovers and pillows out of a cupboard. The now silent crowd parted before her as she made her way to the door, arms laden with quilts. Jerdin and Ferry followed her with the more curious villagers trailing along behind. In the living room, she piled up the covers in two rough pallets at the foot of the Kerm trunk. She placed a pillow under each leaf cluster and turned towards Jerdin and Ferry.

"Please - pick a place to lie. It doesn't matter which, just so long as the leaves can rest against your head." She faced the group of kerbals behind them. "It'll take a while for Jonton .to explain everything. You're all very welcome to stay but there won't be very much for the rest of us to see."

Nervously, Jerdin and Ferry took their places under the Kerm leaves, Jerdin twitching as their hairs tickled his scalp.

"How long is this going to take, Gerselle? These things are making me itch."

"Depends how long Jonton takes," replied Gerselle. "Two hours maybe?" She caught the look on Jerdin's face. "Don't worry, you won't notice the itch once the communion starts. I'll just let him know you're ready."

Jonton tapped his fingers against his water bowl, one eye on the door, one eye on Fredlorf. He raised a eyebrow as Gerselle came into the room, dipping his head solemnly at her

answering nod. He closed his eyes, reaching out, feeling for the kerbal flesh under his leaves. On the bed, Fredlorf shifted restlessly.

"Sorry, Fred - I know it tickles but this won't take a minute. Just relax - I'm starting the communion now."

One by one, three clusters of leaves dipped towards three waiting kerbal heads. A swift burst of flickering images filled each waiting mind, followed by a soft white light. Jonton's head snapped back as a storm of emotions cascaded through the mental link; unease feeding on nervousness, swelling into fear, teetering on the edge of panic. Fighting down his own rising panic, he did his best to project calm reassurance, confidence and *stillness*. Gradually the storm steadied, quivering like a wild animal poised between fight or flight.

Can everybody hear me?

Fredlorf's head jerked up. "How in the... Jonton?"

It's me, Fred. No need to talk, just think of whatever you need to say. I don't quite know how this works with four - Ferry, Jerdin, can you hear us?

The quivering, nascent panic began to recede. A growing wonder bloomed in Jonton's mind, spiralling upwards into delight as swiftly as the previous unease had spiralled downwards into panic.

This is Ferry. I can hear you Jonton - and Fred too! Are you alright, Jerdin?

Much more than alright, Ferry! This is... Kerm, I don't have the words for this.

A ripple of relief and barely masked concern lapped over the three kerbals. Jonton sensed their reflected concern racing back towards him, magnified into a tidal wave of clumsily projected reassurance and joy.

Woahhhh - steady everyone, steady! I'm fine, I'm fine! This is going to take some getting used to, I think. Right, pictures next. Let me know if you can see anything.

The mental link fell silent. Jonton sensed eddies of expectation, then a surge of excitement followed by puzzlement. Ferry was the first to speak.

I don't know about Fred or Jerdin but I can see a sapling and ... a kerbal I think. Not sure what else it could be but it's like no kerbal I've ever seen before.

Currents of agreement and confusion lapped against Jonton's mind. Slowly he blew out a gusty sigh, running through his story in his mind whilst struggling not to broadcast his every thought to the others.

Oh he's definitely a kerbal, Ferry. Jonton paused. One of my first kerbals in fact. Welcome to the Kerbin of your far distant ancestors.

The last image of Barkton faded back into white light. Fredlorf sat up, blinking and rubbing his head. He stared at Jonton wordlessly. Footsteps echoed outside and Ferry and Jerdin

appeared in the doorway, followed by Gerselle and the few villagers who had opted to wait. Silently, Ferry and Jerdin sat down on the bed beside Fredlorf, watching as everybody else filed in.

"Looks like we've got some more buildin' work to do, Jonton."

Fredlorf ran his fingers through his hair. "Providin' that you an Gerselle don' mind of course. If yeh can talk to three of us, reckon you could speak to as many as could fit around yer trunk. They'll be needing summat to lie on though, specially if we're goin' to be using those high-up leaves."

The villagers standing against the wall looked confused but Gerselle just nodded. "Reckon you're right Fred." She smiled at her husband. "Better get used to telling that story, my love."

Ferry raised his head "Yes. Everyone is the village needs to see this." He lifted his hands helplessly. "Everyone on *Kerbin* needs to see this for that matter, although I have no idea how."

"But what are we going to do, Jonton?" said Jerdin, wide-eyed. "The Blight, the Seeding... what are we going to do?!"

Jonton stirred. "I've finally got half an idea about that," he said. Gerselle looked at him in surprise. "The easy half I would think but it's a start. Jerdin - I'm going to need a map that you don't mind me drawing on - plus one of your folding tables from the Records hall. Oh - and a pair of compasses.

Jerdin nodded jerkily. "I'll be right back, Jonton." He jumped to his feet and dashed out of the room. One of the villagers chuckled to see the normally unflappable Archivist scuttling away like an overenthusiastic kerblet but his laughter petered out in the silence. He stared at Ferry and Fredlorf, both leaning against the wall, eyes distant and unfocused.

"So what did you see?" he asked. "What was the big explanation, the long story?"

Ferry looked at him blankly. Fredlorf shook his head. "Reckon Gerselle had that part right," he said quietly. "You'd need to ask Jonton - wouldn't sound right comin' from me and most of it's in the *showing* anyways. But if I told yeh it was the best thing in the world bein' used to show yeh the worst things in the world, that would start to get there."

There was a long, awkward silence, punctuated by the rustle of ponchos and shuffling feet and the occasional cough. Then, the silence was broken by clattering and the rapid slap-slap-slap of sandalled feet. Jerdin burst into the room, robes flapping about his ankles, laden with map and table. Panting, he unfolded the table, unrolled the map over it and set both down within easy reach of Jonton.

"Got...the rest... here too, Keeper." Jerdin fumbled in his pocket, nearly dropping the drawing instruments in his haste. "Think... that was everything?"

Jonton studied the map for a moment. "That's perfect, Jerdin - thank you. If everyone could gather round?" He waited until all the villagers found a space around the map, before unfolding the compasses.

"Right. As best I can tell, we planted Gerselle's Grove here." Jonton pointed at the map. "Her Kerm's territory extends to the sunfruit fields...here, so it's total range isn't far off this." He drew a circle on the map. "Now *my* territory covers the rest of our fields - obviously - but also the surrounding woodlands. There's no Grove yet on the other side of the woods but if there was, its Kerm's territory would cover *this* ground here." Jonton drew another circle on the map and looked up expectantly.

Ferry saw it immediately. "What about the overlap? We don't want Blight in the woods."

"Better the woods than the fields," answered Jonton, "but you're right - we don't want more Blight if we can help it - and I believe we *can* help it. As Capital News helpfully mentioned last night, Blight happens when two Kerm fight over territory. But this *an*-Kerm," he jabbed a thumb at his chest, "would prefer to retreat rather than fight! And if I can retreat before the new Grove is even planted, then there should never be a need to fight."

"an-Kerm?" said Jerdin wonderingly. "Kerm-an are outside, or outwith, the Kerm, so an-Kerm are..." He laughed. "Very nice, Jonton. Inside the Kerm indeed!"

Ferry's eyes lit up. "You can *do* that, Jonton?"

"I think so," said Jonton. "It won't be easy but I think it's possible."

Gerselle saw the brief flicker cross his face and eyed him narrowly. *There's something you're not telling me here, Jonton Kermol.* "It's a nice idea," she said aloud, "but even if it works, a single an-Kerm can't stop the Blight for all of Kerbin."

Jonton dropped his gaze. "I know," he said softly. "That's the hard half that I haven't worked out yet."

"It's a start though," said Fredlorf briskly, "an' startin's always the hardest part of anythin'. Though I'm wonderin' how yeh goin' to know how far to retreat, Jonton?"

Jonton grinned. "That's the *easiest* part of it, Fred," he said. "Gerselle can tell you how."

I can? Ohhh - of course. "Star poppies would be best," Gerselle answered. "Quick growing, easily visible to Kerm and kerbal alike, and they're pretty flowers for the kerblets to plant."

Jonton drew a dotted line on the map alongside the second circle. "Poppies would work nicely," he agreed. "Plant small clumps of them along this line here and that will mark how far I need to retreat. Then I just need to do it."

Chapter 45

Pre-emptive

The chainsaw bit into the snow-crusted bark with a willing roar, chewing through the dense wood beneath. Jerfun's shoulders throbbed with the effort of keeping its blade level, his hands aching with cold and vibration even through his thickly padded gloves. He switched off the saw and slipped it carefully out of the trunk, before fitting two slim wedges into the cut and driving them home with practiced blows from his hammer.

The resinous scent of freshly sawn wood blended with the sharp nip of frost in the air as Jerfun slotted a felling bar into place, picked up his chainsaw with a grunt and set to work finishing the cut.

Last one of the day, thank the Kerm.

Long habit and careful routine made him take one last look to the sides and two looks down the drop line. Quickly, he stepped back and sideways, keeping one eye on the poised trunk, then took hold of the felling bar with both hands.

"Dropping!"

Slowly, majestically, the tree began to topple, spindly branches tilting against the leaden sky. The last sliver of wood holding the trunk together gave way with a resounding crack and seconds later it thudded into the forest floor amidst a great snapping and tearing of undergrowth. Jerfun picked up his loppers and began trimming. By the time Bureny arrived on her kaya, he'd reduced the bottlebrush tree to a single long log and a respectable bundle of firewood. The enormous woolly animal snorted as Bureny backed it up to the log, the warm, wet smell of fermented lichens on its breath overpowering the scents of sap and crushed bottlebrush needles. Bureny tossed a towline to Jerfun, who lashed it around the log and tied on the bundle of branches.

"Move on ya!"

The kaya lumbered forward up the steep forest trail, oblivious to the extra weight. Jerfun plodded along behind, one eye on the path and one eye on the tip of the log bumping over the frozen ground in front of him. As they crested the rise and stepped out onto the main road, Jerfun was breathing hard and the waiting lumber truck, grapple at the ready, was a welcome sight. He unhitched Bureny's mount from its load, heaved the bundle of branches onto the back of the truck and clambered thankfully into the warm, oily fug of its cabin.

Lumber trucks, Jerfun decided, represented the best of his people. Hard wearing, hard working and built for practicality not sentiment. *And just like many a good northern Wakiran, they can also be an honest-to-Kerm pain in the ass.* His teeth snapped together as the truck jolted over yet another pothole and lurched to a stop. The driver swore, shifted into reverse and slowly backed up.

The trailer sprang free, its suddenly shifting weight causing the truck to fishtail violently, one wheel lifting off the ground. Automatically, Jerfun slid across the back seat, throwing his meagre weight against the tilt. Calmly, the driver spun his wheel, the back of the truck swinging out in response and thudding back on to the road. He shoved the gear lever forward with a crunch, engine screaming in protest as it took up the load. The truck slowed, logs thudding ominously against the trailer and then began to creep forward around the pothole.

Further into the hills, the ride began to smoothen out and heaps of chippings began to appear by the side of the road, half buried in the snow. The road itself was a pitted patchwork of fill-ins and craters, gravel and hard-packed earth providing a temporary surface. Red striped marker poles stood out brightly against a landscape of whites and greys. As the road wound down through a cleft in the snow-capped hills, it was joined by a foaming, iron-grey brook. Jerfun nodded in satisfaction. *Fresh water, good defensible territory and it's on our side of the border. We'll take the high ground here and in Conclave.*

As if to mark his words, the truck grumbled to a halt with a squeal of hydraulics, belching a cloud of sooty smoke from its exhaust stack. The heavy, gated log palisade blocking their way was tall enough that the two kerbals standing guard on its parapet could comfortably look down into the exhaust stack if they felt so inclined, and thick enough to give the driver of most vehicles pause for thought.

Not, thought Jerfun, eying the guards, that they would get that far. The rough-and-ready barricade they were guarding stood in stark contrast to their conspicuously carried and thoroughly modern hunting rifles.

And anything that can put a charging scallan down cold will have no trouble with a set of tyres. Truly, we need more than logs to protect them but until the thaw starts logs will have to do.

The third guard peered through the cab window, nodded as she recognised Jerfun and waved them on. The truck rumbled smoothly through the gates and out into the wider valley beyond. Beside them, the stream bubbled through a tunnel cut into the log walls and wound away out of sight.

A partially completed watchtower stood atop the hill on either side of the palisade. Jerfun watched a distant team of kayas dragging sleds of supplies and building materials up to one of them, leaving a broad swathe of trodden down snow and the occasional heap of dung in their wake a work gang of kerbals were busily digging out the compacted snow and marking out the boundaries of a new trail with wooden planks. The dung went on to a nearby trailer.

A similarly industrious scene greeted them when they finally pulled up at the new village site. Another gang of kerbals were methodically packing rounded stream-bed stones into a newly dug out road bed and filling in the gaps with gravel to create a crude but serviceable cobbled crossroad. A pair of broad, low slung log cabins faced each other across the street, each with an attached outhouse. Next door to one of them, a workshop spilled soft yellow light and paler yellow drifts of sawdust onto the cobbles. Jerfun nodded approvingly at the row of neatly turned and carved porch rails propped against the workshop wall. *Pleasing to see a touch of civilisation in this back end of nowhere.*

Further up the street and well away from the cabins, half a dozen lugubrious kaya stood by their paddock rail, backs into the wind; heavy, horned heads foraging under the snow, indifferent to the activity going on around them.

The driver's door slammed, the truck rocking as the driver clambered up behind the cab. Machinery whined to life, followed by the rattling of chains and the distinctive clunk of the grapple closing around a log. Jerfun watched it swing past the cabin door before setting its load down neatly by the workshop. He rapped sharply on the rear window of the cab, opened the door and jumped down, grabbing his rifle from behind his seat as he went. As he slammed the door shut and sprinted clear of the truck, he heard the grapple starting up again behind him.

A small, brick building with a galvanised sheet iron roof stood on a concrete plinth at the very centre of the crossroads. Jerfun unloaded his weapon, dropping the clip into his pocket. He reached under his jacket for his key, unlocked the heavy steel door and stepped inside.

The cloying scent of gun oil in a confined space assaulted his nostrils as he scanned the wall-to-wall gun racks for a space. *Hardly enough room in here but I'm Blighted if we're spending more time hauling cement and steel until the thaw.* He stowed his rifle on the nearest rack with a grunt and dropped his clip into its storage box. *Then again, don't expect the Kerm is going to be doing much in this weather either. Should have this place locked down tight by the time it gets round to Seeding.*

Rain beat against Lemdan's oilskins and trickled over his boots. Runnels of water ran this way and that over the heaving deck, glistening on the heavily varnished planks. In the distance, the Crater beacons gleamed in the dark, the square windows of the nearest ones shining against the night sky, the furthest ones twinkling like stars in the distance. Lemdan crouched by the binnacle, sighting the two brightest beacons across his compass. He grunted, checked the anchor line was still sliding freely in its blocks and retreated under the cabin roof.

Whilst it's name had changed numerous times over the centuries, the Crater had been a favourite port of call for seafaring kerbals since the Age of Sail and possibly long before. Historically, the enormous natural harbours afforded by it's forbiddingly jagged walls, had been the economic force responsible for cementing a loose alliance of Wakiran city states into Kerbin's pre-eminent maritime trading nation and eventually, Regionality. At it's height, the wealth and power of Wakira had rivalled even that of Doren, providing a crucial political counterbalance within the young Council of Twelve Pillars.

Modern day Wakira was still a political and economic force to be reckoned with although its influence had declined since the Age of Sail, especially with the advent of air travel. Nevertheless the Crater harbours remained the busiest seaport in the world, their network of radar stations watching over the constant traffic of hundreds of, predominantly sail-driven, merchant vessels.

At the southernmost tip of the Crater wall, rain spattered off the windows of one station, the ceaseless drumming unnoticed by the three kerbals inside. Two of them sat in front of a large radar screen, their faces lit from beneath by its soft green glow. The Harbourmaster stood at the back of the room listening intently.

"Course I'm in the right place! Yer think I can't take a bearing on a pair o' beacons?"

"I'm not doubting you, Captain," replied Edbur wearily, "it's just that we can't see you from here either."

"You want mebbe I should point my torch at yeh? Pretty sure I could find yeh, even if you cannot find me."

"It might just come to that, Captain," sighed Edbur, "but please could we try one more observation before we call it a night?"

"If yeh think I'm getting any closer to these cliffs at night, lad, yeh've got another think coming!"

"Actually, Captain, we're thinking that you might be too close to the cliffs already. If you wouldn't mind, please could you sail one kilometre further west and heave to."

The voice on the other end of the radio sounded suddenly amused. "No need for heaving to, lad - I'm not in my sailing hauler tonight, nor my raft for that matter."

The other radar operator turned to look at Edbur, eyebrows raised. "Come on, Ed - he's not going to be in our shadow."

Edbur rubbed his eyes with the heels of his hands. "He's not," he said, "but I want to get him out of all that surface clutter around the cliffs."

"That's not going to help much in this weather."

Edbur counted to three under his breath. "I *know* that Gil but I'm starting to run out of ideas here." He gestured at the shifting patterns of speckles on the radar screen. "If we can at

least get rid of the rock returns, we might just have a chance of picking him out of the rest of that junk."

The last metre of chain clinked dully against the fibreglass hull. Lemgan hauled the anchor over the side, folded it and stowed it neatly under a bench with the coiled anchor line. He took his place behind the wheel, glancing distastefully at the idling diesel motor mounted on the stern. Swinging the wheel hard over, he opened the throttle, wincing as the motor roared.

Noisy damn things. Wouldn't want to be runnin' out of battery on a night like this though and least this weather is keepin' the reek away. Lemgan glanced at his compass. *Not too shoddy. Got a while till the tide turns and I'm doubtin' they'll need me exactly due west anyway. Right, that should do it.*

Lemgan eased the throttle back, locked his wheel and made his way forward. Cleating the line securely, he unfolded the anchor again and dropped it over the side, paying it out hand over hand. Easing the boat into reverse, he rested his hand on the line for a moment then, satisfied that nothing was dragging, switched off the motor. For a minute he stared entranced at the ragged, phosphorescent wake trailing back towards the cliffs. Hordes of tiny nightfish dove in and out of the froth, feeding on the churned up plankton; their scales glinting in the luminous glow.

Reluctantly he went back to the cockpit and picked up his microphone. "Lemgan here. Anchor set - any sign of me yet?"

"Not yet, Captain," Edbur replied. "Not even with your wake to point the way." He sighed. "Maybe that's the answer. Forget about the radar, build a chain of watchtowers and have their crews look out for wakes."

"Wouldn't work," said Lemgan. "If I was that dead set on smuggling Kerm seeds, I'd charter a boat, give it a reason to be close to shore so yer watchers are expectin' it, then row a dinghy in after dusk. Wouldn't work around these parts but if the coast was kinder and ah was really desperate, ah'd swim. Either way there's be no wake givin' me away."

"I suppose so," said Edbur. "I think we're done for tonight, Captain. The Harbourmaster conveys his thanks and bids you safe seas on the way home."

"Understood," Lemgan replied. "Signing off."

Static poured out of the speaker. Silently, Gilbin leaned over and switched off the radio. "Well so much for that idea," he said. "If the powers-that-be want a coastal surveillance system it's gonna cost them."

The Harbourmaster cleared his throat. "Are you suggesting that we could use some other sensors?" he said. "Infra-red perhaps?"

"Not a bad idea," said Gilbin, "but radar will do jus' fine. Pickin' out a small target is easy enough in good weather and can even be done in this muck." He gestured dismissively at the

window. "Problem number one is that yer standard traffic management antenna isn't built for the high gain, narrow beamwidth system that yer need for the job and problem number two is that a narrow beamwidth antenna isn't exactly set up for scannin' large areas. Which means a lot of expensive new stations if yer want to watch the whole coast."

He glanced at Edbur. "Which is a waste of time in my not-so-humble opinion. Tryin' to watch the whole coastline to stop one kerbal in a rowin' boat?"

Edbur stirred. "It's not the single seed carrying kerbal we should be looking for," he agreed. "but everything else you need to start a new Grove. Any ship big enough to carry that would be easy enough to spot."

"Unless, as the good Captain pointed out, it was there for wholly legitimate reasons," said the Harbourmaster heavily. He threw up his hands resignedly. "Even so - unofficially - I'm inclined to agree with you. Nevertheless, the powers-that-be have not so politely requested that I investigate all options." He looked at Gilbin. "I would be much obliged if you could draw up an engineering summary of your high gain system. Equipment requirements, numbers of stations - everything."

Gusden stared out to sea, elbows resting on the newly poured harbour wall. Below, a similarly clean, concrete jetty slashed an angular weal across the incoming tide, the blocky new buildings strewn across the wharf speaking more to urgent need and raw functionality than any kind of aesthetic sense. A squad of converted coastal cutters rode at anchor, deck guns reflecting the cloudy sky in sullen gunmetal grey. Across the bay, the old lifeboat station nestled into the cliffside, its launch ramp stained in shades of algae, rust and trailing seaweeds.

"Approaching target zone. Weapon hot."

"Copy that, Vanguard. Clear for release."

Neilbin shivered at the matter-of-fact radio chatter. He raised his binoculars to his eyes, settling his gaze on the dark bulk on the horizon.

The aircraft banked hard, dropping into a spiralling dive before pulling out into a series of sluggish S-turns. It rolled wings-level, a glinting speck falling away from its belly as it raced towards the ship, then pulled up and commenced a slow, wide circle of its target.

A fountain of spray erupted, completely obscuring Neilbin's view. He twisted the focus dial on his binoculars, trying to see through the turbulent whiteness. The spray smashed down, scattering debris across the waves and obscuring what remained of the ship. He scanned the wreckage, trying to piece together what had just happened, when the radio crackled again.

"Clean release and tracking. Weapon impacted amidships." Neilbin thought he heard the pilot's voice shake. "Hull is gone, repeat gone. Nothing left on the surface but flotsam and precious little of that."

Solemnly, he lowered his binoculars and looked soberly at Gusden. "A successful test I'd say, Commander. I presume it was a realistic one?"

Gusden shook his head. "Not really - in fact we went out of our way to make it as unrealistic as possible. Extra reinforcement on the hull, fuel tanks drained so that they couldn't contribute to the blast. It was a stationary target of course but we don't have any way of steering it remotely and I'm not in the habit of shooting live ordnance at my own troops. Besides the manoeuvrability tests were mostly successful, once we'd worked the kinks out of the guidance system."

Neilbin raised his eyebrows. "Go on?"

To his surprise, Gusden grinned. "A *Wavedancer* class racing dinghy makes a fine test target. We did trials with diesel motors to begin with, then electrics. Doesn't make a lot of difference actually, the acoustic sensors can pick up propeller noise almost as well as engine. We're still working on sailboats but between you and me, I think that's just the research team showing off. I can't think of anything wind powered that could out-run or out-manoeuver a Mark II fingrillin."

Neilbin blinked. "One with a dummy warhead I presume?" he said dryly.

"Of course," said Gusden, affronted. "Dye cannister with a - very small - explosive charge to rupture it." He grinned again. "The pilots set up a leaderboard at one point; seeing how long they could last before getting a faceful of dye turned into quite a competition." He caught Neilbin's expression. "And yes - safety goggles *were* mandatory for all test runs."

"Go on then," said Neilbin neutrally, "Who was your paint-torpedo racing champion?"

"You'll get to meet her in a few minutes," said Gusden, pointing over Neilbin's shoulder. "She's just coming in to land."

By the time the two kerbals reached the airstrip, the small single-seater spotter plane was parked neatly by its hangar, wheels chocked and jet engine powered down. Neilbin stared curiously at the empty torpedo pylon welded incongruously to its underside. He squatted down, measuring the gap between pylon and runway by eye.

"Right. Getting off the ground without smacking it off the concrete is the real trick."

Neilbin got to his feet. "Why not hang them under the wings instead?" he asked.

A derisive snort rattled off the hangar walls. "Does sitting up there like a stuffed wagga, picking bullets out of the canopy sound like a good plan to you? Everyone else on this patch of wind and scrubland can please themselves but I plan to get in fast, drop the fish and get out faster. And trust me - hanging one bodged together bomb rack off this plane makes that quite difficult enough thank you."

"Torpedo," said Gusden mildly, "Not bomb. And it's hardly the engineers' fault if one hotshot ex-racer can't handle anything sportier than a Skysprite."

"Hah - a Skysprite would leave this pair of wings and worry on the runway. Seriously though, boss - fast and low is going to work a whole lot better than evasion."

"Just so long as you can pull up in time at those speeds, " said Gusden. "But we can work this at the flight review and before *that* we have a guest to show around our patch of wind and scrubland. Valentina Kerman - meet Envoy Neilbin."

Valentina gave Gusden a cursory glance and then, warned by Gusden's scowl behind the Envoy's back, stuck out a hand. "Pleased to meet ya. Call me Val."

Gusden studied the young pilot thoughtfully, remembering the tremor in her voice from the damage report. *Not quite as hard headed as you want to appear I don't think.* Trim under her baggy flight suit, sleek black hair cut racer-short, Valentina stared back at him through frank copper-brown eyes. He shook the proffered hand. "Pleased to meet you too, uh, Val. So - where do we start?"

Chapter 46

Diplomacy

"Nine...eight...ignition sequence start."

Hanbal sensed rather than saw the sudden flare from the test stand. Eyes fixed on his console, he watched the precisely scripted sequence of telltales and pressure gauges spring to life. Outside, the light blossomed into a fierce orange glare that sent shadows dancing and flickering around the corners of the room.

Pressures looking good. Come on baby, come on.

The orange glare dimmed briefly then rapidly intensified into a searing yellow-white fury. The window edges cast knife-edged shadows over Hanbal's head. Heavy ear defenders protected him from the worst of the noise but they couldn't wholly blot out the awesome, staccato thunder that threatened to blow reinforced glass over his console. He barely heard the last seconds of the countdown.

"Two...one...and zero. Engine running! Full thrust!"

Hanbal held his breath. *Come on, come on, come...* One of the pressure gauges flickered, held, then spiked wildly, setting off a cascade of warning lights and shutdown indicators. He slapped his hand down on the prominent - and extremely sturdy - manual shutdown button, just as the noise from the explosion rolled over the bunker. Hanbal pounded on the button with his fist, shoved his chair back from the console and stalked out of the room.

Outside, all that remained of the SK2-C were twin fans of dirt, debris and twisted splinters of metal gouged across the prairie.

"Ten percent, ten percent...throttle up. Smooth transition. Flow rates good."

Ornie checked his engine status indicators. "I see them. Descent engine at full thrust. Throttle control in auto-one." He glanced over the rest of the control panel, sighed and took a swig of coffee.

"You've got as much chance as any of them," said Wernher softly

Ornie set his mug down on the control panel where it rested neatly in the gap left by a missing gauge. "I know," he said. "One in twelve ain't bad odds either." He stared at the test stand. "Still reckon I'd want the crasher stage for my landing though. Use a proper high thrust engine for the brakin' burn an' a proper low thrust engine for the landin' rather than trying to cram them together into one piece. No disrespect intended."

"None taken," Wernher said equably, "Since you well know that I agreed with you and Bob at the beginning. Jeb's right about those Muna photographs though. They're just not good enough to pick out a smooth landing site, however long Neling spends poring over them with a magnifying glass. Even if they were, I wouldn't take large bets on being able to *hit* that site reliably."

Ornie looked at him wearily. "I know, I know. And Gene's right too - stagin' anything that close to the Mün is just adding its own lot of problems to a busy checklist. I'd just feel a lot happier if we weren't resting the *Munar landing* on a design that we borrowed from an old lawn sprinkler." He glanced at the engine indicators. "It wasn't even the latest model sprinkler for Kerm's sake!"

Wernher's mouth twitched. "It doesn't sound very promising when you put it like that," he conceded, "and I certainly wouldn't want to build anything bigger than the 909 around a conical impingement injector." He gestured at the roaring test stand behind its blast shields and shrugged. "But it does work."

"So far," said Ornie. There was a long silence. "OK, coming up to pitch-over. Throttling down in three...two...one..."

The engine noise dropped to merely very loud, rather than deafening. Wernher stayed tactfully silent as he watched his deputy's hands reaching for non-existent switches and buttons, unfocused eyes staring past the test stand at a private vista.

"Auto-one holding, good radar return, delta-H nominal," Ornie murmured to himself. He shook his head, deliberately resting his hands on the edge of the console with a small, embarrassed grin. "Sorry, boss - kilometres away."

"Nearly four hundred thousand kilometres I make it," Wernher said gently.

"About that," said Ornie. He reached for the engine controls. "Ready for the abort to orbit test?"

Wernher nodded. Ornie threw a switch. "Throttle to manual..." He jammed a lever forward and the engine responded with a willing bellow. Wernher watched the simulated propellant level readouts drop to zero and right on cue, the engine coughed and fell silent.

"Ascent engine armed...abort stage...ignition."

Wernher raised his eyebrows at Ornie's astonished look. Ornie opened his mouth to speak, thought better of it and then burst out laughing. "I tell you what, boss - let's scrounge some simulator time once the Booth Crew have 'em set up properly - and get this piloting stuff out of *both* our systems."

"Better not get it too far out in case you end up being picked," said Wernher checking his watch. "Speaking of which, Jeb should have found that wastepaper basket by now. And I don't care whether you're picked or not - I'm still going to want a hand stripping down that engine afterwards."

Jeb unfolded the piece of paper and looked up at the assembled - and impatiently waiting - Kerbin Interplanetary Society.

"I'll do this the traditional way round," he announced. "The bad news is that Genie's just lost one of his best Guidance controllers for Pioneer 2. The good news is that she's gonna be right up there, running the guidance systems in person. Congratulations, Neling!"

Geneney glanced at Bob. A flicker of disappointment crossed the other kerbal's features, as he watched Jeb dip his hand into the drift of paper slips at the bottom of his wastepaper basket and drew out two neatly folded squares.

"The first crewmember for Pioneer 3 is...Sean. And for Pioneer 4, I give you...Malm."

Sean blinked shyly at the rest of the capsule and life support team. "Guess somebody else is going to be doing the evaporator redesign," he murmured.

"Good timing there, Malm!" Ornie called out. "We've got your descent engine all shined up for you!"

Jeb grinned. "We're gonna need more of those lawn sprinklers," he said cheerfully. "Gene and I have been talking with Ademone and it seems that Rockomax are in for a couple more flights than we thought!"

Bob sucked his breath in sharply. Geneney crossed his fingers silently behind his back. The babble of excited voices rose to a clamour as Jeb lifted his hands for silence.

"So if you lot'll let me get a word in edgeways, we've got another three kerbonauts to pick!"

The clamour subsided to a buzzing anticipation as Jeb's hand dropped towards the basket.

"The first crewmember for Pioneer 5 is...Lucan! And for Pioneer 6 it's gonna be..."

Jeb unfolded the small square of paper and smiled. Geneney saw his friend relax minutely and uncrossed his fingers.

"Bob."

The warehouse exploded. Bill grabbed the younger kerbal round the waist and hugged him, much to Bob's astonishment and the astonishment of everyone else around them. The jostling, raucous crowd of well-wishers parted to let Geneney, Wernher and Lucan through.

Jeb clenched his fist exultantly under the table. Beaming, he lifted the basket high over his head and rattled it for attention.

"And last - but hopefully not for long - the first crewmember for Pioneer 7 is..."

Jeb's eyes narrowed fractionally. *What in the...* He glanced up and saw Geneney staring steadily back at him. *Oh.* He dipped his head respectfully and cleared his throat.

"is Bill! We'll have a bottle of '78 citrus waiting for you when you get back, old friend!"

Jeb gathered up the remaining paper slips and stacked them on the table in front of him. The clamour of enthusiastic voices died away, replaced by a steady ripping of paper as he methodically tore a sheet of paper into twelve pieces.

"Like Gene said right at the start," he said quietly, "we we need experience for these flights so we're picking commanders from all the kerbonauts who have already flown." Jeb gathered the ragged slips of paper together and laid them down in a second, much smaller stack.

"Twelve slips for twelve pilots," he said. "You all know who you are, we all know who you are and I'm betting that I could walk out of here, speak to any two kerbals on Barkton high street and *they* would know who you are." Jeb paused. "So none of you have anything to prove. You, more than anyone, know the risks and if you decide that the Mün is a risk too far - well I for one wouldn't blame you."

Jeb pointed at the smaller stack of paper on the table. "So I'm gonna ask you all to get in line and sign one of those. If anyone doesn't want to go, all they need to do is write "no" on their paper. Once we're done, I'm gonna burn all the slips so that nobody - me included - will ever know if you chose not to go or if you were just unlucky."

Jeb dropped his name into the basket and joined the rest of the crowd. Everyone watched solemnly as, one by one, eleven kerbonauts approached the table, wrote something on one of the slips and dropped it into Jeb's basket. Finally, it was Wilford's turn. He thought for a moment, nodded resolutely and wrote a single, short word on his paper.

"Thank you everybody." Jeb shook the basket vigorously, closed his eyes and pulled out the first slip. His eyebrows rose as he read it.

"Don't remember signing my name in block capitals. Whoever wrote this - I appreciate the sentiment but..." Jeb drew another name from the basket and his eyebrows climbed past his hairline.

"Ohhh-kay. Looks like we've got a sudden outbreak of Jebbs on our hands. He cleared his throat. "This is...generous of everyone but I'm just gonna keep drawing these till I find a real name."

Wilford glanced surreptitiously at his fellow pilots. Ornie's shoulders were shaking, Ribory had her hand over her mouth and the rest were unsuccessfully to keep a straight face. He raised his hand.

"Uh, boss. I don't think you're going to find anything *but* Jeb's in there."

Ornie's guffaw startled a pair of roosting swifts from the upper reaches of the warehouse roof. He cuffed Richlin on the shoulder. "You too?"

Richlin's face cracked into a broad grin. "Yup. You, me and everyone else by the looks of it!"

Stubbornly, amidst mounting laughter, Jeb pulled one slip of paper after another out of the basket. For a long minute he stared at twelve copies of his name in twelve different scripts, before lifting his head to face the eleven kerbonauts.

"I don't get it."

Wernher sighed. "For a smart kerbal you can be amazingly dense at times, Jeb," he said. He gave the kerbonauts a lopsided grin. "OK folks - if you think we're building three Mün rockets for this dunc to fly, I suggest you think again. Which flight did you want to send him on?"

"I can't speak for the rest of 'em," said Ornie, "but Pioneer 4 was the one I had in mind."

Richlin and Wilford nodded vigorously. The other kerbonauts murmured their assent.

Wernher looked slightly taken aback. "Pioneer 4. The first..."

"Landing attempt?" Ornie interrupted. "Yep - sounds about right." He turned to face a flabbergasted Jeb. "Close your mouth, son, or you'll be catchin' flies as my mother used to say. You see boss, everyone builds 'em and everyone flies 'em is a fine system - couldn't ask for a better one if y'askin me - but there's one thing you're forgetting. Someone had to *start* building them before *anyone* could fly 'em."

Ornie looked Jeb squarely in the eye. "I'm remembering me and Richlin sharing a beer with six crazy characters who'd just finished sinking most everything they had in the world into their first halfway proper rocket." Ornie jabbed a thumb over his shoulder at Bill, Bob and Lucan. "And I'm mighty glad to see them finally getting their chance to fly a real one! But even back then one especially crazy character was jabbering on about landing on the Mün - seems only right that he should get the first chance to do just that."

Jeb's jaw hung open. "I...I don't know what to say," he mumbled hoarsely.

"And that's another first right there," added Geneney, rolling his eyes. "More likely you're just gonna be flying another lander around Kerbin for a week, Jeb. If you ask really, really nicely, I might trust you to dock it too."

Jeb summoned up a feeble grin. "Suits me, Gene." The grin faded, replaced by a familiar determined expression. "But if I do get the chance, I won't let you down. Anyway - enough of me - we've got another two commanders to pick!"

The lingering smell of charred paper followed the rest of the Kerbin Interplanetary Society out of the warehouse door. Jeb stared at the guttering flames in the bottom of his

wastepaper basket, rolling a tiny, tightly wound tube of paper between his fingers. *Good decision, Gene - nobody's gonna be concentrating on precision work after all that. Afternoon on the beach is the best plan.* He sighed, unrolled the tube and read it again:

Bob > Lucan > Bill > Geneney

Calzer and Neling, Ribory and Bob. Couldn't ask for better Munar crews if we'd picked them by hand, old friend. Not to mention Malmy. But if we do find a way to launch another set of Pioneers, you'll get to fly one of them - I promise you that. Jeb touched the curl of paper to the fire and watched silently as it burned.

"Well they did say we couldn't miss it," Tommal commented.

Sherfel watched the oversized signboard roll past. "No," she agreed. "Big enough to make the marketing team blush. Except maybe for Hadcott - I don't think that kerbal has any shame. Relax, Tom - this road looks too new to have any lumps or bumps in it."

Tommals eyes flicked back and forth to the road surface. "Probably," he agreed, "but after driving all this way I'd be grumpy if we broke anything with only three kilometres to go."

"With the amount of padding James wrapped them in?" said Sherfel. "We could have dropped them in by parachute and they'd have been fine."

Tommals shrugged. "Even so. Hey - that's more like it!" He pointed through the windscreen. "Will you look at the size of that thing!"

Sherfel stared at the giant radio telescope on the hillside, before lowering her gaze to the main administration building surrounded by its carefully maintained grounds and clusters of outbuildings. Antennas twinkled in the sunlight and as they drove closer she could make out dozens of kerbals bustling from building to building. They pulled up at a set of bollards that blocked their way and Tommal wound down the window to confer with a serious looking kerbal in a gleaming white booth. The smell of fresh paint drifted through the open window.

"Good afternoon. Tommal Kerman from the Rockomax Corporation - we were told you'd be expecting us?"

The security guard consulted a clipboard. "Special delivery for Probodyne?"

Tommals nodded. "That's right."

"Carry on past the main car park, sir. Probodyne is the second unit on the left - you won't miss it." The guard thumbed a button on the booth wall and the bollards sank smoothly into the road.

"Thank you." Tommal wound up his window and cautiously drove forward over their steel rimmed sockets.

I think we could have found our way here without any help Sherfel thought to herself. The Probodyne buildings had quite obviously been built to the same design as the other

outbuildings - and it was equally obvious that Probodyne had outgrown them some time ago. A row of large temporary cabins surrounded the largest building on two sides, each with a bundle of cables snaking out of one wall. The cables plugged into yellow and black striped junction boxes, ruler-straight lines of earth marking the buried cables that linked them to the central building.

A huge steel scaffold stood between two of the smaller buildings. Fully ten metres high and twice as long, it towered over a surreal concrete sculpture of plateaus, steps and angled ramps. Spindly frameworks of different designs, adorned with varying numbers of articulated legs, hung underneath.

Tommal's eyes lit up. "There it is! Or the engineering model anyway."

A giant four-legged metal beetle squatted on a bed of sand and gravel in front of the scaffold. Antennas and clusters of sensors protruded from its matt grey carapace and a long jointed proboscis sniffed at the ground in front of it. The yellow-hatted kerbal standing next to it hurried over to greet them.

"Hi - I'm Sidbo! You must be from Rockomax? Come on in and meet the team!"

Tommal and Sherfel followed the enthusiastically chattering Sidbo towards the main building.

"We thought we'd be trying the Hope probes out at Duna first but the transfer windows didn't work so we built them for a Laythe mission instead. Nothing like aiming high, right? The flight profile isn't what we'd hoped for either - not enough delta-V for the perturbation at Jool *and* orbital insertion at Laythe - not with an off-the-shelf launcher. Which is why we needed you to make a thicker heatshield for the aeroshell because this baby will be coming in *hot*! Shame about the orbiter but we should still get some good data on the fly-by. Anyway, here we are."

Two kerbals were waiting for them in the foyer. Cartoon bedecked partition walls divided the sides of the room into open cubicles stuffed with computer screens, electronic test stands and other equipment that Sherfel couldn't begin to recognise. The central space was strewn with sack chairs and low tables, each overflowing with catalogues, scientific journals and other technical publications. Framed papers from various journals decorated the far wall, including a poster sized article from *Astronomical Proceedings*. Sherfel's eyebrows rose as she read the title:

"Composition and dynamics of the *Minmusian* atmosphere?"

"Preliminary dynamics naturally," said the taller of the two kerbals, "although from the spectroscopy data, I'd venture to suggest that the composition is a settled question." He rubbed his hands together, "We're rather hoping to write a follow up on the Laythian atmosphere in a year or so, if all my clever colleagues manage to butter up their computers the right way! I'm Dunney by the way and this is Jernie."

Sherfel smiled. "I know, Professor. It's a privilege to meet you."

Dunney waved his hand. "Did you all hear that? A privilege no less and this from a Mün voyaging kerbonaut! Our good friends at Rockomax must be going up in the world if they can afford to employ couriers such as these."

Sherfel laughed. "We were heading to Barkton in any case, Professor - it was the least we could do."

"That's Dunney if you please - and they're surely not sending you to the Mün again?"

"No, it's Tom's turn this time," Sherfel answered, gesturing at her colleague. "I'm just sneaking in a visit to a couple of friends before helping out with the simulations."

"Pioneer 2 is only going to Kerbin orbit anyway," said Tommas, "Flight testing the Munar lander, squeezing any problems out of the vehicle assembly sequence, that kind of thing." He turned to a wide eyed Sidbo and smiled. = "We're not the ones going to Jool and Duna."

"An excellent point, " said Dunney. "Why don't we go and unload the heat shields that our distinguished guests have so kindly brought us and then we can do the guided tour if they have time."

"We can make time," said Tommas, "I don't know about Sherfel but I'm itching to get a closer look at that Laythe lander you've got outside!"

"Geneney! Jeb!"

Jeb spun on his heel to see a pair of smartly dressed kerbals crossing the road behind him. He frowned. "Nelton? Ademone? What on Kerbin are you doing here?"

Ademone raised her eyebrows. "It's good to see you too, Jeb. Hello, Geneney - has the good Director summoned you too?"

"Summoned is a good word for it," said Geneney equably. "I don't suppose you have any idea what this is all about?"

Ademone shook her head. "No. Although it's obviously more significant than we thought if yourself and Jebediah are here as well."

Nelton's scowl matched Jeb's. "It had better be," she said. "There are many, many things I could usefully be doing right now and almost none of them involve sitting in a meeting room."

Geneney held the door open for everyone. "It would have been nice to say hello to Sherf and Tommal before we left, " he agreed. "Do you think they've invited anybody else?"

"Just the four of you, Geneney." Lodan stepped forward, hand extended in greeting. "If you could come this way please - we have a lot to discuss and I don't intend to take up more of your valuable time than I can help."

Geneney looked around approvingly at the plainly painted corridor and minimalist, institutional green carpet tiles. Briskly, Lodan led them up an echoing, white stairwell, along

another, equally austere, section of corridor and stopped outside his office door. Geneney squinted at the small, brass nameplate fixed to one corner, catching a glimpse of neat black lettering before being ushered inside.

The welcoming aromas of fresh coffee and hot snacks greeted them. Geneney sniffed appreciatively. "Doreni Blue, Director?"

Lodan looked at him in surprise. "Indeed. I have lemon, anise or bru..." He saw the hastily masked expression on Geneney's face. "Ahh. Black, I presume?"

Geneney nodded and poured himself a cup. "Mountain spring water shouldn't need lemon to make it drinkable," he said, "and I wouldn't dare sully your Doreni porcelain anyway." He closed his eyes and raised the cup to his mouth, inhaling the bitter, slightly spicy steam before taking a tiny sip and blissfully rolling the hot black liquid around his mouth. His eyes snapped open to find Jeb, Nelton and Ademone staring at him dumbfounded.

"Superb. If you go anywhere *near* this with the anise, Jeb, you're walking home. It'd be like drinking one of Jorfurt's brews with ice." Geneney looked at Lodan, who was looking slightly taken aback. "How on Kerbin did you move the cups without disturbing the glaze?"

Lodan smiled faintly. "Boiled raf husk," he said, "The only thing I could find that was soft, odourless and resilient enough. Even then, I didn't risk transporting them until the road was finished - but perhaps we should discuss this later." He gestured at the chairs set around the fireplace. "I propose a working lunch. Please help yourselves to refreshment and we'll make a start."

Lodan waited until everybody had filled their plates before tapping the table for attention. "I'll get straight to the point," he said. "Under Special Order 41 of the Council of Twelve Pillars, the Kerbin Space Agency will be tasked with overseeing a far-reaching expansion of all spaceflight activities. Under Special Order 42, the Director of the Kerbin Space Agency has been granted requisition powers on any necessary resources or personnel to enable that expansion."

There was silence as everyone absorbed Lodan's matter-of-fact announcement. Then Ademone saw Jeb's face darken and hastily stepped in. "Two Special Orders together is...unusual," she said carefully. Beside her, Geneney nodded agreement. "In fact," she continued, "I'm not sure if I've ever heard of such a thing before. Would you care to explain, Director?"

Across the table, Nelton winced but Lodan was either oblivious to Ademone's tone of voice or choosing to ignore it. "Certainly. I trust you will all remember the Capital News bulletin the evening before the Pioneer 1 launch?"

Four heads nodded slowly.

"Nothing about that story was remotely new. In fact - for reasons I'll come on to - the link between Kerm and Blight had been known for some time..."

"My understanding is that the Council are still debating the necessity for Part 3 and that a significant minority is still hoping for a result from the Berelgan. But if we are ordered to go ahead, then we'll have whatever resources and funding we need. Which is cold comfort since we will *not* have anything like the time we need. Nevertheless, as failure will manifestly not be an option either, we will all do what we must." Lodan rolled up his maps and nodded politely at Ademone. = "Does that answer your question?"

Jeb shook his head in disbelief. "Well thank the Kerm for Ambassador Jerfun! Or were the great-and-wise Council actually planning to tell the rest of us mere kerbals about any of this?" He glanced at Geneney. "Better check the fine print on this one, Gene, because I'm betting that's gonna stink too."

"The Council," Lodan said evenly, "were planning to do exactly the right thing. Evaluate the evidence, make a plan and implement it. All that... idiot Ambassador has managed to achieve is to stir up a global panic and make everyone's job far harder than it needed to be."

"And what a wonderful idea that turned out to be!" retorted Jeb, "Even if the Council had managed to keep everything quiet until they had a plan - which was never going to happen - did they seriously expect everyone to meekly follow their plan and *not* to panic?"

Lodan's eyelid twitched. "Of course not," he said, "only the rational majority. And better that than an irrational, *uninformed* majority clamouring for answers that nobody could give!"

"And still can't!" said Jeb, "I don't suppose it occurred to anyone to ask the 'uninformed majority' or their ideas?" He snorted. "Of course not. So all that patronising prevarication has got us exactly nowhere."

"With respect," said Lodan tightly, "the Council has sought opinion from all over Kerbin. The foremost experts on Kerm..." The expression on Jeb's face brought him up short.

"Experts," said Jeb sardonically, "don't cope well with challenges to their expertise." He leaned forward. "The Institute was so stuffed full of experts that it could barely move. Exactly one of them had the vision to see past the inside of his own head - and he's just flown back from the Mün in a spacecraft that he designed and built himself!" Jeb jabbed a finger at Lodan. "Go ask the 'experts' about your precious Part 3 - I guarantee that none of them will give you answer worth half a..."

"Which is why there's a conspicuous lack of Institute staff here today," snapped Lodan. "In case you hadn't noticed!" He leaned forward and knocked Jeb's finger to one side. "So why don't you sit down, shut up and saw that chip off your shoulder before it tips you over!"

"So what do you think, Ademone?" asked Geneney quietly.

Ademone shrugged. "Part 1 is a stop-gap and Part 3 is desperation. I think we'd better hope for some answers from the Berelgan."

Geneney nodded. "Likewise. But if they don't - or can't - find them?"

"Then Part 3 will be the least worst option," said Ademone heavily. "Although I'm not convinced that the Council knows quite what it's asking for."

Jeb and Lodan scowled at each other before pointedly sitting back in their seats and turning to face the others. Geneney reached for a *djan* and crunched it thoughtfully.

"What about those requisition powers?" he said at last "Will your Board go for that?"

"A Special Order wouldn't give them much choice," Ademone pointed out, "But they would certainly question the need for such a drastic measure when a perfectly ordinary subcontract might have the same effect." She looked at Lodan. "Is there any particular reason why the KSA feels the need to have quite that level of oversight?"

Lodan gripped the edge of the table. "Because," he said, "Part 3 is too big for the KSA to risk having its subcontractors indulge in such pointlessly dangerous stunts as *sending prototype crewed spacecraft around the Mün*. I had hoped that Rockomax could temper that kind of foolishness from the KIS but apparently not." Lodan glared at Ademone. "For Kerm's sake - what were you thinking?! Strand those kerbonauts around the Mün and all the public enthusiasm for your space program would have vanished like Spierkan mist."

Geneney shot Jeb a warning look. "We didn't though, did we. Strand them I mean. And thanks to KBS News, our public support is running at an all time high." He spread his hands. "It was a calculated risk, Director but one that all three kerbonauts and *both* mission control teams were willing to take.

"Small risks too, compared to anything we'll need to take for Part 3," said Nelton soberly. "Real-time flight control teams will work for Munar missions and Minmus missions but for anything further afield, the crew will effectively be on their own for most of the flight."

Lodan absorbed her words unblinkingly.

"For now," added Geneney, "we have a sequence of test flights planned intended to minimise the risks of the eventual Munar landing." He ticked off the flights on his fingers. "Pioneer 2 - Kerbin orbit test of the complete Pioneer spacecraft, lander included. Pioneer 3 - full flight test up to Munar descent orbit including emergency abort options. If - and only if - we complete our test objectives for *both* flights, then we make the first landing attempt with Pioneer 4."

"And which lucky kerbonaut gets to fly that," muttered Lodan.

"Jondun, Malmy and Jeb," answered Geneney. He held up a finger. "And before we go any further, Director, you should know that the eleven other candidates for the commander's seat all independently voted to give the flight to Jeb. You might want to think about that for a moment."

"Jondun is one of our most experienced test pilots," said Ademone quietly, "and my Head of Propulsion has been very impressed with Malmy throughout the lander development program."

"We know the risks, Director," said Geneney, "so let *us* take them for you. If our Munar program is successful then you can present Part 3 as not only feasible but *inevitable*. And if we fail then the KSA stays clear of any public backlash. Frankly, Director, the very last thing I would do right now is exercise Special Order 42."

Lodan looked at him thoughtfully. "I'm waiting for the other Mün boot to drop, Geneney. What does the KIS expect to get in return?"

"Independence," said Geneney frankly. "All or nothing, Director. If the KSA is going to requisition us, it requisitions us the way we are."

"And keeps the meddling government out of Jebediah's hair," said Lodan dryly. "Even if they are bankrolling his dreams."

"Exactly," said Geneney unperturbed, "We get to dream and the KSA gets half of their crewed spaceflight division at a stroke. If I could make a bold suggestion, Director, I would also venture that Rockomax's crewed program, would make an eminently sensible and highly complementary second half, under a similar arrangement." He smiled. "Much as it would pain Wernher to admit it, Rockomax are the premier space engineering company on Kerbin at this time, particularly for heavy lift. They have the experience, the facilities and the organisational structures already in place..."

"So why fix what isn't broken," interrupted Jeb.

Lodan favoured him with a wintry smile. "Indeed. In which case, why do I also need the KIS?"

"Because we're not broken either," said Geneney, "And we work well with Rockomax. On our own we managed to compete with them - we launched a satellite and Rockomax launched a bigger one. We launched a kerbal into space, Rockomax launched two at once. Rockomax sent a probe to the Mün but we put one into Munar orbit. And so on." Geneney paused. "But working together we sent *kerbals* to the *Mün*."

"And much as it pains *me* to admit it," said Ademone, "I think the KSA would be... ill advised to break up a media friendly team of volunteers with such an obvious track record. Even if they also managed to turn one of our best kerbonauts into a drilling fool."

Nelton grinned at Geneney and Jeb's suddenly bewildered expressions. "The heat shields for Hope 1 and Hope 2," she told Lodan. "For various reasons the fabrication team was short staffed, so James volunteered to help. Made a fine job of them too but got a reputation for being happiest when he was drilling out defective cells."

Geneney laughed. "I'll be sure to let Ribory know," he said, "She'll be delighted to hear it." He turned to a stony-faced Lodan. "We all build them - we all fly them. It's our motto, Director and it's also the literal truth. When Sherfel and James were training for the Pioneer 1 flight, they had the good grace to go along with it. Sherfel ended up coordinating our multi-site training simulations, James ended up building sizeable pieces of the heat shields for Pioneer 2."

Geneney sipped his coffee. "Every single one of our kerbonauts - and every single member of their flight control teams, myself and Jeb included - had a part to play in building and designing their spacecraft. More importantly, they had a part to play in building their colleagues' and more often than not, their *friends'* spacecraft. It's taken us years to build that kind of teamwork and team spirit, Director and I hope you'll agree that both would be significant assets to a space agency tasked with meeting a very large challenge in a very short time."

In reply, Lodan walked over to his desk and picked up the phone. "Tomass, could you hold my calls please. Yes, for the rest of the afternoon. Please convey my apologies to Dunney and ask him if he would be so kind as to reschedule to tomorrow morning. Thank you."

He poured himself another coffee and sat down at the table. "Very well. My phone is at your disposal, good kerbals. Please make any calls you need to, take a break if you require one and then make yourselves comfortable. I think it's time to talk details."

Chapter 47

Pilgrims

The Kerm branches lashed wildly against the roof of Jonton's hut, scattering glossy green leaves into the gentle afternoon breeze. Inside, gnarled vines dug into bloodless flesh, drawing the kerbal so tightly against the Kerm trunk that they threatened to tear skin and bark alike. Two bloodshot eyes rolled back in their sockets, staring up at the thick cluster of leaves swaddled around the kerbal's head and tethered to it by a dense fuzz of fine white fibres.

A storm of memories ripped through Jonton's mind.

He felt the scorching fire of acid on fibre, saw a blurred image of a scowling kerbal standing defiantly in front of a Kerm sapling. Swirling patterns of sparks shimmered before his eyes, twisting and vanishing beneath a many-layered torrent of scents, sensations and knowledge. A fractured rose exploded in the storm, fragments of stem and petal whisking away into dark corners. He watched the Others' swarming attacks and saw them beaten back.

Before the battle, the fear. Formless shapes lurking in the dark, untasted, sensed but never caught. Once again he struggled for control against a barrage of conflicting and confusing signals, worn down and dulled by the need for a constant watch against unknown - and unknowable - foes...

The uncounted years of peace whirled past. Strong and secure in his own territory, undisputed ruler of his domain with time to devote to tending the strange plants and tasting the dreams of a long procession of kerbals...

Dully aching scars sapped his strength and fogged his mind. The aches became throbbing pain: clouding his thoughts, hiding them away from the raw wounds beneath. He heard screaming, pleading for the cleansing fire. Shattered fragments of mind slammed together in

a blinding spike of agony and awareness, centred on a bright cluster of scents buried in the soil...

The memories begin to fade, turned dull grey by the centuries. Endless peace and then endless war. Time and time again he faced the Others, holding his territory, strength and vigilance his only defences...

Cannot yield. Cannot show weakness. Others will hurt me, hurt me badly...badly...badtree...bad tree...bad tree...

"Bad Tree! Bad Tree!"

The kerbal's head snapped forward. Dimly, Jonton felt something tear in the back of his mind.

He heard Joenie screaming, watched her hammering on his trunk with both tiny fists, felt fingernails digging into palms as he fought for control. He called out to her through the pain, saw her face turn towards his...

"Dada 'ossil."

Joenie dropped the stone into his hand and he heard himself thank her. The pouch slit in the front of Gerselle's poncho gaped open as she lifted Joenie up and put her on her shoulders...

The smell of leftover white bean stew filled his nostrils as he watched Gerselle lift his tiny daughter out of her pouch and hold her out to him. He wrapped her in a corner of his poncho, felt her wriggling as she snuggled into his shoulder. Gerselle turned towards him...

...as a group of the villagers left the room, leaving the rest staring at Fredlorf lying nervously on her bed. He saw the fear on their faces as he lowered his leaves towards Fred's head, felt the first faint wisps of his friend's mind against his own.

My friend...

The Kerm branches slowed their frantic lashing. For a moment they stopped, held unnaturally still against the afternoon sky. Then they relaxed, swaying back and forth in the stiffening breeze.

My friends. All of them - my kerbals and my friends. And I promised them that this an-Kerm would rather retreat than fight.

Erlin drove the long end of the slender, L-shaped probe into the soil. Carefully, he fitted the syringe into the side arm, feeling the usual brief resistance as the needle punctured both membranes inside. The syringe piston slid out smoothly, coming to rest against its stops. Erlin eased the barrel out before depressing the plunger, twisting the syringe clockwise, and pulling it free.

He tugged the probe out of the soil and swiftly dismantled it. Laying the core tube flat on the ground, Erlin tipped the probe head into the palm of his hand and examined the small,

silicone capped, stainless steel vial that fell out. Satisfied, he dropped it into a matching aperture in the lid of the small but heavily insulated box by his side. Then he took the last core tube and vial from a nearly empty second box and reassembled his soil sampler.

The Kerm tree stood in the centre of the copse, it's thirty-six companions arrayed about it in a loose circle. Neatly tended fields spread out in the distance, some left fallow, some newly harvested, others planted with a selection of crops. The pollinator breaks separating the fields were vibrant and diverse enough to satisfy the most exacting of kermol farmers. Of the farmers or their village however, there was no sign. Pairs of tall, brightly coloured and numbered flags waved jauntily in the evening breeze, each flag marking one end of a slim metal plate that jutted out from the soil. Seen from above, Erlin knew, the effect was striking; concentric rings of colour centred on the Kerm copse. He shivered, tightened the drawstring at his jacket collar and set off for the last pair of flags on his round.

The setting sun cast long shadows over the ground, its reflected light staining the marker plate a deep orange. Erlin gently tugged at the plate, frowning as it refused to move by more than a few centimetres. He sighed and climbed to his feet, brushing dirt and twigs off his knees, then picked up his equipment and set off across the fields towards his van.

By the time Erlin drove up to the Berelgan, twilight had long since faded into dusk. Eve shone in the darkening sky, bright against the first few scattered stars strewn across the sky. Brighter light spilled around the edges of shuttered windows as he strode towards the chemistry department, clutching his sample box in one gloved hand. Half of the laboratories were still occupied; white-coated kerbals standing by fume cupboards or bent over their lab benches. Occasionally, one would look up and briefly acknowledge Erlin as he walked past. The mingled solvent smell of the wet laboratories gave way to the tang of ozone and hot dust as he turned the corner, the ever present whine of electronic equipment buzzing like a trapped mosquito in the back of his skull. He scratched the back of his neck absently and pushed open the doors to the mass spectrometry laboratory.

Halsy was waiting for him.

"How are they looking, boss?"

"Well the new plates seem to be intact," said Erlin. He lifted the sample box onto the nearest bench and flipped open two catches on its rim. Icy white vapour billowed out as he lifted the lid away, revealing the frosted metal tubes fixed to its underside. "Although it would be a rare beetle that could chew through steel. Dispose of the dry ice would you - I'd better get these in the freezer."

Halsy upended the sample box into the sink, carefully not touching the double handful of steaming white pellets that cascaded out. "So the plates were loose then?" he asked Erlin's retreating back.

"Up to a point," said Erlin. "The newest ones still had some give but the five-lambda series looks like a wash - couldn't lift any of them more than a few centimetres." A stainless steel vial clicked against its labelled sample rack. "Wish we could work out what's causing that wretched chemotropism. Apart from anything else, if we had some kind of handle on its

effective range, we could correlate root fouling of the plates with Kerm repulsion. If we ever *find* a repelling factor that is."

"Maybe we won't," said Halsy sombrely. "Goodness knows we've been looking long enough." He waved at a tottering stack of paper by the printer. "GC-MS for the last lot of soil vapour samples was inconclusive. Most of it looks like typical background pheromones, some of them are out of their normal ranges but nothing startling. EGF-alpha tends to be high as you'd expect, phenolamines are all over the place. There's nothing consistent though - nothing I can pick out that matches up with observed fouling rates."

Halsy rubbed his eyes. "Kerm are sentient, boss. They were smart enough to knock out the wooden plates and they're sure having a good go at the steel ones too, however they're doing it. Maybe the blasted fibres *can't* be repelled - maybe they're not even chemotropic at all."

Erlin shook his head. "They have to be," he said. "They're effectively nerve fibres - too valuable to risk them in unhealthy soil."

"While they're growing, sure," said Halsy. "But after that?" He tapped the side of his head. "Dunno about nerve cells - can't see those - but I definitely can't wiggle my veins around at will. Maybe Kerm are the same."

The living Grove. Trees providing shade and shelter for countless animals and birds; their roots the anchors that hold the soil in place. Ferns spreading across the forest floor, roots exuding subtle poisons which protect the anchors from burrowing mites, the grubs of a dozen species of insect, and other predators barely visible, or quite invisible, to the naked eye. A myriad of other plants carpeting the ground, each with its part to play in the finely balanced whole. Fungi feasting on the corpses of fallen trees, returning their essence to the soil.

Out in the fields, the crop plants thrive, carpets of clover around their stems trapping water, their roots absorbing gases from the soil and turning them into vital nutrients. Lines of sweet scented flowers threaded through the fields attracting - and feeding - the insects, on whose tiny wings, the next generation of crops depends.

One guardian binds them all together.

Ancient as they are, the thirty-seven gnarled and knotted trunks dotted across the Grove are only markers of the true - and incalculably older - Kerm beneath. Far under the soil, wrapped around the taproots, an intricate knot of fibres lies hidden under each trunk. Densely tangled, finger-thick fibres form the core of each knot, a core that sprouts countless slender offshoots which spread through the soil, dividing and dividing again, surrounding the core in a cobweb lace shell. Over time, the shells have merged, knitted together until the boundaries between them are all but invisible. Twisted bundles of fibres thread the shells together, linking the thirty-seven fibrous knots into a single sentient being.

Like the ferns, the Kerm fibres exude poisons, as well as a subtle arsenal of thousands of other compounds to repel or distract any creature that would feed on them. The fibres sit at the focus of the myriad food chains threaded through the soil, holding them all in a fluid balance. Immune to the depredations of time and predators, the Kerm has endured for millennia.

But now the barriers are crumbling. Along the edges of its domain, the Kerm's defences are failing, not breached from without but methodically dismantled from within. Bit by bit the outer fibres are gnawed away, feasted on by swarms of tiny predators flocking to a new source of food.

"You're very welcome. No, I'm afraid that nobody has any spare beds but there's still plenty of room in the village hall if you can wait until after supper. Sorry - what was that?"

Gerselle smiled. "Yes, I have - I couldn't find the words to describe it either. And yes of course I'll convey your thanks to the Keeper."

The grey haired kerbal picked up her walking stick and shuffled off down the path. Gerselle watched her go, waiting patiently as she fumbled with the gate. Eventually the latch snicked shut and with a last tremulous wave, the kerbal plodded away towards the village proper. Gerselle waved back then went inside, closing the door behind her.

Most of the section of Kerm trunk forming the inside wall of the living room was hidden behind an ungainly, ladder-festooned cross between a bookshelf and a set of bunk beds. Each of the shelf-beds was big enough, with care, to accommodate a single kerbal and contained a thin mattress and a pillow lying under a Kerm leaf cluster. Each bed also sported safety ropes and ceiling pads; Communion-dazed kerbals had a tendency to sit up or roll over, forgetting that they were resting in narrow wooden box.

Ignoring the pile of laundry at the foot of the shelves, Gerselle made her way to the sleep room, pausing just long enough to retrieve a bottle of prickleberry juice and two glasses from the kitchen. Jonton looked up as she pushed the door open.

"Prickleberry?" He smiled wanly. "You read my mind love - you didn't sneak in on the last sitting did you?"

Gerselle shook her head. "No room - I had to turn the last of them away as it was. Going to be another busy day tomorrow too." She handed Jonton a glass of juice. "You need to drink more of this, Jonton Kermol - it's supposed to be good for wrinkles around the eyes."

"How about grey hair?" said Jonton. His face spasmed and he hastily grabbed the glass with both hands.

Gerselle looked at him anxiously. "Are you sure you're up for another long day?" she asked. "We could just do the afternoon groups?"

Jonton willed his jaw to stop trembling. "I'll be all right, " he said. "Honestly, love - the distraction will help. Better than...ow...standing here...owww...brooding all day." He forced himself to smile. "So - did we break the record today?"

Gerselle took a long drink. "Kallahat," she replied.

"*Kallahat?*" said Jonton, "but that's..."

"Yes," said Gerselle. "He's on a walking holiday apparently. He was on his way through to Barkton when he stopped for the night, two or three Groves away - didn't say which - and found the whole place talking about the "lore-keeper" and the "truth-teacher.""

Jonton shook his head. "I prefer "truth-teacher" to "Great Sage" he said wryly, "but Kallahat? What on Kerbin are we going to do if a whole kerman town descends on the Grove?" He gestured at the wall of shelf-beds arrayed against the Kerm trunk. "We're going to be turning away more kerbals than we take in."

"Patbro's Grove is already helping with the catering," said Gerselle, "and plenty of other Groves have volunteered to help too. Fred had some ideas for building platforms around your upper trunk so you could Commune with more visitors at a time but I told him that could wait until...until..."

"Until I've finished retreating?" said Jonton gently.

Gerselle latched onto his words gratefully. "Yes," she said. "Exactly."

Jonton's jaw suddenly clenched and a dribble of pricklyberry juice ran down his chin. "That would be best," he grunted. "Safer if Fred doesn't get too close whilst I'm being chewed on."

Chapter 48

Lightning

The Skyhauler lumbered through the night sky. Twin engined, squat bodied and built for range rather than aerobatics, the old transport aircraft had rapidly acquired the less than flattering nickname of 'Airhog' from border patrol pilots used to faster - and nimbler - machines.

Val hated it.

She glanced at the artificial horizon and hauled her aircraft into a fractionally tighter turn. The flight direction indicator drifted reluctantly around, bright white digits marching slowly past the red inverted V that marked the Airhog's nose. A thin smear of light from the Doreni port glowed sullenly on the real horizon, fainter patches of light from other towns dotting the coastline to the north and south.

"Vinenut three, Val."

She rolled level, tipping the aircraft onto its opposite wing in a stately bank; threading the needle between the patches of light. Staying out of conceivable searchlight range whilst getting close enough for the racks of passive sensors stuffed into the Airhog's belly to do their thing. Or so the flight planners said. Plotted on the navigation charts, their routes resembled the erratically bulbous contours of a fresh vinenut and one of the early reconnaissance crews had promptly labelled all their waypoints accordingly. The joke had stuck.

"Anything down there, Sig?"

"Picking up the usual harbour radars," her navigator replied. "Shouldn't be a problem at this range. Nothing bigger or pointed in our direction - guess the Doreni aren't bothering to throw money down the same gronnek warren as the Wakirans."

"Yet."

"Yet," Sigrin acknowledged. She snorted softly. "They'll probably just pay Rockomax to launch them a nice satellite instead."

Val sucked in her breath sharply. "They might. Or borrow that fancy mapping satellite from the KSA. You should kick that up the chain, Sig."

There was a thoughtful silence from the back seat. "I think I will," Sigrin said slowly. "It'd beat flying round in lopsided circles, that's for sure."

"With nothing else to do than limp away in a straight line if anyone sees us," said Val sourly. "Wish I knew what the Kerm is holding up the Humilisia airstrip. We could fly the Clouddrunners out of there in broad daylight and the Doreni couldn't do a damn thing about it."

"Still takes a lot of concrete to build a proper runway," said Sigrin. "Even if we don't care whether the Doreni are watching...ahhh here we go."

The ELINT system chimed twice in Val's ear. Behind her, Sigrin hunched forward over her instruments, streaks of light from the screens washing over her face, eyes flicking back and forth between the radar and infrared displays.

"Well - they're still there. They've shuffled them around a bit but I'm counting the same number - and same types - that BB reported. Patrol boats mainly with a couple of bigger vessels for variety. Better take a swing past vinenuts four and five anyway to cover the angles but I don't think we'll need another full circuit."

Val automatically checked her kneeboard as she eased the Airhog into a shallow climbing turn. The softly glowing figures simply confirmed what she'd already committed to memory. She glanced at the fuel gauges, nodded and shuffled back in her seat, trying to find a more comfortable spot.

"You sure, Sig? I was starting to enjoy the scenery up here."

Sigrin's snort echoed in her earphones as the Skyhauler droned onward through starlit Doreni skies.

Jerfun's breath smoked in the freezing air. Sand crunched under his boots, loose grains skittering across the ice-glazed walkway and trickling over the edge in thin, gritty drizzles. The air smoked hotter with muttered curses as one foot skidded on the frozen planks, throwing him hard against the safety rail.

Slowly, lifting his feet as high as possible in his stiffly awkward leggings and setting them with down with exaggerated care, Jerfun stepped into one of the low embrasures set into the log wall. From atop the palisade he stared down the road at the distant cluster of figures, black specks against the leaden evening sky. Silently, the guard passed him a pair of binoculars.

Seen up close, the figures were a curious blend of traditional and practical; grey woollen robes belted around the more usual Wakiran cold weather garb. One of the robed figures was carrying a grey pack, another twelve were toting larger, dark brown bundles. The remainder carried conventional mountain gear, most of them festooned with far more than a single kerbals-worth of equipment.

Jerfun's heart sank. "Have you seen any vehicles?" he asked quietly.

"No, Ambassador. They haul their own loads."

Jerfun leaned on the parapet to steady his hands, peering intently through the binoculars. The robed figures wore snowshoes, their companions were equipped with long, cross-country skis. Now that he was looking for them, both the sleds and the bundles of white fabric lashed to them were plain to see. Equally plain to see were the chunks of ice bobbing on the surface of the stream next to them. He straightened up.

"I'll hold the watch. Take word to the village, return with fuel, wood and two days supplies for forty."

"Supplies, Ambassador? For Kolans?"

Jerfun scowled. "Truly? They carry no flag - of Wakira or Kolus. And if we cannot let them pass then neither are we barbarians."

The guard nodded tersely. "My gun is yours, Ambassador." She unloaded her hunting rifle, presented the empty weapon and its ammunition to Jerfun, and turned away. The steady scrape of boots on coarse sand faded into the background as he automatically inspected the rifle, reloaded it and, snapping the safety catch on, propped it against the parapet within easy reach.

Slowly, the band of Walkers drew closer. Jerfun made his way along the walkway, speaking briefly to each of the guards, before returning to his own embrasure. He checked his rifle, watching the Walkers milling around the base of the palisade, then set it aside and cupped his hands around his mouth.

"What can I do for you, good kerbals?!"

There was a brief conference and then one of the grey cloaked kerbals stepped forward. Jerfun was unsurprised to see the grey pack on his back.

"We weren't told about this... roadblock, good kerbal!" the stranger called out, the rounded consonants in his accent clearly audible. "May I ask its purpose?"

"Truly, a regrettable necessity," Jerfun answered. "But new villages require protection in these troubled times." *Certainly against your like.*

"Surely not against a group of Walkers and their companions? Come now, good kerbal, we merely pass through and our time-honoured journey is an urgent one."

"Good Ambassador," said Jerfun pleasantly. Along the palisade, the other guards reached for their weapons. "And truly your journey must be urgent if it has led you here."

"I fear that I don't quite understand...Ambassador."

"The Kolus border is several days away by foot," said Jerfun. "Were I in your party, I would be minded to verify the date on my maps."

There was a pause.

"May we request an escort through your Grove, Ambassador?"

"You may not. You may shelter beneath our palisade tonight and if you wish we can offer transport back to the border in the morning." Jerfun surveyed the loaded sleds beneath him. "We can spare you fuel for tonight and - in honour of your journey - spare you two days of supplies."

"That is... generous, Ambassador. Our thanks go with you."

"It is no more than any Wakiran," the emphasis on the last word was unmistakeable, "would do in my place. And no more than any honorable kerbal would do for a new Kerm. I have already sent word to my village for your supplies."

Enely tightened the belt of his grey cloak, shivering in the salt breeze. He dipped his hand into the grey pack at his feet, reaching for the Kerm seed within; twining his fingers through its fibrous husk for reassurance. His companion Walkers stood around him; tough, weatherbeaten kerbals, hardened by a lifetime spent in the semi-arid wastes of central Wakira. Growing crops under such conditions, even desert adapted species like pepper cactus, taxed the determination and ingenuity of Kerm and kerbal alike. Those that did banded together in close-knit, self-reliant communities, usually remaining kermol for their entire lives.

The Bay of Dazj loomed on the horizon, choked with the boats and barges shuttling supplies and workers ashore from the small flotilla of transport ships anchored further out to sea. Flanking the bay, the twin volcanoes of Dazji Isle rose forbiddingly into the sky. Long dormant, the outpourings from their last eruptions had finally been sufficient to join them into a single island. Centuries of erosion had since carved out a spectacular natural harbour, each horn of the crescent bay guarded by a steep, cloud-wreathed peak. Further west, the Maldonian Archipelago tailed out in the jagged Pillars of Dunlin and a string of smaller volcanic islands; all uninhabited save for thriving seabird colonies.

Like an gigantic, broken eggshell, a half completed radome loomed above the eastern headland, the antenna inside motionless for the moment but pointed unerringly at the eastern Maldonian islands. Nearby, a cluster of dark grey buildings stood wrapped in forests of scaffolding, their concrete walls made with local black sand. A steady stream of vehicles trundled along the coastline between the building site and the harbour.

The younger Walkers watched in fascination as the *Adelan Kerman*'s crew hauled the second of her two enormous skyfoil sails onto the deck and set about detaching it from the winch lines. The first skyfoil was already stowed on the opposite rail, runnels of water

dribbling out of its folds and tubes and splashing into the sea below. The older Walkers and Enely paid no attention, instead staring impassively at their new home.

Ceded from the newly formed Forseti Confederacy towards the end of the Age of Sail, the western end of the Maldonian Archipelago had nominally belonged to Wakira for centuries, although for much of that time it had lain abandoned, save as a line on a map. Dazji Island itself was barely habitable, the twin volcanoes trapping just enough moisture from the prevailing winds that its thin soil could support a sparse collection of hardy grasses and low, thorny shrubs.

The deck thrummed softly underfoot and water suddenly churned around the *Adelan Kerman's* stern. Slowly she crept forward, cautiously edging towards her allotted berth at the bay entrance. Enely patted the Kerm seed one last time for luck and hoisted his pack onto his shoulders. The higher pitched whine of the ship's motor shifting into reverse was followed by a heavy splash and the clanking rattle of chain running through hawse pipe.

We're here.

Under the bosun's watchful gaze and blunt orders, the Walkers began boarding the ship's boats. Enely watched the deck crew wrestle back the heavy, folding cargo hatch and start unloading the hold. He recognised the bales of flat-packed shelters for the new village - *my new village* - but most of the other equipment and supplies were stowed in blandly anonymous crates, the stencils on their sides unreadable from where he stood. Suddenly there was a respectful tap on his shoulder.

"Keeper?"

He spun round to face the bosun. The older kerbal looked at him curiously for a moment then nodded. "Stern seat, Keeper."

"Thank you. And please convey my thanks to the Captain."

"Truly. You choose a harsh place to live, Keeper - I wish you and your Kerm good fortune."

"Thank you," said Enely quietly. He tightened the buckles on his pack, glanced around the deck and clambered into the boat, clutching the gunwale nervously. The davit arms swung out and down. Enely braced himself for impact as the *Adelan Kerman's* hull sped past but much to his surprise, the boat slipped into the sea with barely a jolt. The motor started and they purred away towards Dazji Island.

The siren wailed, numbingly loud even through the blockhouse wall. Val rolled off her bunk, grabbed her flight helmet and hit the ground running.

High volume compressors screamed to life, as the pilots sprinted for the hangar. A rapidly building roar joined the scream, both overlaid with a piercing banshee howl. Val burst through the hangar door into a wall of noise. She jammed her flight helmet over her head, glanced at the ominous shape of the Mark 3 fingrillin already slung under her aircraft and

reflexively checked the hangar floor for debris. She raced past the starter-jockey sprinting clear of her aircraft, scrambled up the cockpit ladder and flung herself into the ejection seat.

The ground crew hauled the start-cart away. Val plugged in her communication leads, reaching for the canopy lever with her other hand, eyes racing over the instrument panel. The aircraft rumbled under her, like a gronnek straining to be let off its leash.

Hydraulics - check. Breakers - in. Caution panel - clear. MCL - off.

"Vanguard - comm check."

"Copy, Vanguard."

Speed-brake - closed. Flight trim system - check, altimeter - norm.

The flight control surfaces sprang to life; extending and retracting, flexing through their full range of movement. Inside the cockpit, Val's head swivelled back and forth, eyes intent. Satisfied, she pulled out the safety pins on her ejection seat, held them up to the canopy and stowed them.

Flight controls - check. Brakes on. Canopy down and locked. Seat armed. Defog and cabin temp - check

"Vanguard - ready for taxi."

"Chocks clear, Vanguard. Proceed to apron."

At the hangar entrance, an orange-jacketed kerbal lifted two circular paddles over his head and flipped their green surface round to face Val. She eased her throttle forward and released the brakes. The engine pitch rose a notch, deafening in the enclosed space.

"Vanguard is rolling." And the day I need a chaperone to get me out of here without clipping my wings is the day I quit flying.

Four Cloudbunner single-seater jet aircraft emerged from their hangars, waves of shimmering air rolling off their engines, the dawn sun gleaming from their prominent bubble canopies. Originally designed as high speed aerobatic and racing planes, the heavy torpedoes slung under their bellies added an air of menace to their lightly swept wings and gaping nose intakes. One by one, they surged forward onto the taxiway, swung lightly round, then catapulted down the runway, engines howling louder than the alert siren, hardly making it to the halfway marker before leaping nimbly into the air and vanishing into the clouds.

"Vanguard is airborne, four by four. What's the drill, Control?"

"No drill, Vanguard. The Doreni fleet slipped anchor at 06:00 this morning and, until further notice, are to be considered hostile targets. Your orders are to make best speed for Humilisia and provide air support for Commander Gusden."

"We're not going to get a lot of loiter time, Control."

"With luck you won't need any, Vanguard. If Gusden gets his way you'll either be too late for the shooting or just in time to buzz the beach barbecue he'll be throwing for our friendly Doreni neighbours. Until then, you're the big stick. Get in, drop the fish if and where you're told to and get out. Joker is grass on Humilisia."

"Understood. Vanguard out."

Gusden scoured the horizon, shifting his weight from foot to foot as the cutter surged and swayed under him. Already, the salt spray was working its way under his headset, making it chafe uncomfortably against his scalp.

The Kolan fleet was drawn up in two parallel lines, facing east towards Doren. A skirmishing force of cutters led the way; all vessels abreast; their crews, like Gusden, searching the horizon for Doreni vessels. Behind them, a defensive formation of heavier torpedo boats stood off the Humilisian coast. Two picket groups circled the islands, keeping a wary watch for any flanking attacks.

"Eyes right!"

Gusden's head snapped round. A surprisingly small cluster of black shapes, just barely distinguishable as ships, were steaming into view. Gusden blinked, then realisation came crashing in.

"All crews - rotate the line! Centre pivot! End crews - watch for envelopment chances!"

The roar of marine engines split the air. Gusden nodded in satisfaction as the nearest cutters heeled over in opposite directions, churning the waves into foam as they swung round onto their new course. He tapped a button on his headset, shouting for his seconds in command but heard only faint voices over the din of engines. Swearing, he ran for the deckhouse, yelling orders as he went.

"Anchors?"

The responses were muffled but audible.

"Swinging south, sir! Line's holding!"

"Swinging north sir! Line's holding!"

Gusden scowled out of the window, watching the cluster of Doreni boats uncoiling across the distant water, racing south at flanking speed, then slowing.

Aye, that won't help you. Cut my line would you, ya crawling slasherns.

The reports rattled in in quick succession, both seconds in command crisply confirming the new heading for their halves of the skirmish line. Gusden opened his mouth to reply, only to be cut off by a flat crack echoing across the water, which was swiftly followed by a distant fountain of spray. He tapped his headset.

"Ranging shot! All crews - hold the line and *hold your fire!*"

The two lines of cutters, both now stretched out west to east, faced each other across the waves. A second shot smashed into the water, a third, then a fourth, all falling well short of the Kolan vessels.

"It takes more than wasted shots to rattle a Kolan!" Gusden shouted. "All ahead - steerage way!"

As if in reply, the Doreni line surged forward, trailing foaming V shaped wakes behind them. The Kolan line wavered, one boat after another breaking formation as more shots crashed into the sea around them. All, Gusden noted, aimed *between* his forces. A single shot flew the other way; one panicking Kolan crew returning fire.

"Hold your fire!" roared Gusden. "They are *playing* with you. Do not enga..."

Gusden watched in horror as another incoming shell ripped into a Kolan cutter, tearing into the deck and hurling equipment and screaming kerbals into the sea. *Single shot* one corner of his mind yammered. *Not a volley - stray shot*. Dimly, he heard himself issuing orders, bringing his own vessel about, powering ahead through the engulfing melee towards the figures bobbing in the water.

Deck guns thundered in a continuous barrage as the opposing battle lines dissolved into chaos. Cutters from both forces darted this way and that, chasing each other across the waves, jinking as best they could to throw off enemy aim. Fountains of spray marked missed shots; inexperienced gunners and fast moving targets ensuring that very few shells found their mark. Gusden hung tightly onto the cabin rail, bellowing orders into his microphone as he tried desperately to make some sense of the battle.

"Anchors - pull back and reform your lines! Pick your targets and cut across their bows - get both your popguns into the fight! And for Kerm's sake hold your fire for any vessel making a pickup. I don't care if they're Doreni or pink-skinned Dunans - you *do not shoot at them!*"

One of his crew dashed into the cabin, stumbling against the doorway as a wave caught the cutter amidships. Gusden wheeled round, catching a brief glimpse of bleeding kerbals sprawled on the deck, two of them missing legs, eyes rolled back into their skulls. Another of his crew knelt by them; tending to his comrades, seemingly oblivious to the gunfire raging overhead. Then Gusden finally took in the bloodless face and wide eyes of his aft gunner.

"Commander," he choked, "The north..."

Gusden's head snapped round. *What in the seven smoking hells...* He jabbed at his headset, gesturing to the gunner to get back on deck.

"Fingril line - sitrep!"

"In position but observing fire! Your orders sir?"

Gusden stared bleakly at the ordered line of Doreni reinforcements sweeping down on his forces. "East, half ahead," he replied. "Load all fingrillin tubes and stand ready to lay down screening fire."

A handful of burning boats dotted the sea. Pools of flaming fuel dispersed rapidly on the waves but not rapidly enough for the charred figures floating by the wreckage; some barely recognisable as kerbals. Gusden clenched his teeth, dry heaves wracking his body. He swallowed hard, acid stinging the back of his throat. Then he issued the order.

"All crews pull back to the islands. Flanking speed. Fingril line will provide covering fire."

The retreat, Gusden reflected, was a bitter tribute to all the kerbals under his command. The Kolan forces slipped neatly from the jaws of the Doreni trap, a single line-ahead roaring towards the comparative safety of the Humilisian islands and the waiting line of torpedo boats. His seconds in command joined him in bringing up the rear; the three cutters harassing the pursuing Doreni vessels, offering themselves as targets to buy the others more time.

The lead Kolan cutter fled through the line of repurposed fishing vessels. Gusden glanced fore and aft, gauging speeds and distances. *Time for one fingrillin salvo before we're back to deck guns.* He tapped his headset.

"Vanguard - ETA?!"

There was a brief pause then Val's voice crackled crisply in his ear.

"Ten minutes out sir, Orders?"

"We're falling back to the islands, Vanguard. Your weapon passes are westbound, repeat westbound. Target the command vessels - bulbous bows, twin radio masts at the stern. Two releases on the first pass, give them time to retreat, second pass only if required."

"Yes, sir. Vanguard out."

Gusden's spirits lifted briefly as the two cutters carrying his seconds in command raced past the advancing line of torpedo boats. The instant his own boat reached safety he gave the order. The response was immediate, keyed up kerbal gunners reacting instantly to his words. A wave of fingrillin arced out over the sea in a rush of rapidly expanding air and disappeared beneath the surface almost as one. Sweating deckhands struggled to reload torpedo launchers as the ungainly vessels swung due west, trying to put as much distance as possible between themselves and the oncoming Doreni.

Val hissed in dismay, hardly hearing the sudden oaths from the other Vanguard pilots. Wreckage strewn the sea beneath her, kerbals hanging grimly on to the shattered remnants of sunken boats. Other boats sped towards the wreckage, crews already throwing ropes over the side, glancing up only briefly at the Cloudburners screaming overhead. Still other boats burned furiously, sending ugly plumes of oily black smoke into the sky.

"So much for the barbecue."

Val swallowed hard, bile rising at the back of her throat as she realised what she'd just said. Hands shaking, she toggled her microphone.

"Cal - you're with me. Ferl, Gil, take the second pass. Remember what the boss said - give them a chance to retreat before going in." *Although they sure don't look interested in retreating* she added silently, hauling her aircraft skyward. Sea and sky wheeled past dizzyingly, blood rushed to her head; then she was through the half-loop, rolling the Cloudbunner upright and searching for her target.

Twin radio masts. There - and there.

"Cal, break left. I'll go right." Val threw her aircraft into a tight, spiralling dive, levelling out at rock-throwing height above the waves. Steel glinted in the corner of her eye; the enemy guns swinging down and round to follow her, a sudden muzzle flash throwing shadows over her ejection seat. Then she was through, finger convulsing against the weapon release trigger, the Cloudbunner lurching under her as the weapon pylon sprang open. Val hauled back on her flight stick, her other hand wrenching the throttle hard against its stops, clawing for every last metre...

Gusden screwed his eyes shut against the sudden actinic glare. The cutter bucked under his feet; throwing him against the deckhouse wall. Black spots danced in front of his eyes as he squinted out of the window. One of the spots resolved into a tiny figure, flailing wildly as it tumbled through the air, trailing thin ropes behind it...

He sprinted for the deck rail, hand over his mouth.

Unnoticed, four aircraft flew overhead, heading due west, two of them still carrying torpedoes.

Chapter 49

Through the Eyes of a Child

"That's perfect thanks, Ferry. How about you, Gildas - can you see the screen all right?"

Gildas blinked shyly at Jonton and nodded his head.

Anlie ruffled his hair. "It's only Jonton you big silly. When was the last time you were shy with Jonton?"

Since I've been spending all my time hiding in a Kerm tree, thought Jonton. He smiled at Gildas. "It's okay. Tell you what, Gildas - I think Joenie needs some help with the cushions. Would you like to go and find some for her?"

Gildas looked up at his mother.

"Of course you can," said Anlie. "Go on, go and play with Joenie. I'll come and get you when the spaceships are on."

Gildas's eyes lit up and he scuttled out of the room. Anlie shook her head wryly. "Good thing it's not far to Barkton. I'm going to lose that one as soon as he's old enough to go kerman."

"Definitely," agreed Ferry. "We'll be watching him on the television, flying real Mün rockets instead of cardboard ones." He propped himself against Jonton's trunk. "We cut a window hole in the side of a big cardboard box and drew lots of buttons and whatnot on the inside. He spends hours lying under it, flying his spaceship. Couldn't believe it when I found a sheet of newspaper draped over his little table one morning with a photograph of the Mün facing the window."

Anlie smiled. "Those pictures you ordered from the KIS museum were the best birthday present you ever thought of," she said,

Ferry craned his neck, looking up at Jonton. "Bought a couple of prints from the Muna 2 flight and fixed 'm back to back in a nice light frame," he explained. "One of Kerbin, the other of the Mün - figured they'd look a bit better than an old newspaper."

Jonton grinned. "Here's to kerbonauts, young and old," he said.

Ferry lifted his mug of prickleberry juice in reply, when there was a sudden knock at the window. Jonton looked up and saw Fredlorf grinning at him, arm in arm with Enemone and followed by two kerbals that he didn't recognise. He waved at them all and thumbed a button on his pedestal. The verandah doors rumbled open and Fredlorf stepped inside.

"Afternoon, Jonton."

"Afternoon, Fred. Hi Enny, hello...Alemy? Kerm, I'm sorry - I didn't recognise you there for a minute."

A brief flicker of curiosity passed over Alemy's face as he looked at the face buried in the Kerm leaves. "Expect I've changed a bit in six years, Keeper," he replied, inclining his head politely. He put his arm round the quiet, dark haired kerbal beside him. "Jenrie, this is Keeper Jonton, Keeper - this is my partner, Jenrie."

Jonton smiled at the simple but classically elegant silver torc around Jenrie's neck.

"Welcome to the Grove," he said warmly. "If I might ask for the Kerm, what name have yourself and Alemy chosen for this visit?"

Jenrie dimpled slightly as she glanced at Alemy. "Kermol, Keeper," she replied firmly. "For a little while."

"Well that sounds like the perfect reason to celebrate!" called a voice from the window.

"Please tell me you brought something decent to celebrate with, Fred? I've had enough prickleberry juice in the last four months to last me a lifetime."

Ferry looked up. "Afternoon, Meleny," he said equably. "Bit early in the afternoon isn't it? What will our new villager be thinkin'?"

Meleny grinned. "She'll be thinking it's her last chance before Alemy starts taking her down to the kerblet clearings of an evening."

Alemy and Jenrie both blushed deep green. Ferry rolled his eyes. "Give the poor kerbals a day or two to find their way around first, Meleny?" he suggested.

Meleny batted her hand at him, gesturing out of the window. "Just thought they'd want to take advantage of all this fine weather," she said cheerfully. She patted her stomach. "Mind you, a bit of frost in the air can work it's charms too - can't it dear?"

Thombal coughed. "It seems so," he said dryly.

There was a chorus of congratulations from everyone in the room. Joenie popped her head around the door inquisitively, arms full of cushions. Her eyes lit up at the sight of Meleny who hastily flung her arms out to catch the hurtling kerblet.

"Careful, Joenie - careful! Mind my tummy."

"Meleny's had a baby, Joenie," said Anlie, "So you can't cuddle her too hard or you'll squash...him? Her?"

"Her," Meleny smiled. "Pouched her last night."

Joenie stopped wriggling. "Can I see the baby?" she asked.

"She's sleeping now," said Meleny gently. "She needs lots of sleep to help her grow but you can see her when she's bigger."

The door creaked open and Gerselle came in carrying a large tray. She barely had time to set it down before Joenie bounded over, grabbed her hand and dragged her over to Meleny, calling out "Baby, baby, baby!"

Gerselle raised her eyebrows, then hugged her friend in delight at the answering nod.

"That's wonderful news!" she exclaimed. "Have you chosen a name for...?"

Meleny hugged her back. "Her," she said, "Katisa Kermol."

"Your mother would have been so pleased," said Gerselle softly. She smiled, "And Adbas will be so excited to have a little sister!"

"Can Katisa be my sister too?" said Joenie.

Gerselle opened her mouth to speak but Meleny just laughed. "Of course she can, Joenie," she said. "She'll love having a big sister to play with. Now - how about you and me go and help your mummy bring everything through from the kitchen?"

Anlie wedged a cushion behind her back. "So, what is it that you do, Jenrie?" she asked, "or rather, did?"

Jenrie put her mug down. "Project management for Stratus Ltd.," she said. "Helping to set up the new production facilities near Foxham. We subcontracted CMB Construction for most of the building work." She put her arm around Alemy. "Which turned out to be one of my better decisions."

"Foxham's on the east coast isn't it?" asked Thombal. "Has the Humilisian conflict..."

"Not us," said Jenrie. "But I have two friends working at the medical centre." She lowered her gaze. "They were on-shift when they brought the injur...injured sailors back from the islands."

Ferry cleared his throat. "Stratus make parts for the space program don't they?" he said.

"Pretty sure I've seen your logo on a couple of the rockets launched out of Barkton."

Jenrie nodded gratefully, "High pressure tanks mainly," she said, "We started supplying them to the KIS for the Moho flights and finished a trial contract for Rockomax just before

Pioneer 1." She spread her hands. "Suddenly we had to build the new factory to keep up with demand."

"Stratus Ltd - putting kerbals on the Mün." said Alemy. "Tell them about Halnie's new group, Jen!"

Suddenly animated, Jenrie leaned forward. "Halnie was our original business development manager for space systems," she explained. "She still runs the KIS account in fact, but she's just been made Director of our new Portable Systems Division too - and their first contract was to design and build a life support backpack for the Mün walkers!"

"I would definitely keep *that* quiet if I were you," said Ferry, "Unless you want to be pestered with questions from a certain kerblet of ours!"

"And ours," said Meleny from the door. "Is there anywhere I can put this out of reach of small fingers, Jonton?"

Jonton eyed the bottle of citrus wine appreciatively. "I can look after that," he said. Water cascaded into the bowl on top of his pedestal. "Just put it in the wine cooler here. "He glanced at the wall clock. "And speaking of tiny fingers, we'd better round them up. Show's about to start."

Anlie got to her feet and leaned around the door. "Gildas!" she called, "Spaceship time!"

Adbas and Joenie hurtled into the room in a thunder of small feet and flung themselves at their parents. Gildas ran in after them and flopped onto his cushion, frantically shushing the other two kerblets. Ferry waited until all three were settled down and a plate of snacks put in front of each, then flicked on the television.

"Hello and welcome to this very special episode of Engines and Engineers. With me in the studio today are two kerbals who need no introduction to any followers of kerballed spaceflight."

"Kerke Kerman was one of the Rockomax Corporation's first test pilots and flight-qualified the R1 capsule with fellow pilot Jondon Kerman. He flew into orbit aboard the Next Step for its historical joint flight with the KIS's Eve 1 spacecraft. He's taking a break from training to be with us today - training for the command seat on Pioneer 3."

"Bob Kerman is a founding member of the Kerbin Interplanetary Society and flew on the Kerbal 1 alongside Bill and Jebediah Kerman. He is the chief engineer for the KIS and Rockomax's Munar lander development program and he's been chosen as a crew member for Pioneer 7. Good kerbals, please put your hands together for Kerke and Bob Kerman!"

Bob took a sip of water and smiled at the enthusiastic applause. Across the table, Kerke looked cool and relaxed despite the heat from the studio lighting. As the applause died down, he nodded minutely at Bob.

"It's a pleasure to be here, Tom."

"The pleasure is all ours, Bob. Now, I know there's one question on everyone's mind - how is everything up there?"

"Better than we dared hope to be honest, Tom. We had a pretty ambitious set of tests scheduled for Pioneer 2 but the crew have done a fantastic job in working through them. Especially Tommal, who volunteered to sleep in the lander for the first three nights on orbit."

"Testing the life support systems, Bob?"

"Absolutely, Tom. We couldn't fit a full duration test into the flight plan - the lander is designed to support two kerbals for a two day stay on the Mün - but we reviewed the consumables data on day four and all the systems had worked as planned. Incidentally, to answer your question from last week's show, the lander uses the same air scrubber cartridges as the main capsule, so we we have redundant supplies in case of an emergency."

"That's good to hear, Bob. So what else have you been testing?"

"Just about everything we can think of, Tom and few more things after that. Kerke can take us through the details but basically we've simulated almost a full Munar landing whilst staying in Kerbin orbit. Kerke?"

Kerke cleared his throat. "That's right. We had three primary objectives for Pioneer 2. Firstly, and most importantly, we wanted to practice docking the Munar lander to the CSM - that's capsule and service module. Secondly we wanted to flight test the lander as a standalone spacecraft. And finally, we've been checking that the navigation and flight control systems on either spacecraft can handle the complete stack."

"So am I reading this right, Kerke - you tested the engine on the lander whilst it was docked to the rest of the ship? Why would you need to do that on a real Munar flight?"

"Well, hopefully we never will, Tom. The main reason for doing it was so that we could test a complete thrust pattern for the Munar descent. If we'd tried that with the lander alone, it would have ended up in some crazy high orbit, but because the lander was pushing all the extra mass of the CSM, the orbit wasn't affected nearly as much. But we were also testing an emergency option - if something went wrong with the service module engine on a Munar flight, could we get the crew back from the Mün using the lander engine alone?"

"Like a lifeboat?"

"Exactly. And the answer looks to be yes - we can use the lander as a lifeboat if we had to."

"Well, that sure is a relief to me, Kerke, and I'm guessing it's a relief to everyone watching." Tom looked towards the camera. "We'll be talking more about the lander engines after the break - including the all new, deep-throttled descent engine. But right now, we have some footage for you from the very first part of the flight."

Jonton glanced at the three kerblets sitting on the floor. Joenie and Adbas were staring raptly at the screen and Gildas had shuffled so far forward that Jonton was surprised he could still see everything.

The bottom of the picture was filled by *Pioneer 2's* blunt conical prow, gleaming against an azure blue sky streaked with iridescent white clouds. Dead ahead, a shining white tube hung in space, its hollow tip pointed towards the camera and shrouded in shadow. The picture drifted this way and that, the kerbonauts making final course corrections as the two spacecraft swam ever closer together.

The end of the booster stage loomed over the watching kerbals, the dark maw of the docking adapter reaching out to engulf the end of the capsule. The camera shook briefly then steadied to reveal the two vessels snugged neatly together.

"...on a Munar flight, the spacecraft would now be ready for trans-Munar injection and the crew would spend the next two orbits checking over their systems and setting up for the burn. What you're about to see would normally happen after TMI, once the spacecraft was on its way to the Mün..."

The tapered end of the booster split into four immense segments, each pivoting smoothly back and out, to reveal an ungainly looking heap of equipment inside. Jonton peered at the screen in confusion.

"...protects the docking mechanism during TMI. You can see sections of the brace at the tips of the shroud sections. Those are hydraulically actuated - the engineers didn't want to risk explosive detachment this close to the docked capsule - each powered by two Roncott actuators driven by an open-loop hydraulic system..."

Fredlorf scratched his head. "They're plannin' to land on the Mün in that? Or on that?"

Gildas bounded over to the television and started prodding at the screen excitedly. "The kerbonauts sit in there, with the big engine behind them! The little engines are for steering... this is the radio. There's one of the legs! Look, look!"

Fredlorf grinned at Ferry. "Glad somebody knows what its all about," he said. "Yeh could probably make one fer him out of a coupla tin cans and a cardboard box. Probably fly about as well as the real thing too."

"It can't fly," said Gildas, "There's no air on the Mün so it's got rockets to land."

Jonton burst out laughing. "You listen to the lad, Fred - he'll set you right." He turned his attention back to the television which was now showing a starry sky and a very much smaller spacecraft in the middle of the screen.

"...jettisoned the descent stage and started a series of manoeuvres to rendezvous with the CSM."

Thombal tapped his earpiece. "And we've just had confirmation from Mission Control that the lander, with kerbonauts Neling and Tommal Kerman aboard, is on final approach to the

waiting CSM. He turned to the camera. "We're now going live to the Pioneer 2 capsule and kerbonaut Calzer Kerman..."

"That's one lean, mean flying machine you've got there, Pioneer."

"Yep, we stripped this hot-rod all the way back to the metal. Looks like we forgot to pack a heat shield though - thanks for the ride home."

"Copy that, Pioneer. Good to see you too."

The view through the camera jogged sideways, tipped back and forth and then settled. Calzer tapped it, noting the blinking light on its cover. "Flight, Calzer. How does the TV look?"

"Squared away, Calzer. We can just about count the rivets."

The lander slid closer. Originally designed as a single piece shell, the crew compartment had been through several weight-saving redesigns and now resembled a flat, circular can studded with antennas, thrusters and other equipment housings. Incongruously, an ordinary aluminium ladder - available at almost any hardware shop - stretched from just below the crew hatch to beyond the protruding ascent engine nozzle.

"Flight, Pioneer. Beginning inspection manoeuvres."

Calzer stared intently out of the capsule window as the lander spun slowly about its axis. *Looks good so far, fingers crossed... ah...* "Pioneer, Calzer. Give me a plus forty yaw please."

Shadows drifted over the rear of the lander, pooling in creases and folds of crumpled metal. Calzer cursed under his breath then glanced guiltily at the communications panel. "Pioneer - give me a minus ninety yaw."

Slowly the lander pirouetted around. Calzer keyed his microphone, keeping his voice carefully matter of fact. "Okay, Flight, I'm seeing some buckling on the commander-side staging mounts. The thermal shield is a little creased up but be advised that I am not, repeat not, seeing any damage to the gimbals."

"Flight, Pioneer. That's consistent - we haven't noticed any off-nominal RCS response under thrust. If there is any gimbal misalignment, the flight control systems have been coping."

"Copy, Pioneer. We'll review the TV footage and flight control telemetry but right now, Lander and Guidance confirm. Please proceed with docking at your convenience."

A sombre Thombal turned away from the screen and towards the two kerbonauts seated opposite him. "Crumpled mounts, damage to the thermal shielding - that can't be good can it, Bob?"

"Well, like Geneney said, Tom, we're going to be reviewing the TV images and telemetry downloads very carefully indeed, but right now, I don't think this is anything that should give us too much concern."

Kerke nodded. "The RCS valves are quite loud from inside a spacecraft - you quickly get a good feel for how much they're working during manoeuvres. If the guidance systems *were* compensating for damaged engine gimbals, the crew would have definitely picked up on the altered thruster firings.

Bob rubbed his chin thoughtfully. "From Calzer's report, my immediate thought is that the decoupler between the two lander stages didn't separate cleanly, transmitting an offset load to the ascent stage. If that's right - and until we've reviewed the spacecraft data it's simply too soon to say for sure - there are any number of ways we can work around that."

"So you don't think this will affect the Pioneer 3 flight plan."

"I hope not, Tom but it's just too soon to tell. If we need another Kerbin orbital test-flight before sending another Pioneer to the Mün - that's exactly what we'll do."

Jonton smacked his lips and rolled the water around his mouth appreciatively. The pleasant smell of fresh coffee drifting in from the kitchen tickled the back of his nose but, for once, failed to elicit even a momentary twinge of regret. *Oh, that's much better. Maybe a trace of root rot left if I tried hard, but I really think that's fixed it.*

The sleep room door swung open and a thoughtful-looking Joenie wandered in. Jonton watched her fondly as she walked up to his trunk and brushed her hand over it. Solemnly, she rubbed one of his leaves between finger and thumb, then sniffed them, nose wrinkling at the pungent cinnamon aroma.

"Daddy?"

"Yes, popkin?"

Joenie scowled at him. "Daaaaddy! You *promised* you wouldn't call me that when I went to school!"

Jonton kept his face straight with an effort. "I did, didn't I. Sorry pop...Joenie."

Joenie glared at him for a moment before curiosity got the better of her again. "Daddy - why are you always talking to your tree?"

Jonton blinked. "Whatever do you mean, Joenie?"

"Alby-at-school's daddy has a tree but Alby says he doesn't talk to it all the time like you. And mummy has a tree but she doesn't talk to it very much at all. Why do you talk to your tree all the time?"

Oh Kerm. "It's a bit complicated, sweetheart," Jonton said carefully, "Do you remember when the tree was sick?"

Joenie nodded hesitantly. Jonton smiled at her. "And I remember that you were big and brave and told the tree to stop hurting me." He paused to gather his thoughts. "I had to talk to the tree for a long time to help it get better. And by time it was all better, I'd been talking to it for so long that I was part of the tree myself."

Jonton waved at Joenie before tapping the side of his head. "I've got arms and legs and a head and eyes." He rustled the leaf cluster next to Joenie's hand. "And now I've got a trunk and branches and leaves too."

Joenie leapt back from his trunk as if it were suddenly hot to the touch.

"It's okay, Joenie, it's okay!" Jonton held out his hand and wiggled his fingers at his daughter. "I can wiggle my leaves just like I can wiggle my fingers. Look I can wiggle these leaves, or these ones, or these ones."

Joenie watched wide-eyed as the leaves above Jonton's head slowly wafted back and forth. She pointed a trembling finger over his head. "Those ones, Daddy - wiggle those ones."

Jonton craned his neck towards the ceiling. "These ones?" he asked, flexing the nearest cluster that he could see.

"Not those ones - the other ones!"

"These ones?"

"No! The *other* ones. Stop teasing me, Daddy!"

"I'm not teasing you, sweetheart," said Jonton, "I just can't see where you're pointing." A thought struck him. "Am I hot or cold?"

"Cold!"

"How about now?"

Joenie giggled. "Getting warmer, Daddy,"

"What about...these ones?"

Joenie bounced up and down, blowing on her fingers. "Hot, hot, hot!" she exclaimed.

"Ah-ha," said Jonton, "You meant *these* ones?"

Joenie nodded happily, then suddenly scrunched her face up in thought. "When I helped Mummy plant all the red flower seeds, she told me that they would grow boots to drink water with. Do you have boots, Daddy?"

Jonton smiled. "Roots," he said gently, "Not boots. I *do* have lots of roots though - the beetles keep tickling them." He took hold of Joenie's hand and quickly ran the fingers of his other hand up her arm. "Like this."

"Tickly beetles?" Joenie giggled.

Jonton nodded. "Tickly beetles. And when they tickle me I have to talk to them and tell them to stop. They don't understand Kerba though, so I have to talk to them with smells. Do you remember your birthday butterflies?"

Joenie rolled her eyes. "Butterflies, Daddy. Only kerblets call them butterflies."

"Butterflies," Jonton corrected himself solemnly. "I talk to them with smells too. With the right smells, I can ask them very nicely to sit on my branches and wait for you to come and say hello to them. The tree is teaching me to talk to lots of other animals too."

"Do the animals talk to you?" asked Joenie.

"A little bit," said Jonton. "They tell me when they're hungry or scared and sometimes they can tell me where they've come from and where they're going. The tree is teaching me how to make sure all the animals that live in the soil live in the right places to make all the plants grow properly."

"Tree school!" exclaimed Joenie in delight. "I'm going to kerbal school and Daddy's going to tree school."

Jonton laughed. "I suppose I am, sweetheart," he said. "I suppose I am."

"Could I go to tree school too?"

Jonton's jaw dropped. "I...I don't know," he said. "Maybe - if we ask the tree nicely." Hastily he dug back through his memories. *Pre-Age of Madness...group Communing...did kerblets...?* Something stirred in a deep and distant corner of his mind. He prodded at it tentatively but the memories seemed curiously blurred, almost *soft* as they skated away from underneath him, leaving a lingering echo of happy anticipation in their wake.

<small kerbals good><not Kerm><good, not danger>

Dimly, he felt something tugging on his arm.

"Daddy?"

Jonton shook his head, trying to clear his thoughts. *I guess that's a yes. I'll need to be even more careful than I was with Gerselle though.* "Uh - yes you can, sweetheart. I think that would make the tree very happy. I tell you what - how would you like to go to tree school right now?"

Joenie's eyes lit up. "Talk to butterflies?"

"Oh not yet, popk...Joenie. That's too difficult - you'll need to learn lots before you can do that. *And you're not the only one,* he muttered silently. "Let's start with talking to me." He saw Joenie's puzzled look. "Without any words," he added. "Can you get me a big fat pillow from the bunk beds and put it on top of the pillow on Mummy's bed? Then I want you to lie on the pillows so that your head just touches those leaves."

Joenie grabbed a pillow, flung it on the bed and flung herself after it. She squirmed under the leaf cluster, reaching up curiously to touch it. Jonton gathered himself.

"Stop touching the leaves please, Joenie. I'm going to rest them on your head now and they might tickle a little bit."

"Like the beetles, Daddy?"

"That's right, sweetheart, just like the beetles. Now I want you to pretend you're watching a beetle and keep very still in case it runs away." Jonton took a deep breath and lowered his leaves around Joenie's head, gently probing for a connection. Joenie flinched as the leaf hairs brushed against her skin, then lay very still.

"Good girl."

Hair after hair slipped slowly into place. Jonton reached out through them, hyperalert to any response. A fleeting connection formed on the very edge of his awareness and he froze. *Gently...gently*. The connection wavered and then held. Faintly, Jonton sensed white light, curiosity and trust layered over fear.

"It's all right, Joenie," he whispered, "it's all right..."

"Daddy?"

The bond intensified. Images swirled past him: a kerblet racing through a cornfield amidst shrieks of laughter; a procession of kerblets walking through a doorway, the rest of the building an indistinct blur; a bright airy room, colourful pictures on the wall, toys and books scattered over low tables; a picture book seen up close, with a voice murmuring in the background. Jonton let the images wash over him, allowing himself to sink into placid receptivity, reluctant to touch his daughter's mind any more than necessary.

"Daddy??"

"I'm here, Joenie. Now I want you to remember something nice and I'll see if I can guess what it is. Don't tell me about it though - just think about it."

Jonton sensed a blurry image of a pile of cushions and a kerblet leaping off a bunk bed into the middle of them. The bunks rushed towards him then skittered *past* him before the image abruptly whirled around and he found himself staring down a vertiginous drop. A moment to catch his breath and then the world plummeted upwards exploding into a shower of cushions and muted giggles.

Let it go. Let it go.

"I see you... playing with Adbas."

A burst of excitement and enthusiasm bubbled over the link. "Now *you* think of something nice, Daddy."

The cushions faded away, replaced by a dark, horizontal line against a woven grey background. A tousled head peeped over the top, blinking sleepily. Two hands appeared, lifting the kerblet out of its pouch and holding it out.

"Is that Meleny's baby?"

The image receded, woven background becoming an ordinary poncho wrapped around...

"Mummy!"

"That's right, sweetheart. That was the first time Mummy took you out of her pouch and let me hold you. Now - who do you think this is?"

The image blurred briefly then snapped back into focus. A blue poncho had replaced the grey one, the outstretched arms now holding a bald and distinctly grumpy looking kerblet. Jonton sensed puzzlement washing over the link.

"I don't know, Daddy."

"Well, who do you know that always used to wear a blue poncho?"

"Grandma?"

"That's right. So if that's Grandma then..."

"Daddy! Baby Daddy. Why do you look so cross, Daddy?"

"I think I was probably asleep, sweetheart, and didn't like being taken out of Grandma's nice warm pouch."

The house was suspiciously quiet, Gerselle thought to herself. She poked her head around the sleep room door. "Jonton - have you seen Joenie this morning?" Then she saw the small figure lying on her bed and froze.

What are you doing Jonton Kermol!

Just then, Joenie chuckled to herself. "Silly Daddy," she murmured, "Silly Daddy eating soil."

Gerselle's eyebrows shot up. She walked over to the wall of bunks and, slipping quietly into the nearest space, lifted her head up to the waiting leaf cluster.

It took longer than normal for Jonton to respond and when the white light faded, she found herself standing in front of a radiant young kerbal dressed all in green. A semicircle of beaming Witnesses stood behind her, all dressed in their best and some discreetly dabbing the corners of their eyes. Further in the background, Gerselle sensed a much larger crowd of well-wishers. She looked around but received only a vague impression of dozens of happy faces.

A pair of hands reached out and placed a golden torc around the young kerbal's neck. Hesitantly, she stepped forward and the image dissolved into a blur of warm green skin, silky dark hair and rustling fabric, all overlaid with a melange of musk and flowers. A welter of emotions poured down the link: happiness, relief, joy and overwhelming love, some bright and immediate, others tinged by a subtle incomprehension.

"Gerselle."

"Jonton? Joenie?"

"Mummy! Look at Grandma, Mummy! Daddy said I could see Grandpa too!"

Jonton sensed her unease. A smooth current of reassurance rippled over her together with an image of a familiar kerblet head on a pillow, with a cluster of Kerm leaves just barely brushing against its skin.

Gerselle caught the faint, pleading undercurrent. "Did he, sweetheart? Well, how about we *all* go and see him?"

Chapter 50

Under Pressure

For a long minute the gentle susurrations of unfolding leaf clusters was the only sound in the room. Then, gradually, it was joined by the rustling of ponchos, the occasional popping joint and the creak and rattle of wooden bunk frames as their occupants clambered stiffly off their beds. Patbro watched kerbal after sombre kerbal retrieve their footwear, murmur their thanks to the figure by the Kerm trunk, and file quietly out of the room.

"Could you do me a favour and open the drapes, Pat?"

Pellucid light trickled through the window, doing little to disperse the gloom inside. Patbro watched the verandah doors rumble open, letting in a cleansing breeze. He ran his fingers through his hair, staring out at the grey afternoon sky, the crisp air refreshingly cold on his face and neck. A sudden splash of water on stone caught his attention; he turned round to see Jonton taking a deep draught from an earthenware mug, before wiping his lips with the back of his hand.

"That's better - thanks. Got a spare mug here if you want one?"

Wordlessly, Patbro studied his friend, noting the streaks of grey at his temples and the thinning skin pulled tight over newly prominent cheekbones. Deep nests of wrinkles at the corners of his eyes and an oddly distant gaze, completed the picture. He nodded.

"I could use one after all that. You've turned into a half-decent public speaker though, Jonton - how often have you told that story now?"

Jonton handed him a mug of water. "I've lost count to be honest," he said, "Especially over the last month. People are still trickling in from Kallahat and Barkton, we're starting to see more and more from Foxham and last week we had a pair of Firesvarn turn up - Kerm only knows how they heard about it all." He rubbed his eyes. "That's one figure of speech I *really* need to lose."

Patbro reached for the light switch. "Ker...Pillars but it's gloomy out there. Mind if I put these on?"

"No, go on," said Jonton. He gave Patbro a lopsided grin. "That's one thing that this Kerm definitely does know - light is always good. Shame we can't migrate - I could just do with upping roots and heading somewhere sunny. Forseti maybe, or the Maldonians."

Yellow-white light flooded the room, chasing away the drab view outside. Jonton's face seemed less drawn and haggard in the comforting brightness and Patbro swore he could see the an-Kerm straightening up slightly, head turning towards the bulbs. "Forseti would be nice," he agreed. "Even with their heatwave." He sat down on Jonton's bed, raising his eyebrows at the cartoon-covered pillows scattered under the Kerm leaves.

"Didn't figure you for a Twelve Riders fan, Jonton."

"Oh, those'll be Joenie's," said Jonton, "You were saying about a heatwave?"

"There's quite a *lot* of pillows here, Jonton," said Patbro.

"Well yes," said Jonton, "She's only little - her head can't reach the leaves without them."

"That's what I was afraid you were going to say." Patbro said slowly. He laced his fingers together nervously behind his head and stared up the ceiling. "Sorry, Jonton - all this is taking some getting used to." He looked at his friend soberly. "I'd keep quiet about Joenie if I were you. Sharing your Kerm is bad enough but sharing it with a kerblet..." His voice trailed away.

"I'm not *sharing* anything," said Jonton impatiently. "I *am* the Kerm. And communing with kerblets was old before the Age of Madness."

"Yes," said Patbro. "Exactly."

"Oh come on," said Jonton. "Communing with kerblets had nothing to do with it. A lot of mistakes were made but that wasn't one of them." He lifted his hands defensively. "Besides, I was careful. I only communed with Joenie after a lot of practice. She's still my daughter, Pat - I haven't changed that much." He stopped at the sudden crumpled expression on Patbro's face.

"What is it, Pat?"

"My daughter," said Patbro thickly, "And *my* Kerm. Tivie... she found it's seed. I..I heard the stories about you - came here to find out if what they're saying about the Blight is true." He cleared his throat. "S-sorry, Jonton. Was hoping you'd have a different story, or an answer or..." Patbro swiped the back of his hand across his eyes. "Or something."

"Actually," said Jonton slowly, "I might." He looked at Patbro. "At least I hope I have. It could still be dangerous though - I'd understand if you didn't want to risk.."

"She found it a week ago," said Patbro quietly. "First thing I did was go to Barkton and check the satellite maps - there aren't any single sites left for hundreds of kilometres, maybe further. Everywhere else has been zoned for overlapping Groves."

Jonton nodded. "The nearest site used to overlap with my range," he said, "But not any more."

Patbro's eyes widened as Jonton quickly described how he'd learned to watch over the land around his Grove and his struggle to relinquish control over even a small part of it.

"We'll need to be careful, but the poppy line should be enough of a marker."

"And there won't be any overlap?" said Patbro hoarsely. "No Blight, no sparks, no..."

"No," said Jonton softly. "No sparks, no struggle. Tivie's new Kerm should have all the room it needs."

"Upside-down?" Lodan looked disbelievingly at Dunney. "How the Kerm did they manage to install the blighted thing upside-down?!"

Dunney dropped his creased and rumpled jacket on the seat of the chair and dropped himself on top of it. The smell of sweat and unwashed clothing clung to him like a miasma and the bags under his eyes spoke of far too many sleepless nights.

"An infelicitous design choice compounded by too many late nights of adrenaline and coffee, multiplied by Kerm knows how many weeks of work without a day off," he said wearily. "We managed to catch the other slip-ups but one finally got through the post-assembly checks. Frankly, I'm astonished it's the *first* one that got through."

"But..."

"The instrument packages are modular. Power connectors on one end, data connectors on the other. Put them on a standard chassis and you can build whatever payload you need in short order. Testing and troubleshooting is nice and straightforward - just keep on swapping out modules until you find the duff one." Dunney sighed and rubbed his eyes. "Until you drop one in upside down and short the main power supply through the IO bus. That just gets you a bang, a couple of crispy circuit boards and about three weeks work straight down the Wak."

"How..."

"When we get a minute to breathe we'll redesign the connectors. For now we're just painting yellow warning stripes on the sparky end of each module. Before they're assembled I might add, to stop some sleep deprived engineer painting the wrong end of a finished one. Was there anything else, Director?"

"I was just going to ask how long it's been since you got any sleep yourself?" Lodan said mildly.

"What day is it?"

"That's about what I thought," Lodan poured a glass of iced water and slid it across his desk to Dunney. "I'd offer you coffee, but under the circumstances I don't think it would go down too well."

Dunney grunted in agreement. Lodan looked at him thoughtfully, steepling his fingers over the bridge of his nose, before resting them on the edge of his desk. "I remember," he said carefully, "thinking long and hard before setting up Probodyne as a semi-autonomous KSA department. In the end I thought it was the right decision, and that putting yourself in charge of it was also the right decision." He looked directly at Dunney. "I still do."

Dunney finished his glass of water in one swallow. "Well that's something at least. But would you get to the point. Celestial mechanics - least of all launch windows to Duna - wait for no kerbal."

Lodan opened his mouth, then closed it again. "Very well," he said at last. "As of this minute, I am rescinding Probodyne's autonomy. I am closing down all Probodyne manufacturing facilities and suspending your staff pending two full nights of sleep and one compulsory day of rest and relaxation. Once I am satisfied that all members of staff are in a fit state to return to work, your autonomy will be reinstated. I trust my point is made clear, *Professor*."

Dunney lunged to his feet, planting both hands squarely on Lodan's desk and leaning towards other kerbal. "Quite clear - *Director*! And don't you ever..." He pulled up short at the sight of Lodan's raised eyebrow.

"Ah - reinstated you say?"

Lodan just looked at him. Dunney sat down again and picked up his glass before noticing it was empty and putting it down. Quietly, Lodan refilled it and leaned back in his chair.

"Point made, Lodan, point made." Dunney sighed. "We can make up the time. Rework the schedule, run extra night shifts..."

"Or we can bring in some more staff," said Lodan, "I'm quite certain that Jebediah or Ademone will be able provide some help in that regard." He saw the look on Dunney's face and sighed. "I know it's not ideal, Dunney but I'm sure they can send you one or two kerbals capable of holding a soldering iron and following instructions. Rockomax do have a very large satellite team of their own and even the KIS managed to put a probe around the Mün."

"Right - and we're going to be putting *two* in orbit around *Duna*."

"I'm not proposing to put them in front of a console and help you fly them." said Lodan patiently. "Just to help you build them. I know as well as you do that we can't afford to miss the next launch window - and I can't afford to burn out my scouting party either."

The corner of Dunney's mouth twitched. "Plenty of time before the Eve launch window opens," he said, "Especially as I decided to skip the one before that." He lifted a finger warningly as Lodan opened his mouth. "I trust you'll agree that scouting out Eeloo is not an immediate priority?"

"No," said Lodan, "No, you're right of course." He sighed. "Go on - go and tell your team to take tomorrow off. And if I catch anyone on the assembly floor tomorrow, you can let them know that they'll be suspended indefinitely."

Wispy trails of ice crystals streaked the sky overhead, like a gauzy veil cast over the world.

Far below, the grasslands and conifer forests of northern Kolus were gradually giving way to tundra. Even so, fingers of cultivated land still sprawled into the wilderness, in a patchwork of irregular fields, dotted with the inevitable Kerm Groves. On the western horizon, the very tallest peaks of the Northern Range shouldered their way through into the sky; their massive granite ramparts draped with folded bastions of dense white cloud.

Val swallowed the last mouthful of pressed sunfruit bar, made a face at her water bottle and hooked her oxygen mask back over her face. *The less time I spend in a wetsuit, the better. Though it might cushion this damn seat a little.*

The waypoint indicator chimed and clicked over from three to four. Val glanced at her kneeboard, nodded to herself, and eased the Cloudburner into a gentle bank. Rolling her wings level, she pushed the control stick forward, nudging her aircraft into a shallow descent towards the distant mountains.

According to the historical records, kerbals had inhabited Kenar Vale since the Age of Sail and probably long before that. Sheltered by the eastward curling tip of the Northern Range and watered by mountain streams, the valley was both fertile and well defended from the elements. Iskenar had begun as a small mountain community sheltering in the natural cave formations at the back of the valley. The city had long since outgrown its roots, although the original cave dwellings were still in use and a popular destination for the more adventurous kerbals from the southern reaches of Kolus.

Some fifty kilometres outside the city and situated at the mouth of the valley, Iskenar airport had been deliberately built at a safe distance from mountains and the often turbulent winds around them. Built from local greystone like the city itself, the roofs of its sculptured buildings planted with plots of grass and wildflowers, it blended seamlessly into the surrounding landscape. From the air, only the surrounding network of roads and runways saved it from almost invisibility.

The Cloudburner swooped down the outermost runway, flared gracefully and touched down with the barest jolt. Partially deployed airbrakes folded all the way out as the nose wheel kissed the tarmac. The little aircraft braked rapidly, swung smoothly around and rolled back up the runway, brakes and flaps retracting into its wings. With a final, expertly judged tap on the wheel brakes, Val turned the Cloudburner's nose into the wind and shut down the engine.

There was a sudden, deafening silence. Val removed her flight helmet, scratched her head and stretched as best she could in the confined cockpit. Then she reached down and pulled the canopy release lever. A freezing wind swirled through the cockpit, cutting through her

sweaty flight suit like a knife and plastering the suddenly icy fabric against her skin. Cursing, she jerked the canopy shut again, and twisted the cockpit heater up to full. She scowled through the fogged up plexiglass, shivering as the clammy suit moulded itself to her legs.

A pair of headlights appeared at the far end of the runway, dazzlingly bright as they raced towards her. Val blinked as the olive green car screeched to a halt and a figure leapt out, barely recognisable as a kerbal under its greatcoat and furred cap. She braced herself, pulled the lever and threw herself out of the cockpit, grabbing her windcheater as she went. The metal ladder stuck unpleasantly to her gloves as she scrambled clear of her aircraft and ran for the car. Her escort thrust an armful of heavy woollen fabric at her before dashing over to the Cloudbunner.

Val hastily pulled on the greatcoat and turned to see the stranger closing and locking the cockpit canopy before swinging easily to the ground. He jogged over the car and gestured at the door nearest to Val before jumping into the driver's seat and slamming his own door shut behind him.

"Welcome to Iskenar, Commander. Good to have you here."

Val snorted. "Wish I could say the same."

There was a chuckle from beside her. "Even on this pleasant autumn day without any snow falling?"

"Only because it's too damn cold," Val muttered, hunching down in her seat. "What's the weather report from the border?"

"About the same, Commander. We've been lucky."

"And the squadron?"

"The last of them flew in yesterday. Mountain rescue pilots mainly and more used to choppers than fixed wings. Most of them do hold a dual license but they'll be out of practice and none of them have any..."

"Combat experience," said Val bleakly.

"No. Officially we're to be a reconnaissance team of course but if the situation does go Humilisian on us..." he shrugged. "That's why they asked for you, Commander."

Val glanced at him, taking in his creased and weatherbeaten face and the insignia on his collar. "What's your take on it, Sergeant?" she said at last, staring out of the window.

"Messy ma'am. The Wakirans have been pi... sorry - disappointed - with us ever since that idiot Keeper tried to take a shortcut through their mountains. Firesvar hasn't made any overt moves yet but we think it's only a matter of time."

Val closed her eyes. "Great. Just great. Is the armaments and refitting team on site yet?"

"Waiting for us in the hangar. I'll be flying them, and the last of their gear, out in the Airhog tomorrow."

"It sounds like you have everything in hand, sergeant."

"I try, ma'am. Fuel truck is on its way - you'll just about have time for a coffee and a - well it'll be hot, ma'am, that's about all I can promise - whilst you're waiting to get airborne again."

Geneney stared into his empty cup, the Doreni Blue coffee sitting heavily in his stomach. "We're doing our best," he said at last. "Making the lander lighter *and* stronger hasn't been easy. And the last thing we need is a repeat of the Pioneer 2 result - or worse - in Munar orbit."

"I know that - and for what it's worth, I agree." A flicker passed over Lodan's face. "But without the inspiration of a Munar landing to prop it up, the colonisation program is going to look impossible. How long, Gene? If Pioneer 3 goes to plan, how long before Pioneer 4?"

Geneney caught the pleading look in Lodan's eyes and bowed his head to hide his shock. "Six months at the earliest," he said. "Realistically, more like eight. The hardware shouldn't be a problem - booster assembly is going well, the capsule is almost ready for final outfitting, and Ademone is confident that KDS4 will be finished in the same timeframe."

He looked up to see the KSA director's usual imperturbable expression firmly back in place. "The training and flight planning is another matter though. I've barely started roughing out the contingencies and aborts list, Nelton and I are starting to think that we'll need an actual trainer vehicle for the landing, rather than simulating it in the Whirligigs, and the trajectory team still haven't got a good handle on the mascon problem." He paused. "Sorry, mass..."

Lodan's lips twitched. "Mass concentrations? I'm familiar with the term - the Probodyne team have made quite sure of that." He shook his head at Geneney's hopeful expression. "Not as far as I know, Gene but I'll check."

"That would be helpful," said Geneney. He pinched the bridge of his nose. "To be honest though, it's a small problem compared to the rest."

Lodan nodded. "Could you send me an outline?" he said. "A memo would do; I don't need the details, just something I can put in front of the Council to give them some idea of what's involved."

"I can do that," said Geneney carefully, "but I can't promise them a landing for Pioneer 4. They do realise that, don't they?"

Suddenly, the desk phone rang. Lodan reached out to pick it up. "Direct line," he said briefly, "I'd better take this."

"Lodan." He paused. "Both separated and deployed? Excellent - please pass along my congratulations and thanks to the whole team. And Hope 1 and 2? Very good. Indeed but it's always reassuring when the universe decides to agree with us. Yes, he's with me as we speak, so if you wouldn't mind. Yes, I'll come over to Probodyne once we're finished. Thank you, Dunney."

Lodan put the phone down and for the first time that afternoon, permitted himself a small smile. "Hope 3 and 4," he said. "Both completed their injection burns to Duna and separated from their boosters on schedule. My thanks to your team as well, Gene - having Bill to help made things considerably easier."

"Glad we could help." Geneney looked at him soberly. "Between you and me, unless Duna turns out to be a complete disaster, it's going to be our best hope, whatever we get from the Laythe probes. But back to the Mün - the Council do understand that we can't guarantee a landing on the first attempt don't they?"

"That's what they'd tell you if you asked them in public," said Lodan. "In private...well that's my problem not yours. Just promise me you'll give it your best shot, Gene?"

Pleading and then a deep, deep weariness flickered briefly in Lodan's eyes. Geneney swallowed hard, biting back a pointed comment and doing his best to project a firm reassurance.

"Of course, Director. You have my word - the Kerbin Interplanetary Society will not let you down."

Chapter 51

Halfway Point

Cut, don't crush.

Enely peered at his notebook, lips moving soundlessly as he read over his handwritten instructions again. Six grey packs full of loose, damp earth stood in a neat row by his feet, each divided into six chambers by thin wooden tubes driven into the soil. Beside them, a knife, a soft round-headed brush and a shallow bowl of cinnamon-scented, watery green paste were arranged on a square of canvas, next to a heap of small dark grey drawstring bags. He wedged his notebook under the bowl, picked up the knife and grasped the Kerm branch between finger and trembling thumb.

Only take cuttings from the first two rings of branches. Cut straight across, below a leaf node.

Enely stared fixedly at his hands, willing them to stop shaking. Then, cautiously, he placed his knife against the branch and pressed. The blade slid easily through the thin bark and tender green wood, leaving him holding a slender shoot tipped with small, furry green leaves. For a moment he cradled it in his hands, like a new father presented with his first kerblet, then pushed it gently into the first pack of earth.

Paint the branch stump with a thin coat of leaf paste. Place bag over the end and tie. Do not allow bag to touch the paste.

The stump greedily soaked up the paste, turning the exposed, creamy-white wood a delicate shade of green, thickly speckled with darker fragments of leaf mash. Enely examined it curiously, peering at the ring of darker green just under the bark. He picked up one of the grey bags and, turning away from the Kerm, shook it vigorously, dislodging a thin cloud of charcoal dust. Slipping the bag over the branch stump, he pulled the drawstring tight, knotted it and stepped back to inspect his work.

Well I think that looks right. It had better be - nowhere near enough spare branches to try this again. Best take the next one from the opposite side.

Taking the second cutting took rather less time than taking the first and by the time he'd tied down the straps on the second pack, Enely had settled into a steady routine of slicing, painting and bagging. He flexed his fingers, working the tension out of his cramped knuckles, then picked up his knife and went back to work.

Five finished packs later, the Kerm sapling appeared to be suffering from a peculiarly regular fungus, with dark swellings extending from each of its lower branches. Enely pressed his brush against the raw end of the last branch, squeezing out every last trace of leaf paste from its splayed bristles. He scraped out the bowl, chasing down the last few fragments of leaf and painted them over a bare patch of wood. He fumbled the last grey bag into place, pushed the final cutting into its pack and stood up, digging his thumbs into the small of his back.

Each of the five kerbals silently watching him work stepped forward and hoisted a pack onto their shoulders. Enely picked up his own pack and looked at them.

"Does everybody know where they're going?"

"We do, Keeper."

Enely knelt down and stretched his arms out towards his companions in the traditional gesture of benediction. "Then go, my friends. And may all our saplings flourish." He climbed to his feet and watched his companions spread out through the village, each heading in his or her own direction. He shrugged his pack into a more comfortable place on his shoulders and set off.

The village had grown in the months since landing, although the need to ship most of the raw materials over from the Wakiran mainland had made for slow progress. Nevertheless, neat stone and slate buildings were gradually replacing the original, temporary, shelters which, one by one, were being dismantled and used for spare parts. Newly marked out fields stretched out in all directions, carpeted in quick growing clover. Eventually, Enely knew, the fields would be protected from the salt winds by a barrier of sturdy dwarf pines, although right now, the planned windbreak was only visible from the village if you had a pair of binoculars and a good idea of where to look.

Green and white pennants snapped in the breeze, each emblazoned with a stylised Kerm tree growing out a ring of thirty-six stars. Groups of kerbals bustled about, setting up awnings and bunting or heaving trestle tables and benches into place. One awning had been converted into an outdoor kitchen which was already occupied by a large knot of kerbals dressed in traditional leather aprons and hard at work wrapping mounds of tubers in metal foil, chopping vegetables into large flat-bottomed pots and preparing deep trays of layered pastry, dried fruit and wrinkled, sliced apples.

One of the cooks waved his spoon threateningly at a pair of young kerbals who'd strayed suspiciously close to one of the trays. Enely smiled as a pair of apples sailed through the air and were neatly caught by the two would-be plunderers.

On the outskirts of the village a gang of kerbals stood around a long rectangular pit, watching a truck cautiously backing up to it. No sooner had it stopped when two of the kerbals, both wearing heavy boots and gloves, scrambled onto the back trailer and began shovelling out smoking black sand. The others gathered round and started scraping the hot volcanic ash into the pit. One of them waved at Enely as he walked past.

"Not as good as desert sand but it'll make a sathy enough fire pit! You going to lend us a hand, Keeper?"

Enely grinned and jerked his thumb over his shoulder. "I won' be much use with only a trowel," he said, "but get me a shovel and I'll be right back after the planting."

The marker post and bright red water bucket stood out clearly against the dark, gritty soil. Enely knelt down and scraped out a rough bowl with his trowel, carefully filling it with earth from his pack.

Cut end down.

He pushed the Kerm cutting into the soft soil, probing gently for the harder packed ground beneath. Mentally crossing his fingers, he pulled out the cutting, sprinkled two handfuls of soil into the hole it left behind and replaced it. Carefully, he tamped down the earth around the cutting, then poured the water all around it. Finally, he took a slim wooden tube out of his pack, slipped it over the Kerm and drove it firmly into the damp soil.

One down, five more to go.

Enely picked up the empty bucket and set off for the next marker post.

Chapter 52

Craters

Tinny music rattled around the Rockomax Mission Control room as Nelton watched the bouncing, swaying figures on the main screen with an equal mix of amusement and exasperation. The irritatingly chirpy blend of drums and synthesisers faded briefly, spiked to a loud and sudden peak and then cut out. One of the figures struck a dramatic, if cramped, one-handed pose, his other hand still firmly clamped around the frame of his acceleration couch.

"Yeahhh! Flyin' to the Mün - and poppin' some moves!"

Nelton rolled her eyes. "Copy that, Pioneer. Be advised; Guidance and FD concur that your slang is approximately 6.53 years out of date."

"So just about ready to come back round again, Flight," grinned Kerke. "We're not behind the times - we're leadin' the times!"

"The good commander begs to differ," said Seanan. He panned his hand-held camera round and zoomed in on a very familiar face. The slap of palm on forehead echoed through the capsule.

"Guys - what in the first Kerm is... correction, *how* in the first Kerm did you..."

"Personal effects, Flight," said Barrie happily. "No weight limits breached and there's nothing like a mascot for luck. So what better mascot than..."

Seanan recognised his cue. The image on Nelton's screen zoomed back to reveal a small bobble-head doll attached to the main control panel by a patch of fabric. It seemed to be shaking its head at Kerke's pose.

"Commander Kerbiman - "Kerb" - Kerman! Hero of Duna!"

Nelton groaned. "I've got a commander who's six years behind the times, a scientist who believes in lucky mascots.."

"For sound psychological reasons, Flight, " said Barrie blandly.

Nelton ignored the interruption. "Do I want to know what my landing module pilot has in store for us?"

Seanan's eyes flicked to the cardboard tube stashed under Barrie's couch. "Nothing to report, Flight, " he said equably. "One boring, by-the-book kerbonaut here."

"Well thank the Kerm for small mercies," muttered Nelton. "Okay you lot, the book is telling me that we've got a platform alignment check to make and an MOI burn to set up, not to mention a set of environmental system checks to run. Back in your seats team - playtime is over."

Kerke swung himself onto his couch and reached for his waist restraints. "Copy that, Flight," he said crisply. He glanced sideways at Barrie, who was strapping herself in at the navigation station. "All crew secured, cancelling thermal control roll...now."

"Okay, Flight, give me a check on the SME gimbal settings please."

"Plus point five zero pitch by minus point one eight yaw, Pioneer."

Seanan scanned his instruments. "Confirmed. Thanks, Flight."

Kerke flipped over a page on his flight plan. "And we abort on red-line chamber overpressure, black-line underpressure, excess tank delta-P or sustained off-nominal pressure drop in either tank. Proceed with engine shutdown and mode-2 abort at MOI plus fifteen, course corrections to follow on instructions at periapsis plus two hours."

"Down cold, Pioneer. Nerves kicking in?"

Kerke stared at the engine control panel. "That's affirmative, Flight. We're a long way from home right now."

"We got you out there, we'll get you back, Pioneer. Two minutes to loss of signal."

"It's pitch black out there, Kerke," Barrie offered quietly. "And it went black at the right time. We're driving straight down the road."

Seanan swallowed hard and turned his head towards the window. He sensed the vast dark bulk beneath them, a looming presence against the star-studded depths, blocking out the reassuring light from Kerbol.

Shadow of the Mün - we're in the shadow of the Mün...

Mission Control interrupted his thoughts. "Thirty seconds to loss of signal. All systems Go, Pioneer. Good luck."

"See you on the other side, Flight."

Kerke held up a hand, fingers outstretched, eyes fixed on the flight clock, counting down the seconds on his fingers. Just as he clenched his fist, the radio crackled, static hissing loudly from the speaker. He breathed a muted sigh of relief, clicked off the radio and sat up a little straighter from his couch.

"Straight down the road indeed. Lets get to it."

Seanan checked and rechecked his instruments, fingers gripping the edge of the control panel tightly. *Burn program loaded, SAS in AUTO, tank pressures nominal.* Across the capsule he heard Barrie murmuring to herself, checking off the items on her own memorised checklist. He glanced at a set of indicator lights. *Valve controllers and gimbal motors drawing power.*

"Platform reference set for MOI. Attitude is green, autopilot is good." Barrie's voice rang across the capsule, making Seanan jump. He unpeeled his fingers from the control panel, doing his best to hide the tremor in his voice.

"SME is Go, guys. Engineering station strapped in for burn."

"Navigation strapped in."

Kerke nodded. "Four minutes to ignition. Proceed at 60 seconds, Seanan."

The seconds crawled past. A blue light began to flash on Seanan's panel and unhesitatingly, he leaned forward and pushed a single button. All three kerbonauts watched the flight clock intently; Kerke uncaging the manual ignition button, hand hovering over it as they waited.

"Ten seconds."

"Five...four...three...two..."

"One."

The service module engine lit, pushing Seanan back onto and then firmly into, his couch.

"Uhh - getting some transients here. Going to secondary.... no hold that, we're good.

Pressures coming up...okay coming up nicely now."

"Delta-P?" asked Kerke sharply.

"Spiked for a second but balancing," said Seanan. "Chamber pressure back between the lines and holding."

Kerke nodded tersely, eyes focused on his instruments. Grey light spilled through the capsule window, throwing unseen shadows across his chest. Beside him, Seanan and Barrie were breathing heavily, unaccustomed to their sudden weight after over three days in free-fall.

"Chamber pressure... holding. Propellant levels are good."

Kerke reached for the engine shutdown button. "Thirty seconds to go. Twenty..."

The service module engine roared silently in the vacuum.

"Three...two...one..."

"Shutdown!"

Barrie's fingers raced over her computer keyboard. "Delta-v is low but we have an orbit! One-eleven by three-five-five!"

"And thank the Kerm for that." Seanan mopped his forehead with his flight suit sleeve.

"Thought we were in trouble there for a minute."

Barrie shook her head. "One hundred and eleven kilometres away after travelling over four hundred thousand kilometres to get here. I thought Pioneer 1 was cutting it close but...Kerm, the trajectory team are on their game today."

Kerke grimaced. "Apoapsis is high. Not surprising after that burn but we'll need to compensate at circularisation."

"Shouldn't be a problem," said Barrie, "We've got the fuel for it. I can compute a correction burn if you like but I imagine Mission Control will want to run the numbers themselves. All the important burns are farside on this flight. Works for me - we get a chance to fix any screw-ups before Nelton gets to see them."

"Not until Foxham have had a chance to look at that engine we don't," said Kerke heavily. "I didn't like that start-up at all. This was supposed to be our sightseeing orbit anyway, so lets use it for that." He took hold of the attitude controls and eased *Pioneer 3* into a slow roll.

Seanan tipped his head to one side, blinking at the streaks of grey sliding past the capsule window. He moved a little closer, trying to ignore the reflected lights from the instrument panel, peering *through* the window rather than at it. Then suddenly, perspective twisted and, like seeing the hidden image in an optical illusion for the first time, he found himself looking *down* at a landscape unlike anything on Kerbin.

"Oh sweet..."

"Craters upon craters upon craters..." Barrie whispered in awe.

"And then some more craters on top of those," said Kerke, "Can't see what else those speckles would be."

"Boulders?" suggested Seanan.

"Kerm - I hope not. Rocks that we can see from orbit are *not* what we need anywhere near the landing site."

"Hard to tell with the sunlight at this angle," Barrie noted. She squinted out of the window.

"Is it just me or are you guys seeing colours down there?"

"Just looks grey to me," said Seanan. "Well, lots of different greys."

"No - I see them too," said Kerke, "Very faint tans and golds and pale pinks. Near the horizon and around the crater edges mainly."

Seanan knocked on the window. "These are pretty thick - they're probably just distorting the view."

Kerke shook his head. "Too subtle for that. Maybe something to do with contrast - I don't know. Kinda pretty though."

The whirring fans and muted gurgles from the depths of the life support systems provided a reassuringly homely backdrop to the stark vista of greys, black and washed out, translucent pastels unrolling beneath them. The three kerbonauts watched the Munar landscape drift past, each of them lost in his or her own thoughts. Occasionally, out of ingrained habit, Kerke scanned the advisory panels in front of the commander's station for warning lights before turning back to the window.

Seanan stirred. "Still not seeing any gold or tan out there," he said quietly, "but I am getting some blue."

A sliver of azure light crested the horizon, swelling rapidly into a gleaming blue hemisphere, streaked and whorled with iridescent white. Reluctantly, Kerke dragged his gaze away and switched on the radio. The crackling static shook Seanan out of his contemplation. He tapped a rapt Barrie on the shoulder on the way back to his couch, managing a credible impersonation of Nelton's clipped tones.

"Playtime's over."

Broken fragments of words surfaced from the static as *Pioneer 3* soared out from the Munar farside. Barrie frowned. "Getting a lot of noise still on high gain one. Switching antennas." She reached forward and clicked a switch on her panel.

"F...ght to...eer 3. Co...in Pione... Fli... to Pioneer 3. Come in Pioneer."

"Pioneer 3, Flight. Receiving you loud and clear on high gain two."

Nelton's reply was drowned out by the storm of cheers in the background. The kerbonauts winced at the heavy thud from the speaker, followed by a muffled voice shouting over the noise.

"Copy that, Pioneer - good to have you back."

Kerke grinned. "Good to be on the noisy side of the Mün again, Flight." The grin disappeared. "Please be advised that MOI was off-nominal, we're seeing a three-five-five apoapsis - requesting update for circularisation."

"Say again, Pioneer?"

"We had a hard SME start, Flight. Recovered before we could switch to secondary valves but still gave us an under-burn."

"Understood, Pioneer. Propulsion are on it. Flight dynamics are waiting for the tracking data but we'll get a circularisation update to you once they have a good trajectory fix. Suggest you start the landmark tracking on this orbit whilst we work this, and we'll set up for circularisation on orbit 3."

"Sounds good, Flight. Can't say we were paying much attention to the timings on that last orbit but the major craters all seemed to be in the right place."

"You don't want to see the expression on the boss's face right now, Pioneer," Nelton said dryly. "On a different note, CapSys is on-loop and ready with a troubleshooting procedure for high-gain one. Please switch to loop B and stand by."

"Two minutes to loss of signal. Propulsion have got Barkton on the line, working the under-burn with them. Don't worry guys - we'll have an answer for you on the next orbit."

"We know you will," Kerke answered, "Thanks, Flight."

He received a grunt in reply. "Thirty seconds. See you on the next pass, Pioneer."

The radio fuzzed into static. Kerke stared at it for a moment before clicking it off. He looked up at the ripping, tearing noise from across the capsule. Silently, Barrie held up her Kerb Kerman mascot before stowing it under her seat. Kerke opened his mouth to speak but thought better of it.

"They'll work something out," said Seanan quietly.

"Oh, we'll get home," said Kerke. "One of those valve sets should still be good and if they're not, we've got the lander lifeboat drill."

"Not what we had in mind for it though," said Seanan.

"No," Kerke agreed. He shook himself. "Right - if this is gonna be our last orbit, lets make it a good one. Least we can save the next team some camera time. Barrie, give me an attitude check. Seanan - unstow that camera again and get yourself to a window."

"Say again, Flight?"

"We want you to split the circularisation burn into two. Guidance is standing by with the burn numbers and TKI updates for the next four orbits. You'll fire each half on a different valve set - if both sets are green then the rest of the flight is a Go. One stuck set and we'll bring you home on the next orbit. Two stuck sets and we'll bring you home in the lander lifeboat.

"Mode five if we get a stuck-on?"

"That's affirmative, Pioneer. Better get that lander warmed up and checked out."

"On it, Flight." Seanan pushed away from the window and, with a deft assist from his couch frame, swung down into the equipment storage bay. Bracing himself against a nearby handhold, he took hold of the hatch lever. "Unsealing hatch!"

The lever pivoted smoothly - far more smoothly than Seanan was expecting - and the locking bolts withdrew with a heavy clunk and a brief whoosh of equalising air pressures.

"Cabin pressure holding, Seanan. Go ahead."

Seanan lifted the hatch out of the way and poked his head cautiously through the opening. "Woah - better take this feet first. Don't want to kick anything important, squirming around down there." He tucked himself into a ball and slowly spun over in a half somersault, grinning as he extended his legs and slowed his rotation almost to a halt. *Gotta conserve that angular momentum!* He eased himself forward through the hatchway and then down into another world.

"Okay - I'm in. I see what the Pioneer 2 gang were talking about now - that orientation shift is *weird*. Those hose clips were a good idea too - wouldn't fancy having them flapping around me."

Seanan shuffled his feet firmly into their restraining straps on the lander floor. Then he bent down and plugged his suit umbilical into its socket. "Okay - ready for my hat and gloves. How's that pressure looking?"

"Holding, Seanan. Catch."

A spacesuit helmet fell slowly towards him through the hatch. Seanan caught it, checked that both gloves were inside and placed it by his feet. A shadow passed over his head, followed by the soft clank of the hatch settling against its stops. *First things first.* He clicked his microphone on.

"Pioneer 3 to Barrie. Requesting comms check."

"I hear you, Pioneer. How do you read, Flight?"

"Loud and clear, Barrie, Pioneer. Copying no movement on your cabin pressure."

Seanan checked the circuit breaker panel before cautiously flipping a series of switches. Section by section, the instrument panel came to life, indicator lamps lighting up, dials swinging over and electroluminescent panels glowing soft green. He flipped a second set of switches, pausing occasionally to study his checklist. "Okay. Drawing power from main buses. Lander batteries full and trickle charging. Evaporators look good. Bringing up the guidance systems."

The computer screen - a duplicate of Barrie's screen up in the crew module - and the keyboard beneath it, both lit up. Seanan tapped out a sequence of commands, watching a row of indicator lights flicker and then settle. "Guidance data transferred from CSM systems. Give me an attitude read please, Barrie." He listened to the string of numbers coming over his headset then tapped a key. "Transfer confirmed and saved. How are we doing for time?"

"Fine" said Kerke, leaning down through the now open hatchway. "RCS checks are scrubbed unless we get the good word from Nelton; environmental and life-support we'll either pick up after circularisation 1 or catch during the lander separation prep. Time to get that hatch back in place."

"On my way." Seanan extricated himself from the lander systems and carefully kicked off for the open hatchway. Emerging into the capsule, he wrestled the hatch into place and heaved the locking lever closed. "Ready for pressure test!"

Kerke reached over to Seanan's side of the instrument panel and flipped a toggle switch. Over his head, two fans started up, blowing a cool, slightly rubbery smelling breeze into the capsule. "Cabin overpressure at 5%...10%...and holding at 15%." He flipped the switch back and the fans fell silent, as Seanan scrambled into his couch beside him. "Okay, Flight - are you seeing this?"

"We are, Pioneer. If the pressure holds, CapSys advises to vent before loss of signal."

"Understood, Flight. Burn program for circularisation 1 is loaded, readbacks confirmed for circularisation 2 and TKI updates." Kerke paused. "Looks like we're on the plan, Flight - please pass along our thanks to everyone for sweating the details."

"Copy that, Pioneer - we'd do it all again. CapSys tells me that the cabin pressure is holding but wants to keep an eye on it for a bit longer yet."

Pioneer 3 sailed silently over the near side of the Mün, the paired spacecraft gleaming in Kerbol's full, unfiltered glare. The geometric simplicity of the capsule and service module contrasted starkly with the boxy, cobbled-together appearance of the Mün lander it was joined to. Four plumes of vapour jetted out from around the join, freezing instantly into sparkling motes that swiftly dissipated in the vacuum. Minutes later, the spacecraft slipped around the curve of the Mün and disappeared.

Alone above the Munar craters, the spacecraft edged into position. Its main engine fired, slowing it fractionally, lowering its orbit. Coded bursts of radio waves flashed across the void as the spacecraft swung around the near side of the Mün, its crew momentarily back in touch with their home planet. Then, once again, it slipped into the shadow of the Mün and disappeared.

Inside the capsule, the crew were silent, strapped stiffly to their couches, eyes fixed on their instruments. A blue light flashed; a green finger pushed a button in response. Exactly fifty-four seconds later flames vented from the spacecraft thrusters and then precisely six seconds after that, valves snapped open allowing volatile liquids to mix and erupt in a fiery torrent. The spacecraft slowed again and the torrent ceased; its end as swift and certain as its beginning.

"It was beautiful, Flight!" Barrie's exultant voice echoed over the speakers. "Sean pushes the button, the RCS fires for ullage and then - wham - SPS, full thrust, right on schedule, no mess, no stress!"

Nelton decided not to mention the copious amounts of both mess and stress in the Mission Control back rooms. "Copy that, Barrie. We see you at undock attitude - please confirm."

"Confirmed, Flight. The away team are in the lander, we have a good seal on both hatches, RCS and life support systems are Go."

"And comms," said Kerke cheerfully. "Don't forget the comms."

"And comms," agreed Barrie. "Ship to ship link confirmed, Flight."

"Thank you, Barrie. Lander confirms Go. Propulsion copies, Guidance and FD confirm. Pioneer - you are Go for undocking."

Barrie leaned forward and uncaged a button on the instrument panel. One that was conspicuously set as far away as possible from the other controls. She rested her thumb against it, took a deep breath and pushed. Latches rattled under her feet, accompanied by a flashing orange light on the console. A gentle thud rocked the capsule, the light flickered and then glowed a solid, reassuring green.

"Barrie, Flight. Undock confirmed." She peered out of the rendezvous window above the instrument panel. "Looking good...landing legs deployed!"

"Pioneer, Flight. Spacecraft handling is nominal. Moving to station-keeping distance and standing by for rendezvous radar tests."

One and a half orbits later, Sean lifted his eyes from the radar display and stared at the inky blackness outside the lander window. Behind him, he knew, Barrie was following them at a safe distance in the capsule and service module. Under his back, a lonely, cratered landscape slid past unseen and far away on the other side of the Mün, Mission Control - and everything else that he had ever known - waited for them. For now it was just himself and Kerke. Two kerbals staring wide-eyed at the rest of the universe from inside their tiny, fragile landing craft.

"How did we ever get out here," he murmured. Kerke turned to look at him.

"You too, huh?"

Sean nodded slowly. "Yeah." He tapped his chest. "Pillars preserve me; I was a *plumber*. Joined the KIS because building rocket engines looked like fun. Never figured I would end up building actual capsules, never mind watching kerbals fly them into *outer space*." He gestured over his shoulder. "And now here's me this close to the actual damn *Mün*!"

"And it's about to get a lot closer," said Kerke quietly. "If it makes any difference, Sean, I was a pilot before I joined Rockomax. Flew a lot of planes in a lot of places but right now?" He shook his head. "Yeah, I know exactly how you feel."

Kerke glanced at the mission timer, then down at the navball. "Spacecraft alignment confirmed. Go, for descent orbit insertion."

"Radar is tracking. You're looking good from here, guys. Good luck."

"Thanks, Barrie. Throttle mode zero. SAS in AUTO. Proceeding at sixty seconds."

"Twenty seconds. Tank pressures nominal, standing by for ullage burn."

"Seven...six...five...RCS firing...three...two...one..."

The descent engine fired.

As soon as it shut down, Seanan turned to the computer and punched in a burn status request. The two kerbonauts sighed with relief at the numbers that flashed up on the screen. Kerke keyed his microphone.

"Okay, Barrie. We're seeing a delta-V of 28.4 metres per second with a new periapsis of 18.5 kilometres. Residuals minimal."

"Radar concurs with the delta-V, Kerke. I'll follow you down and firm up the trajectory numbers."

Seanan was busy at his keyboard. "Okay, ditching the CSM data. Landing radar attitude entered and saved. Phasing burn program entered and saved."

Kerke glanced at his sleeve checklist. "Got the CSM altitude matching and circularisation data here. We'll load them in on the second pass once we've dropped the descent stage. Don't want to get our burns mixed up. Okay, let's see what we can see."

Seanan felt the rattle of thruster fire through the hull. The stars slid past, replaced by the cratered Munar surface. The thrusters rattled again as Kerke checked their spin. He stared at the pockmarked surface below, hunting for the first landmark on their list.

"Got them! The Gateway Craters - and right on schedule. Okay, looking for Mount Kelvey - should be coming into view in a couple of minutes."

Up in the crew capsule, Barrie crossed off the landmarks on her checklist as Seanan read them out. She grinned at the increasingly excited voices from the lander.

"Kerm but we're picking up some speed now!"

"Would you look at those dark speckles round the crater rims Those have *got* to be rocks - look at the size of those things!"

"Looks like plenty of space between them though. We could set down there if we had to."

"Don't think we packed enough snacks for a surface stay. Oh wow - Bill's Rille sure looks different from down here. Like someone took an axe to the side of the Mün!"

"Woaaaaahhh. What the...!"

"It's fine - it's fine! Just the radar test - computer's got us. Too high to get a ground return but tracking looks good. Okay, landing radar to OFF. Hey, Barrie - any news from Mission Control?"

"Fourteen minutes to acquisition, Kerke. Don't worry - I'll make sure you're patched in."

Nelton frowned as she caught herself tapping her fingers on the edge of her console. *Again*. The main screen was still showed the two spacecraft orbiting the Mün together; a status plot which was nearly half an orbit out of date. *Station-keeping would be acceptable. Better that than...no, don't go there.*

"We're getting something, Flight! Broken but definitely telemetry, transmitting on Barrie's frequency!"

"...to Foxh...Co...in Foxham..."

"Flight, Barrie. Reading you loud and clear - what is Pioneer's status?"

Nelton swore she could hear the kerbonaut's grin over the air to ground loop.

"Oh, they're doing just fine, Flight. Switching to three-way now."

"I got it, Kerke, I got it! Site 2, fat as you like! Kerm - look at *those* ones - better warn Four not to come in short!"

Nelton watched a ripple of smiles breaking out around Mission Control at the unbridled enthusiasm in Seanan's voice, although the flight dynamics team looked at each other uneasily. Lemgan caught her eye mouthing "rocks?" at her. She leaned forward and tapped her headset.

"Flight, Pioneer. How's the Mün look from down there?"

"Extraordinary, Flight! Beats the view from orbit all hollow - you can practically count the boulders down there!"

"About that, Pioneer. What's your assessment of the landing sites?"

Kerke spoke up. "Site 1 was clear in the middle, Flight but we saw a lot of ejecta on the approach. Can't say for certain till we get a look at the camera footage but my eyeball estimate is that the trajectory team could drop an ellipse down there and keep it away from the major craters. Right now, I'd give it a cautious Go. Site 2 looks like a scrub - there's a major boulder field in the middle that we didn't pick up from orbit and I don't remember seeing from the Muna maps. The geology team would love us for it on a future landing but I do not recommend it as a site for Pioneer 4."

"That's a decision then," said Nelton. "Thank you, Pioneer."

"We could do a timed overflight on the next orbit, Flight - try and get some better data for the trajectory team?"

"It's good thought but no, Pioneer," said Nelton. "Your priority will be setting up and executing the phasing burn."

"Understood, Flight."

Until the lander passed out of radio contact again, the *Pioneer* crew treated their flight control team to a non-stop running commentary from the Mün, Kerke's drier, more precisely composed observations interspersing with Seanan's enthusiastic rapid-fire chatter and Barrie's occasional questions. At the flight director's console, Nelton relaxed minutely for the first time since the arrival at the Mün. Once she pointed out that the air to ground loop was being recorded for later analysis, the controllers crammed around the trajectory and science consoles relaxed slightly as well.

As the flight clock ticked away the minutes to reacquisition of signal, the Lander team gathered around their console, rustling flight plans and the smell of stale coffee betraying tense controllers, alert for the first sign of telemetry from the static on their screens. Numbers flickered on their screens, amidst a clutter of fragmented characters.

"Picking up telemetry noise, Flight! Waiting for...and we got them, Flight! Fuel levels consistent with a good burn."

"Copy that, Flight!" said Kerke. "This descent engine is a landing *machine*. Throttling, guidance... all right on target. We're gonna be flying high on this orbit!"

"The engineers will be glad to hear it, Pioneer," replied Nelton. "Flight dynamics have the backup numbers for your altitude matching burn if you're ready for them?"

"Ready and waiting, Flight," said Kerke. "But if they built the ascent engine the same way they built the machine underneath it, then I don't think we're going to need them!"

"Let's hope so," said Nelton. "This is the final test, team. Pull this one off and we've got a landing mission."

As *Pioneer 3* plunged towards the Mün for the third time, one thought ran through hundreds of minds.

Would the ascent engine fire?

It ran through the minds of the engineers who had designed and built the engine. It ran through the minds of the flight controllers tasked with watching over it. Most especially, it ran through the minds of the lone kerbonaut in orbit around the Mün and her two crewmates standing right on top of it. Seanan took a deep breath.

"Burn programs loaded."

Kerke scanned his navball. "Thirty seconds. Attitude good, correct end pointing towards space."

Barrie didn't bother to reply. The corner of Seanan's mouth twitched briefly as he braced himself as best he could against his foot restraints. Kerke reached forward, hands racing over the controls.

"Ascent engine armed! Abort stage... and ignition! Ascent engine firing!"

"Smooth separation and a steady start," Seanan called out. "Mine's a coffee, Barrie... we'll see you soon!"

"You guys got your hats on?" Barrie checked the air hoses connecting her suit to the bulky life support pack strapped to her back. "What did they call this thing again?"

Seanan locked his helmet onto the collar ring of his own suit and checked his gloves. "The EMU," he said. "Short for Extravehicular Mobility Unit."

"Sounds like some kind of a bird," said Barrie, her voice tinny through the suit radio. "You would think they could come up with something snappier." She pressed a switch on the control box attached to her chest. The backpack started up with a faint gurgle and a stream of cool air blew across the inside of her helmet. "Seems to be working though." She glanced at Kerke and Seanan. "All set?"

"All set," Seanan said.

Kerke nodded. "Depressurising."

Insulated from the cabin noise inside her suit, Barrie watched the pressure gauge drop silently to zero. She reached up and twisted the hatch locking bar, grunting with effort. "Mobility unit my foot." She heaved the hatch open and, checking her tether, pushed her head out of the capsule. Seanan and Kerke watched nervously as she pulled the rest of her body through the opening but her life support backpack slipped out without catching on anything. They heard a sudden intake of breath over the radio and then Barrie's carefully matter-of-fact voice.

"Okay, Flight. I'm clear of the hatch. The suit gloves are pretty stiff under vacuum but I can still grip the hand-holds."

"I've got the tether, Flight," said Seanan. "Ready for second-eyes duty."

"Copy that, Pioneer."

Seanan settled himself half-way out of the capsule, holding tightly onto the hatch rim with one hand and onto Barrie's tether with the other. "Tether looks good, Barrie. Ready when you are."

Barrie clambered slowly along the capsule, paused for a moment as she felt for the next foothold, then edged onto the service module. She tucked her fingers under a recess on its curved metal skin and pulled. The access panel dutifully popped open and Barrie reached inside. "Okay, Flight, I have the sat. What next?"

"It should activate automatically, Pioneer. Check for a green light on the base."

"Got it, Flight. You picking up a signal."

"Loud and clear, Pioneer."

Barrie carefully lifted the small spherical device clear of its compartment, being careful not to snag any of its four stub antennas. "Deploying." Grinning inside her helmet, she tossed the satellite away with a gentle underarm throw and watched it tumble slowly away into space.

"Good work, Pioneer. That and the ascent module should let the tracking team get the mascons pinned down before the next flight. How about a couple of holiday pictures to finish the EVA?"

Seanan blinked. *Did she really just...sounds like she's been spending too much time with Gene or Jeb.* He ducked back inside the capsule. "One moment, Flight."

Kerke regarded the rectangular shape on Seanan's couch with amusement and clicked his suit radio over to the crew's private channel. "Is that what it looks like?"

"If it looks like a roll of painted cloth held straight with a pair of old car aerials," said Seanan, "then, yes it is. Fiddly too - good thing I opened it before suiting up." He passed the makeshift signboard through the hatch to Barrie, before climbing back out himself.

"Up a bit, Barrie, get it pointing over your left shoulder. Bit more. Perfect!" Seanan hastily switched over to the air to ground loop. "Okay, Flight. Here goes with the exterior camera. Let me know if its out of focus."

Nelton froze in her seat. A couple of the flight controllers chuckled briefly then fell silent, drinking in the view.

The cratered grey Munar horizon filled the right hand side of the main screen. In the centre, a spacesuited figure stood boldly atop *Pioneer 3's* service module, its mirrored visor gleaming in the sunlight. It appeared to be holding a road sign, arrow pointed over it's shoulder directly at the shining blue and white marble in the background, writing clearly visible to everyone in Mission Control:



Nelton stared entranced at the screen. "I should yell at you lot for this but somehow...somehow that just sums up the whole program." She cleared her throat. "I almost hate to say this guys but we've only got thirty minutes before loss of signal. Time to come inside."

The spacecraft circled the Mün for the last time. The boxy remains of the landing craft separated from its mothership with a spurt of ice crystals and drifted away on the barest puff of gas. Thrusters fired, aligning the capsule and its service module along some unseen arrow. They fired again, a longer burst this time, urging sluggish fluids into position. Then, at

the appointed moment, the main engine burst into life for the last time, hurling the spacecraft and its crew away from the Mün and onto the long path home.

Barkton Mission Control was packed with, and surrounded by, anxious kerbals listening to the flight updates from Foxham. Geneney sat bolt upright at the flight director's console, jaw clenched, hands crushing the armrests of his chair. Jeb paced back and forth behind him

"Control to Pioneer 3. Come in Pioneer 3..."

"Control to Pioneer 3. Come in Pioneer 3..."

"Pioneer 3, Control. Reading you loud and clear, standing by for drogues!"

Distant cheering crackled over the speaker, together with snatches of voice chatter from the rescue boats. Geneney's grip relaxed a fraction. *Come on, come on, come on.*

"Recovery 1, Control. We see them! We see the capsule!"

"This is Recovery 2. We got all three chutes! Repeat, three chutes deployed!"

Geneney sagged into his chair, a broad smile lighting up his face as the room around him erupted. Jeb squeezed his friend's shoulder briefly, then turned and walked away, picking his way through the exultant crowds. He took a key out of his pocket, unlocked a small door in the corner of the room and slipped through, locking it again behind him. The old iron steps rang underfoot as Jeb climbed up onto the roof. He walked over to the rail and leaned against it, staring out to sea.

Three flights. Three flights that had tested the mettle of spacecraft, crew and Mission Control - and not found them wanting.

It was time.

Pioneer 4 was going to the Mün.

Chapter 53

If you cut us...

"So which treaty is current?" The voice betrayed the faintest edge of impatience.

"The latter of the two, Mr President." This voice held more than a faint edge of frustration.

"Although I'd very much like to find which committee drafted it." *And stuff their collected heads into a gronnek warren.* "Frankly sir, it's a mess. Parts of it refer back to the older treaty and the rest is filled with the kind of ornately obfuscatory wordsmithery that I would fail a student for using, let alone anyone experienced enough to be let loose on an internationally binding accord."

"A genuine Wakiran classic then," somebody murmured.

"Quite. And they are taking full advantage of it."

"Their radar post. Surely that is prohibited under either treaty?"

"Their "maritime traffic monitoring station" is not. Their "purely precautionary and defensive installation" doesn't appear to be either. Naturally we strongly disagree with both descriptions."

"They're running patrols for Kerm's sake!"

"Training exercises only, dear fellow. As you must understand, it behooves them to maintain complete and current charts of such a potentially hazardous stretch of water."

The President sighed. "How long can they keep up this... stalling?"

"Long enough, Mr President. Their Kerm is young - too young to have Knitted. Given another month however..."

"And we are certain it can be moved?"

"As certain as our botanists can be, sir but the longer we leave it, the higher the risk of permanent damage."

Another voice spoke up. "And we're certain that we need the blighted archipelago?"

"Regrettably, yes. The recent heatwave has pushed both Spierka and Forseti to the brink of Kerm saturation. With some sacrifices we can absorb the latest burst of Seeds but after that we have no *choice* but to look further afield. The archipelago is a stop-gap at best but a necessary one."

"And the cold storage option?" someone said quietly.

The President's voice chopped through the sudden buzz of conversation. "No. Our Kerm have the same rights to life as any other. We do not bury them alive."

"In which case, Mr President, it behooves *us* to move quickly before we endanger their Kerm as well."

"Agreed. We will continue to seek a diplomatic solution but in the absence of any tangible progress at the next negotiation round... I trust I make myself clear?"

"Quite clear, Mr President."

Duna. The Red Planet.

A wandering star that had drawn kerbal eyes skyward ever since they had thought to look beyond their Kerm; their efforts to predict and then understand it's path across the sky the underpinning behind some of their greatest scientific achievements.

The historical record was replete with astronomical works, the very earliest ones dating back to the First Age of Prosperity and only recognisable by their diagrams and charts. The accompanying texts tended to be written in obscure notations and more often than not were simply lost. Even then, scientific historians pointed out, they showed a comparatively sophisticated understanding, suggesting that still earlier records were destroyed in the turmoil of the Age of Madness.

Through the earliest telescopes, Duna appeared as a blurred reddish-orange disc which exhibited only limited phases, unlike the Mün. As their instruments improved, kerbal astronomers observed dark and light regions of Duna's surface. They watched them change over time and deduced the length of Duna's day, which was found to be a little longer than Kerbin's. The white regions at Duna's poles were also seen to change, although over the course of a season rather than a day. Popularly supposed to be made of ice, the Duna polar caps were the cause of much, largely unverified, speculation on Dunan weather and whether water might be found elsewhere on the surface.

The pressing navigational needs of the Age of Sail drove new waves of enquiry into astronomy and turned telescope manufacture from a pastime and curiosity into an industry. Progress was rapid and was matched by an equally rapid growth in the number and quality

of astronomical observations. Duna's position in the sky was pinpointed with unparalleled precision, steadily more detailed maps were made of its surface and, like Kerbin, it was found to have a moon, which was named Ike.

As the Age of Sail waxed into the Second Age of Prosperity, the burgeoning sciences of photometry, and then spectroscopy, provided kerbal astronomers with their first temperature measurements of Duna's surface and skies and their first glimpses into the makeup of those skies. Ever more sophisticated observational and mathematical techniques placed an upper limit on the thickness of Duna's atmosphere, established that it contained significant quantities of carbon dioxide and suggested that on the whole, Duna was a smooth world, free of large surface irregularities.

Further progress would have to wait for an extraordinary leap into the unknown and the pioneering achievements of three teams of kerbals. And like the Age of Sail before it, the astronomical accomplishments of the new Age would be driven as much by dire need as by scientific curiosity.

Lodan studied the printout intently. "These are confirmed?"

Jernie nodded. "Averaged radio occultation data from the Hope 3 and Hope 4 orbiters over the last twelve orbits. We'll continue to refine them of course but I wouldn't expect any significant changes."

"Not as thick as we were hoping for from the scattering studies," said Dunney soberly, "Fifteen percent atmospheric pressure was optimistic I'll grant you but even ten to eleven percent would make things much more convenient. Six percent is going to require pressure suits."

"Kerbinside observations are always going to be limited," said Jernie. She rubbed her eyes. "And as best we can tell, we should just edge over the Geofler limit on the lower plains."

Lodan made a note on his pad. "I'll speak to Erlin at the Berelgan," he said. "I doubt that six percent is survivable for Kerm but I'm certainly no expert. Building Kerm sized shelters is going to present some logistical challenges though."

Dunney snorted. "A nice problem to have," he said. "Whilst I confess to having no good idea how fast Kerm grow, if we even get to the point where we need to worry about building them a bigger greenhouse, I'd say we were doing well."

"Indeed," said Lodan. "Which reminds me - do the spectroscopy team have any more information for us?"

"They're still trying to quantify the nitrogen content," replied Jernie. She shrugged. "Nitrogen is always a pain to work with. We're seeing carbon dioxide, nitrogen, argon mainly. Traces of water and oxygen but nothing you could breathe. The mass spec data from the landers will give us a better picture."

Dunney bent down and retrieved a long tube from under the table. "Speaking of which." He carefully extracted a roll of glossy paper. "A hand if you would, please, Jernie."

Jernie jumped to her feet and helped Dunney unroll the paper and pin it to the wall. Lodan stared at the black and white picture, noting the pair of thin, red ellipses drawn over it. Dunney picked up a pointer, unfolded it, and to Lodan's inward amusement, tucked a thumb into his belt and began to lecture them.

"This is the initial, low-resolution composite map of Duna, generated from the wide angle cameras aboard the Hope 3 and Hope 4 orbiters - you'll notice that it has a slightly mottled appearance for that reason. Cylindrical projection of course, so the polar regions are grossly distorted, but we're not immediately interested in them in any case."

Dunney cleared his throat. "The orbiters are also equipped with high-resolution cameras and the survey team will be assembling an improved map over the next few weeks, which they'll use to select the final landing sites. However, based on the images obtained to date, we have tentatively identified two possibilities that may be of interest."

The pointer jabbed at one of the red ellipses. "The first site - here - shows features akin to a large river delta here on Kerbin. This will need to be confirmed on the high-resolution images and even if verified, is unlikely to be due to currently flowing surface water. In fact, we believe the features are more likely to be created by surface erosion due to fluidised particulates."

Dunney gave them a lopsided grin. "Of course, we cannot entirely rule out an alternative hypothesis which is that we're looking at an *ancient* watercourse, ideally with sub-surface ice deposits still present. We propose this landing site as a means to test that hypothesis but more prosaically because it's a large flat region of Duna that ought to be comparatively straightforward to land on." He pointed at the second ellipse. "Giving the flight planners a bit of practice before asking them to put a lander down at Site 2."

Lodan leaned forward. "Presumably without hitting those mountains," he said. "Well, those hills anyway."

Dunney nodded. "They're higher than they look but yes, that's the idea. We're thinking that the hills would provide shelter from the prevailing winds and ideally we'll find a nice cliff face somewhere that the colonists can burrow into. Better yet would be another stream bed nearby but I rather imagine that would be setting our hopes too high."

Lodan drummed his fingers on the table thoughtfully. "Agreed," he said at last. "Unless the high resolution studies find somewhere better, Site 1 is our main objective. If we do manage to set down there on the first attempt, then we try for Site 2 as well."

Dunney folded up his pointer. "Thank you, Director."

Silently, *Hope 3* split into two, its flattened, discoidal base drifting slowly away from its spindly, angular upper body. Tiny rockets fired around the rim of the base section, nudging

it onto an intercept course with the snow-capped, dusty orange sphere waiting far below. The body section pivoted to follow, onboard cameras tracking the disc as it fell, surrogate eyes of silicon and glass for the anxious kerbals watching from so many millions of kilometres away.

The rockets fired again, making fine adjustments to the disc's trajectory and orientation. Light minutes away from Kerbin, the final moments of its long voyage would be over before its controllers could react, let alone respond.

Trails of glowing gas streamed away from the descending spacecraft, its blunt, saucer shaped front end glowing red, then yellow, then white hot, as it tore through the thin Dunan air. Instruments buried within its shell sensed the steadily building forces. By itself the resultant information was a meaningless stream of electronic pulses. Combined with other bits of data hard-wired into the spacecraft's computer memory, it provided the vital measuring rule against which its descent could be gauged.

Two strings of numbers were compared many hundreds of times per second and for a fleeting moment they matched. A threshold was crossed, triggering new sets of instructions. Explosive bolts fired, blasting the upper aeroshell section away from the plummeting craft. Seconds later parachutes deployed, hauling it free from the still glowing heatshield, which tumbled away out of sight.

Two more numbers slid into alignment. Four articulated metal legs unfolded from the spacecraft body. Rupturing gas cartridges slammed knife blades through restraining tethers and cut the parachutes free. Clusters of rocket engines fired, bleeding off excess speed whilst invisible beams of radio waves probed the surface below. The spacecraft dipped to one side, floated sideways and then steadied.

A final pair of numbers crossed their preprogrammed thresholds. The rocket engines shut down, the exhaust from each engine barely enough to stir the dust from the waiting planet's surface. Four legs kissed the ground; honeycomb padded feet crumpled under the load and brought the spacecraft to a standstill. Antennas unfolded and tilted skywards, automatically seeking a pair of invisible stars through the dusty Dunan sky, one high and swift-moving, the other low and fixed, a bright blue speck hidden by Kerbol's dim disc.

"Picking up a carrier signal. Something made it down in one piece anyway. Waiting for post-landing self test."

Muted applause rippled through the crowded Deep Space Operations Centre. The *Hope 3* team sat up a little straighter at their consoles. Behind them, dozens of Probodyne staff had crammed themselves into the room, their eyes fixed on a large, static filled screen set into the far wall. Lodan and Dunney stood silently in the middle of the crowd, their eyes fixed on the flight control teams.

The screen sputtered into life:

Probodyne OCTO v. 1.05.

Vehicle designation: Hope 3-L

KCOM.....OK

BIOS.....OK

MEM1.....OK

MEM2.....OK

>Loading surface operation modules...

SOM_chksum.....OK

>Starting PLST sequence...

CBatt.....95%

PV-A.....DEP

PV-B.....DEP

PCON.....OK

B1.....IN

B2.....IN

System reports scrolled rapidly up the screen. The muted buzz of background conversation swelled, groups of engineers clenching their fists in suppressed triumph as, block by block, *Hope 3's* systems came online.

XRFS_con.....OK

XRFS_pow.....OK

XRFS_dat.....OK

XRPS_con.....OK

XRPS_pow.....OK

XRPS_dat.....OK

>System set.

>

The room erupted. Ignoring the cheering kerbals behind her, Jernie walked over to one of the consoles and conferred briefly with the controller perched in front of it. The controller nodded and typed in a single, brief command on his keyboard.

>starting contingency sample

ARM_MODE.....SCRAPE

ARM_YAW.....0

XRFS_MODE.....R-SCAN

>starting sample arm

>starting XRFS

A set of locking pins shot free, glinting as they sailed through the air and thudded into the coarse ochre dirt. *Hope 3's* sample arm unlimbered, joints flexing briefly, almost organically, before unfolding straight out. The scoop tip lowered, dipping into the soil and scooping out a shallow scrape. The arm slowly curled up and back, transferring its precious contents to the waiting instrument bay for preliminary x-ray analysis. Slowly, painstakingly, the detector crystals rotated, gathering the scattered radiation from the sieved sand grains; counting their constituent elements and transmitting the count back to Kerbin.

At the Deep Space Operations Centre, the main screen displayed a blinking cursor at the foot of a bewildering list of checked-off commands and system status reports. The science team, and a handful of off-duty engineers stood around in small groups, conferring quietly amongst themselves. In the centre of the room, Dunney shifted his weight from foot to foot, eyes flicking from consoles to main screen and back again. Lodan stood beside him, face locked in an expressionless mask.

The screen flickered and went blank. Dunney held his breath as four new lines of text appeared.

XRFS report

Mode: R-SCAN

Result type: Bulk Element Count (non-quantitative)

Element list: C, O, Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, Cr, Fe, Mn

Dunney blew out his cheeks. "Phosphorus and potassium," he said quietly. "with a handful of other elements that I'm almost positive are good secondary nutrients. Throw in that nitrogen and carbon dioxide atmosphere and think our good colleagues at the Berelgan are

going to find this very interesting indeed." He cocked his head at Lodan's slow nod, listening to the excited babble from the consoles. "I'd want the rest of the mineralogy results before calling it but I'd wager that kerbals could grow crops on Duna if they absolutely had to. I think your scouting party has just found what you were looking for, Director."

The radar station gates hung open, the surrounding walls heavily pockmarked and chipped. Here and there, twisted steel reinforcements showed through jagged scars of shattered concrete. Six heavy, zipped up canvas bags lay in a row by one of the gateposts.

Armed guards stood watch over a group of bloody and bruised kerbals, their torn, sand-encrusted uniforms barely recognisable; tight faces and restlessly searching eyes matched by equally grim vigilance from the guards. One of them risked a quick glance to the side, tensing himself to run. A clubbing blow between the shoulder blades sent him sprawling into the sand.

"Put a lid on that, soldier!" An older looking guard, with a stripe on her uniform collar, stepped forward and helped the fallen kerbal to his feet. "We are not barbarians and we will treat non-combatants with respect. These kerbals are to be escorted to the harbour and they and their kermol compatriots are to be given safe passage back to Wakira." She surveyed the sullen Wakirans neutrally. "If they run, we will make no attempt to detain them. However, I would remind everyone that as of now, this island is part of the Forseti-Spierkan Confederacy. Our legal code include some...excessive penalties for acts of trespass or malicious damage and I do not recommend that anyone here incriminate themselves in such a manner. Now form up!"

Down at the village, Enely squatted by one of his Kerm saplings. Gently he tugged at one of the glossy green leaves, stretching it out between finger and thumb, watching as it curled back into its cluster. Woodenly he climbed to his feet.

"The soil is damp enough for this one too," he said tonelessly.

In the middle of the village, where the tallest sapling had once stood, an enormous pit had been excavated; its edges bizarrely scalloped where long roots or other fibres had been eased from the soil. Thirty seven saplings stood in a row behind him, each replanted in a disproportionately sized canvas planter. The planter for the thirty-seventh and tallest sapling was almost grotesquely large but even so, the soil around its stem was broached in numerous places by root tips and thin, pale fibres emerging from the dense tangle beneath the surface.

A pair of heavy duty trucks were parked nearby, one hitched to a wide, flat-bed trailer.

The villagers stood in silent rows. Some of the younger kerbals still wore stunned expressions; the elders watched their Forseti guards expressionlessly or stared inscrutably out to sea. Even the kerblets were silent, holding tightly onto their parent's hands.

One of the guards nodded at Enely and gestured at his companions. Eight heavy-set kerbals stepped forward, each taking hold of a rope handle around the top of the largest planter.

One of them swore as they wrestled the unwieldy mass over to one of the waiting trucks and heaved it onto the tail lift.

Hydraulics whined under the load. Another team of kerbals scrambled onto the back of the truck and dragged the planter onto the truck bed. Smaller teams of four picked up the smaller planters and hauled them across to the lift. None of the villagers made any attempt to help.

As soon as the last sapling had been safely secured, the Forseti captain gestured at the flat bed trailer. "First two rows - up you go. Quickly now."

One of the younger guards standing by the pit scuffed at the ground with his boot, uncovering a streak of white material. Curious, he knelt down, prodding at the pale, oddly textured fibre with his finger only to snatch it back at the sight of a thin pinkish fluid leaking from one end. Hastily, he stood up, shivering as he kicked soil back over the exposed fragment of fibre.

Behind him the truck engines rumbled into life, carrying the Kerm saplings, and the first group of villagers, towards the harbour.

Chapter 54

One Small Step

A pall of cinnamon-scented woodsmoke hung against the evening sky, lit by the rays of the setting sun. Beneath it, flames licked against the tree trunks, a single sapling wreathed in smoke with thirty-six smaller saplings leaning against it. Together they made a briskly burning chimney. Donman bent down and picked up a leaf. Its edges were singed by the flames and its once glossy green surface was dulled by heat and smoke, but the spots were still visible; a scattering of dull black eyes staring at him accusingly. He turned to the kerbal standing rigidly beside him.

"Would you like to talk about it," he asked gently.

"They mutilated my child and left it to die in the dark, Ambassador. What else is there to talk about?"

Despite himself, Donman flinched. "I know this is difficult," he said quietly, "but we need to know what happened, Enely. We must know what went wrong." *Even if it means intruding on your grief*, he added to himself bitterly.

Enely's flat gaze regarded him incuriously. "Why? How many other Kerm were you planning to murder, Ambassador? Because that's what any attempt to uproot them will be. Murder." He looked around. "Where is Ambassador Burvis?"

"I spoke to her," said Donman carefully, "and we both agreed it would be better if I came in her place."

"Oh."

The smoke caught at Donman's eyes, making them water. He looked down guiltily at his

handful of shredded Kerm leaf and slipped the fragments into his pocket.

"They tried you know," said Enely conversationally. "Dug a great big pit, unearthed all the roots they could find, teased out the fibres with gloved hands. I was there - I saw it happen - but it didn't make any difference." His face crumpled with grief, the momentary brittle facade splintering like skim ice under a careless footfall.

"D...d...didn't make any difference."

Donman sat down on the grass and stared into the fire. One of the saplings shifted in the blaze, the charred filigree around its base crumbling into ash. Beside him, Enely's face was buried in his hands, shoulders heaving spasmodically, breath hitching in his throat in little mewling hiccups. Donman dabbed at the corners of his eyes and waited.

"We managed to replant them all," said Enely thickly. "The second year saplings were flourishing on the mainland - hardly surprising after spending all their lives in thin volcanic grit. We gave them a month to settle in, then the proper four months for Knitting. The seed-sapling was looking healthy enough - all its branches were growing back, all its leaf clusters were green and glossy. I lay down for first Communion..."

Enely paused to wipe his eyes. "And everything seemed just fine. I wasn't anywhere near prepared for it of course - those itching, burrowing leaf hairs and then that first touch of another mind against yours!" He sniffed. "The poor thing seemed a bit subdued, a bit slow compared to some accounts that I'd read but some kerblets start out quieter than others, so why shouldn't Kerm be the same, especially after all this one had been through."

Donman nodded.

"For a while," Enely continued, "everything just got better and better. My Kerm learned to recognise me - I taught it a picture of a smiling kerbal and afterwards that was always how it greeted me! It tried to show me things although they never made much sense, just coloured blotches and swirls. Maybe they would have made sense in time, but then the pains started."

Enely stared at him. "Have you ever had earache, Ambassador? That's what this was like. Not too bad - not to begin with, but always there and *nothing you can do about it*. You can't reach it with a cold compress, you can't draw it out with a hot poultice. And how do you give a Kerm painkillers? The Archives weren't any help but I did everything I could think of - checked the soil to make sure there wasn't anything attacking it - although a Knitted Kerm should have been able to look after itself. Mostly, all I could do was to Commune with it, try my best to comfort it, tell it that everything was going to be alright."

Enely's face twisted. "Although by then it was obvious that things were far from alright. Finally, I plucked up the courage to go digging. I didn't want to - not after the Forseti - but I

had to...had to find out what was hurting so badly.” He looked at Donman through tear-blurred eyes. “The fibres were cracked and *leaking*, Ambassador. All sticky and pink and crusted with mud. I don’t know whether it was something in the soil that it wasn’t used too - nothing much grows in volcanic grit I don’t expect - or whether it was an injury from the uprooting that had gone bad. Whatever it was, it was too far spread to be cut out.”

A hard lump settled in the pit of Donman’s stomach. *This is worse than talking to Jonton*. He bowed his head, unable to meet the other kerbal’s eyes.

“A...after that,” said Enely, “there was nothing else to do but hope that my Kerm could fight off whatever had infected it. But as the pain got worse...” He shook his head, wincing as his poncho rubbed over his shoulders.

“Some days I couldn’t get through at all and some days I was afraid to *try*.” He saw a flicker of expression cross Donman’s downturned face. “I did try once, Ambassador but it was like...well you wouldn’t cross the path of a scallan with toothache, would you? And it got worse. It started off angry and confused - I couldn’t make it understand *why* it was in pain - and then the anger just turned into misery. Showing it pictures of happier days didn’t help - it couldn’t *remember* those days or what the things in the pictures even were. It began to ignore me and then near...n...n...near the end, it didn’t even recognise me. At least it couldn’t feel the pain anymore either - I suppose that’s something. All the fibres must have been dead or nearly dead by then.”

Enely drew a handful of Kerm leaves, matted with dried blood and stray hairs, out of his pocket. “And then it just stopped. No pictures, no voice, no.... no more pain. The leaf clusters wouldn’t let go - I had to tear my head free.” He swiped the back of his other hand across his eyes. “The rest you know, Ambassador. So what happens now?”

For a long moment, Donman was silent. “You need to speak to...an acquaintance of mine,” he said at last. “If there’s one person on Kerbin who could understand what you’ve been through, it would be him.” He caught Enely’s disbelieving look. “I communed with him - trust me, he’ll understand.”

“You communed with him?”

“Yes. He used to be a Keeper too. He lives in a Grove near Barkton - his name is Jonton Kermol.”

“You *communed* with him?!”

“I did,” Donman replied. “It’s a very long story, and one which he is far better placed to tell. You can trust me on that as well.” He looked reassuringly at Enely and passed him a small square of card. “Whenever you’re ready to travel, just present this at the airport and ask them to put you on the next flight to Barkton.”

Enely's eyebrows shot up. He looked closely at the card, noting the number stamped on it in gold and rubbing his thumb over its embossed seal. "Is this really...?"

"It is," said Donman. "You'll be travelling under the auspices of the Twelve Pillars. Not something we do every day but then - these are unusual days. Don't lose the card on your flight - you can also use it to requisition transport to Jonton's Grove."

There was a knock at the window.

Aldsen looked up from his monitor and lifted his hand in farewell to the tired looking kerbal standing outside. As he turned back to his work, he heard a door closing behind him. The lights in the main laboratory went out, leaving nothing but the faint glow of sleeping computer screens and the blinking lights of row upon row of disk drives to illuminate the room.

Aldsen sipped his tepid coffee and pulled up the day's list of satellite images for review. *I need a bigger monitor for this. And better software running on a faster computer. And a chair made of hand-carved Mün rock.* He snorted softly and tapped out a command, leaning back as the first sub-sector of Kolus appeared on the screen.

The Blight was clearly visible, dark ellipses of dead vegetation boxing in the brighter spots of cleared ground that marked the new Groves. *Like eyes watching us even as we watch them. Doesn't seem to be any un-contained Blight though, thank the Pillars.* The keyboard clicked rapidly. *Scan and match filter sets...execute alignment on HOTSPOT data...cross correlate...run.* A grid appeared over the map with the upper left square greyed out. An analysis program started automatically in a separate window, rows of numbers flickering past as the computer matched the section of image, line by line, against its database of spectral signatures.

The analysis window blanked out and the next grid square turned grey. Aldsen watched the screen for a moment then swung around to face the pair of monitors behind him. Rubber squeaked underfoot as he rolled his chair over the nest of cable runners stretched across the floor. He tapped a key, paging through the list of jobs running on the laboratory computers, scratching the back of his neck thoughtfully. *Hmph – so much for that. Three by three it is then.* Disc drives chunked and whirled and both screens filled up with new sections of map.

The computer bleeped softly behind him. Aldsen glanced at the clock on his office wall, sighed, and regarded the thick black sludge in the bottom of his mug with some

trepidation. *Probably just as well Lodan isn't here.* Idly, he swung back and forth on his chair, trying to muster the enthusiasm to start another set of satellite images. *We really need to figure out a better way of doing this. Some way of normalising the cleaned images without washing out the Blight signatures.* He yawned. *Not tonight's problem.*

A stippled patch of dark green woodland filled the middle of the screen, set amidst a chequerboard of fields that lapped against the beginnings of a range of foothills to the north. A Grove occupied the space on either side of the woodland and a gleaming hair-thread wound down from the hills, skirting the eastern Grove before disappearing off the southern edge of the map. Aldsen smiled at the lushly coloured image. *Not a speck of Blight in sight. Looks like those folks got lucky.* He picked up his mug and was halfway to his feet when an oddly shaped field caught his eye.

Strange. If it wasn't for the colour I'd swear that was an overlap. He sat down again, mug forgotten, peering closely at the screen. *Position is consistent too. I wonder.* He retrieved a creased and well-thumbed atlas from under his desk and flipped through it rapidly. *Not far from Barkton – thought I recognised the image codes. One square to the north...* He typed in a number and waited for the computer to fetch the new image. The screen refreshed and Aldsen leaned forward intently.

And there it is. Kinda hilly - not anywhere I'd pick for a Grove but it seems to be doing alright. At the right sort of distance for that field to be an overlap too. Aldsen typed in a command and a grid drew itself over the map. Another command and a scale bar appeared along the bottom of the screen. He tapped the screen thoughtfully, working out the distances in his head. Something about the first map nagged at him, something not quite right. Frowning he flicked back to the previous image and pulled up the grid and scale bar again.

Hang on a second.... those two Groves. They're far too close together... and there's no scrap of....

Aldsen's eyebrows rose. His fingers flew over the keyboard; the map flickered, replaced by a HOTSPOT infrared map. He stared at it in disbelief, possible overlap utterly forgotten.

That can't be right. That vegetation is thriving - and it's all well established. Maybe that Grove isn't so new after all.

The keyboard clattered.

Date stamp is correct. Okay lets step this back. Six month intervals should do it to start with. Aldsen drummed his fingers on his desk impatiently. *Definitely need a faster computer. Okay, here we go...both Groves still there. Back another six months...*

Aldsen fumbled for his desk phone with suddenly nerveless fingers.

"Lodan."

"Director? You're working late."

Lodan stifled a yawn. "Time and the Council wait for no kerbal," he said. "So once again I spend the evening trying to distill Geneney's latest report into something memorandum sized. At least the executive summary was straightforward: Pioneer 4, first Munar landing attempt, launch date two weeks from today. Anyway - what can I do for you at this unreasonable hour?"

"Could you come down to my office, Director? This is a matter best discussed face to face I think and I think it will also be a matter for another memo to the Council."

Lodan stared at the screen. "You're quite sure about this?"

"Positive, Director. The images are date stamped and the dates match with the system logs. I've cross-referenced them against the HOTSPOT data and that checks out too. Somehow, somebody has planted a new Grove without triggering a Blight incursion."

"Whereabouts are the Groves?" asked Lodan quietly.

"Nowhere special as far as I can tell," said Aldsen. "From the image codes they're somewhere north of Barkton but I haven't checked exactly where yet."

"Barkton," muttered Lodan. "Barkton, unexpected Kerm behaviour..." The colour drained out of his face. "Jonton."

"Jonton?"

"A Keeper. His Grove is north of Barkton and..." Lodan stood up, pacing back and forth in agitation. "We'll need an investigatory team - I'll call the Berelgan first thing in the morning." He flashed Aldsen a quick glance. "We will need a second memo for the Council - they'll want somebody on the team I have no doubt."

Aldsen stared at his Director, forehead wrinkled in puzzlement. "But this is good isn't it?" he said slowly. "If this - Jonton - has found what the Berelgan have been looking for: a way of close-planting Kerm? No need for a colonisation program - not yet at any rate..." He stopped at look on Lodan's face.

"Jonton is a...unique case," said Lodan. "and I fear for any kerbal volunteering to follow his example." He shook his head. "The risks would make volunteering for the colonisation program look safe by comparison. No - this is but a first small step - it cannot be the key to

the Kerm crisis - it simply cannot!"

Lodan gathered himself with an effort. "You'd better come back to my office - there are files you need to see. Files in my *personal* safe." He eyed Aldsen's long-forgotten mug with distaste. "And I think we're going to need some proper coffee too. It's going to be a long night."

Chapter 55

The Days the World Stood Still

A gap appeared in the queue.

The car in front slid across a lane to let the KBS van through, its driver waving cheerfully at the news team as they eased past him. An over-long pennant flopped forlornly over the car roof, twitching in the occasional snatch of breeze to reveal the KIS tilted rocket logo trailing a longer than usual stream of fire. Passengers leaned out of the back windows, raising their drinks in salute. Judging by the colour of the cans, Leland was fairly sure that they weren't drinking sapwood.

He lifted a hand in thanks and drove on through the slowly moving carnival of traffic. The KIS logo fluttered from dozens of cars and vans, along with clusters of grey balloons and an eclectic profusion of homemade flags sporting an equally eclectic range of slogans. "Destination: Mün!" seemed to be a popular choice, closely followed by: "Pioneer 4 - All Systems Go!" Leland snorted with laughter at the "Bring us back a Mün Rock, Jeb!" banner rippling from the roof of an ancient electric bus, that was crammed to bursting with eager kerbals.

By the side of the road, a crowd had gathered around a truck; it's owner cheerfully dispensing drinks and snacks from atop the trailer. Music blared out from a radio and a hastily scrawled cardboard sign declared the truck to be an unofficial mobile launch party. Inspired by this eminently sensible example, other drivers had followed suit and the number of vehicles crawling along the road to the Space Centre was very nearly matched by the number of vehicles parked on the verge. Sunlight twinkled from hundreds of binocular lenses, all trained on the distant rocket standing alone on its launchpad.

Thudding music drifted through the air, growing steadily louder as the KBS van wound its way towards the Space Centre. The closer they got, the more Leland became convinced that the drummer was making a spirited attempt to murder one of the guitarists with his own

instrument, or possibly vice-versa. He glanced over at the kerbal sitting in the passenger seat next to him, tapping his feet and nodding his head in time, a distant look on his face.

"We can let you out here if you like, Don?"

Don shook his head. "Sorry? Oh right, the music." He grinned. "They've picked up a trick or two since Moho 1, haven't they? Nah, if we pull over here, you'll never get to the commentary box before the launch. Definitely going to get some interview footage down by the stage though."

Leland swung the van round a bend and pulled up at a pair of heavy bollards blocking the road ahead. He wound down the window and held out a bundle of press passes for inspection by the serious looking kerbal standing by a booth at the side of the road.

"KBS?"

Leland decided not to point out the large logo on the side of his vehicle, contenting himself with a nod and a scrupulously straight face whilst the guard peered in through the back windows at the rest of the KBS team, comparing faces to photographs and ticking off names on his clipboard.

"Hope he lets you through," murmured Don under his breath. "And doesn't ask any questions about the much younger kerbal on your pass." He grunted as Leland elbowed him in the ribs.

The guard walked around to the driver's window and handed the bundle of passes back to Leland, who accepted them with a smile. It was not reciprocated.

"Please keep to the left, sir, and follow the signs for parking area C. The VIP and Press spaces are in the smaller park to the right as you go in."

From the corner of his eye, Leland saw Don open his mouth. "Keep to the left and take a right at the entrance to area C," he said hastily. "Thank you very much." He wound up the window and watched the guard walk back to his booth. The bollards sank smoothly into the road and Leland cautiously edged the van forward.

"So which are we - Press or VIPs?" said Don cheerfully as they drove off

Leland sighed, "It doesn't matter," he replied, "and I don't think our friend by the booth was in a mood to joke about it either."

"No, he didn't seem the type for small talk," said Don, He spotted another, equally officious looking, kerbal standing by the junction, waving them through to the left. "Kerm, they're laying on the security today."

Leland lifted his hand politely to the second guard. "Not surprising," he said, "There's going to be a lot of disappointed kerbals sent back to Barkton to watch the launch on the big screens, and I'd be at least a bit worried that some of those roadside parties are going to get spirited later on." He glanced over his shoulder before swinging the van into the car park. "Now where's our... ah, right."

A large KBS logo was painted on the road inside one of the parking bays. Leland drove over to it and switched off the motor.

"Everybody out!"

Don and his camera team began hauling equipment out of the back of the van. Leland pulled a spare headset and a cardboard folder stuffed with notes from the shelf under the dashboard and climbed out of the van.

The kerbal at the Press entrance was no less thorough about checking passes than the roadside guard had been but was considerably more cheerful about it. Leland spotted him surreptitiously tapping his foot in time to the latest drum-and-guitar extravaganza from the entertainment stage, and grinned to himself as Don joined in.

Inside the Space Centre the stands were full to bursting, with long queues stretching back from all the many concession booths. The aromas of grilling meats, spicy vegetable and mushroom skewers and hot *djan* chips filled the air; carried aloft on ragged blue tendrils of smoke from portable barbecues. The music from the stage played on over a din of excited voices and Leland began to feel the familiar launch day flutters in the pit of his stomach.

The field leading down to the stage was almost as crowded as the stands. Kerblets hurtled past, bumping into everyone, clutching model rockets and trailing large grey balloons behind them on long, brightly coloured ribbons. Near to the KBS team, a kermol couple watched their children playing, patiently holding two of the, temporarily forgotten, balloons. Leland studied them curiously for a moment, then burst out laughing at the familiar mottled pattern of dark and light greys and the prominent flag-of-all-Kerbin, pointing to a spot in the middle of one of the dark grey patches.

"Mün balloons! I like it!" He tapped Don on the shoulder and pointed "Something for your two?"

Don eyed the queues at the Kerlington booth. "If there are any left by the time we're done." he grumbled. Then he grinned, "I'll get one for you too. We can tie it to the van on the way home."

Leland chuckled. "I'd better get to the commentary box," he said. "Make sure you get some decent footage - and try not to spend all your time at the stage."

Don signalled to his camera team, who picked up their equipment. "No promises there!" he said cheerfully. "Enjoy the launch - and try not to lose your voice again."

For a moment, Leland gazed out of the commentary box window, collecting his thoughts, savouring the atmosphere, and taking in the panorama of crowds, futuristic Space Centre buildings and the distant launchpad with its waiting rocket. Then he walked over to the commentary desk, plugged in his headset and, glancing at the single sheet of scribbled notes in his hand, listened intently to the latest update from Mission Control, occasionally underlining a word or two or jotting down additional points.

"Good afternoon everyone. I am Leland Kerman and this is KBS News, broadcasting live from the Barkton Space Centre. We are just ten minutes into the planned countdown hold at T minus thirty minutes, with the flight control team waiting for the expected confirmation of the KDS-4 launch. KDS-4 of course, is carrying the Munar lander together with the rocket stage that will boost it, and the Pioneer 4 capsule and service module - or CSM for short - to the Mün. The countdown to the CSM launch is progressing smoothly, with no other holds reported at this time. This is Leland Kerman at the Barkton Space Centre."

For the next hour, Leland paced up and down the commentary box, listening to the quiet chatter from Mission Control and alternately staring out of the window or relaying such news as he had. Outside, the crowd had quietened, with any kerbal not responsible for kerblets, keeping a watchful eye on the countdown clock. Then, distantly, he heard the long awaited jangle of a telephone.

"Good afternoon to everyone who's just tuned in. I am Leland Kerman and this is KBS news , reporting live from the Barkton Space Centre, for Pioneer 4's historic Munar landing attempt. We have just received confirmation from the Rockomax Crewed Spaceflight Centre that KDS4 has launched successfully and initial indications are that all vehicle systems are functioning nominally. KDS4 consists of the Kerbin departure stage, from which it takes its name, and the Munar lander. Once on orbit and docked to the capsule and service module, the Kerbin departure stage will boost the completed spacecraft out of Kerbin orbit and onwards to the Mün." Leland paused. "This is Leland Kerman at the Barkton Space Centre."

Down on the entertainment stage, a lone kerbal stepped forward and unplugged his guitar from the mass of equipment at his feet. The sound system popped and sputtered before sounding out a quickly strummed scale.

"Alright, Barkton. This is our last song of the afternoon so we're gonna take it down a notch and play you something a little different." The singer stared at his feet for a long moment, then looked up at the immense crowd of kerbals in front of the stage. "As some of you will know, Fire in the Sky have had the great honour and privilege to play at every crewed launch from the Barkton Space Centre since Jebediah Kerman's first journey into space."

The singer settled his guitar strap around his neck. "We wrote this next song especially for this flight and we'd like to dedicate it to the space program and everybody who made that happen. This one is called: 'You Never Know.'"

A single, pure chord rang out over the crowd, followed by another and then yet another. Shorn of all electronic effects, the sweet, deceptively simple melody sparkled in the air like cut glass before the entranced crowd. It spoke to them of the trackless void between the stars, of being far from home on a winters night and of the importance of having a hand to hold in the dark.

The drummer picked up her sticks, laying down a muted but insistent percussion line. The bass player picked up the rhythm, adding subtle overtones to the building music. Then the second guitarist stepped up.

The melody shifted up a key and suddenly, the lingering melancholy of the opening bars became a banner defying the night, a symbol of comradeship and a clarion call to the power of hope over adversity, that called on everyone at the Space Centre to never let go of their dreams.

"...you never know till you try. Try to walk - ohhhh they're gonna walk. Gonna walk. Gonna walk on the Mün..."

"Thank you Barkton."

Jeb broke the silence. "Well that was...where on Kerbin did they pull that from?"

"No answer here, Pioneer," Geneney replied, "but Bob is asking me to remind you, and I quote, 'I always told you there was more to those guys than three-chord overdrive.' "

"Well that's fine for him to say," grumbled Jeb, "He's not sitting here all suited up. Do you have any idea how hard it is to blow your nose in a space helmet, Flight?"

"That's an image I *didn't* need, Pioneer." Geneney paused. "OK, time to get serious, people. KDS4 is on orbit, all systems online and nominal. We're Go for countdown restart at T-minus thirty minutes."

"Copy that, Flight," Jeb said briskly. "Malmy is standing by for RCS and SME pressurisation."

"T minus six minutes and counting. The pad team is clear and all gantries are at launch stations. Flight Director Geneney Kerman has begun his poll of the flight controllers and we are seeing no further holds as we approach the five minute mark."

Sitting at his desk, Leland fidgeted with his headset microphone, clicking it back and forth on its pivot as he listened intently to the rapid-fire status reports from the flight control team.

"T minus four minutes and counting. The spacecraft is just about to go to internal power and all flight controllers are reporting a Go for launch. From Commander Jebediah Kerman: 'We're feeling fine - tell the band we're gonna give it our best shot.'"

"T minus two minutes and counting. The flight team have transferred power to the booster and everything is looking good. Launch control confirms we have a Go for engine start."

Familiar adrenalin pounded through Leland's veins and his voice began to shake in anticipation. "T minus sixty seconds. Guidance is internal, autosequencer is Go."

"T minus forty seconds. We have a launch commit on Pioneer 4. T minus thirty seconds and counting!"

"T minus twenty seconds..."

"T minus twelve...eleven...ten...nine...eight..."

Outside in the Space Centre grounds, all eyes turned towards the launchpad. Fingers pressed earplugs firmly into place; parents lifted kerblets onto their shoulders.

"Seven...six...five...four...three..."

Fire blossomed over the launchpad. Leland surged to his feet.

"Ignition... and liftoff! We have a liftoff!" His voice soared exultantly over the watching crowds. "Twenty-two minutes past the hour and liftoff on Pioneer 4!"

The raw sound from the rocket engines hammered against the commentary box windows, making it difficult to think, let alone talk. Down below he could see even the older kerblets racing around in circles, shrieking with excitement. A roiling inferno of smoke billowed out from the launchpad; from its centre, the rocket climbed skywards on a painfully bright spear of light.

"Tower clear! Next stop - Mün!"

Pioneer 4 thundered past the launch tower, the river of fire pouring out of its engines still washing over the pad. Leland was dimly aware of somebody shouting "Go! Go! Go!" into his headset but fortunately nobody else seemed to be able to hear it over the noise battering at them. The booster marked twice its own length in flame above the launchpad and then its own length again, the ragged trailing edge of its exhaust plume finally clearing the tower too. Leland watched the rocket accelerate towards the clouds, the incandescent trail behind it curving out over the Great Tranquil Sea and tearing the sky asunder with furious noise and fire.

Leland pushed his headset back into place. "Pitch and roll program complete," he said hoarsely, "and dear Kerm above, I've watched every launch from the Barkton Space Centre since Moho 1, but let me tell you - you just never get used to the sheer raw *power* of those machines."

"Decouplers A through C armed. Go for T20 shutdown and detach."

Aboard *Pioneer 4*, Jeb struggled to turn his head against the mounting g-forces shoving him into his couch. Squinting out of the corner of his eye, he saw Malmy's finger pointing at the control panel. Three lights winked out on the instrument panel and he just had time to register three muffled bangs far below him before the sudden drop in acceleration flung him forward against his harness.

"Ooof. Flight, *Pioneer 4*. T20 detach confirmed."

"Copy, *Pioneer*. We see them gone."

For the first time since lift-off, Jeb allowed himself to relax a fraction and for a moment his thoughts turned faintly melancholy. If Lodan was right, the space program was set to become bigger than even he had ever imagined - but the KIS would only be one small part of the whole.

His gaze flickered around the capsule, resting briefly on each of his crew and then returning to the instrument panel in front of them. He snorted at himself in disgust. *Jeb - you're flying to the Mün in a spacecraft in which every last nut, bolt, rivet, bulkhead and circuit board owes its roots to six kerbals working out of the back of a junkyard.*

And nobody will ever be able to take that away from us.

Jeb grinned, melancholy forgotten. Above his head, the altimeter raced past thirty thousand metres.

"We are now just over a minute and a half into the flight. Pioneer 4 is a little over thirty kilometres high, travelling at one point three kilometres per second. Downrange distance from the launchpad is just under twenty eight kilometres."

Outside, the crowd silently waited for the, now traditional, affirmation from Mission Control. Leland glanced at the clock, twisting his headset cord between his fingers. Then, right on schedule, the public address system popped to life, Geneney Kerman's measured tones rolling over the Space Centre.

"Thirty-six kilometres. Pioneer 4 - your trajectory and guidance are Go."

Leland clenched his fists exultantly, the sudden roar from the crowd drowning out any reply from Pioneer 4.

Next stop - Mün. And may they have the strength to follow their course.

On the other side of Kerbin, wherever the skies were clear enough, kerbals braved the chilly evening air in their thousands to send Pioneer 4 on its way. Observatories offered guided tours and a chance to watch the departure through their telescopes. Professional and amateur astronomers alike offered their services to friends, family or, more often than not, impromptu groups of strangers. Some had telescopes of their own, others watched through binoculars. Those that had neither simply stared up at the sky and crossed their fingers.

"Flight, Pioneer 4. Our board is green; requesting telemetry check."

Jeb's voice crackled out from countless radio sets. Gloved fingers twisted dials, trying to tune out the worst of the static.

"Pioneer 4, Flight. We copy your board is green. Stand by."

The radios fell silent. The sky-watching crowds milled around anxiously, hands tucked under heavy outdoor ponchos, stamping their feet to work some little warmth back into frozen toes.

"Telemetry confirmed. Pioneer 4, you are Go for TMI."

"Copy, Flight. Go for TMI. KDS ignition in twelve minutes and counting."

Older kerbals reached under their clothing to retrieve ornate timepieces from around their necks. Notebooks fell open to well thumbed pages. Astronomers handed out photocopied star maps, identifying constellations, pointing out where *Pioneer 4* was due to appear in the night sky and occasionally took a map from a confused-looking kerbal, turned it upside down and gently handed it back.

"Pioneer 4, Flight. Booster is Go, starting re-press and ullage sequence."

"Copy, Flight. Guidance is Go."

"You're looking good, Pioneer. Thirty seconds."

Far away from Mission Control, all eyes turned skywards. Binoculars swung up, hunting for the right stars. Telescope owners made last second adjustments to focus and angles with fingers that trembled even inside their gloves.

"...three...two...one...Ignition!"

A new comet burst into view over Kerbin.

Awestruck kerbals shook their companions by the shoulder, pointing wordlessly at the sky. One telescope owner reluctantly lifted her head from the eyepiece and stared up at the sky blinking water out of her eyes. A huge smile lit up her face as she saw the glowing trail pointing the way from the last sliver of setting sun out to the starry skies.

"Eight dot two kps. KDS tank pressures holding steady, guidance is nominal. Clear telemetry links through primary and backup channels."

For several long minutes the crowds watched in wonder, frozen feet all but forgotten. Then, as abruptly as it had appeared, the comet vanished.

"Ten dot two kps. Ten dot... and shutdown! We're running the numbers, Pioneer but that looks like a good burn."

In the days that followed, schools across Kerbin sprouted *Pioneer 4* posters and activity charts from every classroom wall. Final year students - and their teachers - struggled with equations and proudly marked off distances and velocities. The youngest kerblets, with no less pride, coloured in pictures of Kerbin and the Mün and filled in boxes along stylised flight paths with the days of the week, written in big, careful letters.

Students of all ages, whether Doreni, Wakiran or Kolan, put the finishing touches on model rockets and Mün landers that ran the gamut from lovingly constructed, glue-smeared assemblies of cardboard boxes, empty plastic bottles and tinfoil, to replica spacecraft that, in the words of Ornie Kerman to one delighted, final year class: "you could fill up with fuel and I'd fly it myself."

In the fields and Groves, the surest way for a kermol to make him or herself popular was to bring a portable radio along for the day's work and keep it permanently tuned to KBS Space News. A close-run second way was to bring a spare set of batteries for somebody else's

otherwise defunct radio. Lunchtimes saw groups of kermol gathered together, perched on whatever impromptu seat came to hand and listening to the latest news or broadcast from *Pioneer 4*. In the evenings, kerbals crammed themselves into packed village halls to watch the evening KBS bulletins.

Near a bleak mountain range bordering Firesvar, Wakira and Kolus, a lone soldier set out across the tundra, carrying a pair of fabric wrapped poles. In full view of the border forces of all three Regionalities, he, or possibly she, laid down their weapons, took thirty-seven measured paces and planted both poles in the ground. Before long, two makeshift banners flapped in the wind, one daubed with the flag of all Kerbin and the other with a tilted rocket streaming fire. A gloved hand retrieved a radio from a field pack and presently Leland Kerman's tinny voice drifted over the tundra.

In time, the other sides sent out their own volunteers and they too put down their weapons and sat down beneath the flags. More soldiers came to join them and then still more. One squad rigged up a portable field shelter, another produced water bottles, kettles and camp stoves. Rations were shared out and, regardless of origin, commiserated on by all. One sergeant unearthed a bottle of distilled redfruit juice from his pack and neither his squad mates, nor the suddenly much cheerier kerbals around them, felt inclined to point out the numerous standing orders that he was breaching. Teams were dispatched to fetch additional supplies, tents and, most importantly, extra radios.

Along border after disputed border, kerbals of all Regionalities came together under the twin flags and, for an all too brief handful of days, Kerbin was reunited.

In the towns and cities, enterprising cinema proprietors began running regular 'Mün Matinees' for their customers to watch the latest, often shaky, film footage from space. Queues quickly became legendary with especially keen kerbals bringing sleeping bags and snacks, the better to wait through the night for the first morning show. Kerbals walking to work in the morning treated the queues with tolerant good humour, some making impromptu coffee runs for waiting friends or family, others hastily booking a quick day off and joining the same queue that evening.

Even the drive-in cinemas, long the exclusive haunt of young kerman couples, were as likely to be showing starscapes and spacecraft as the latest date night movie. To the delight of local news outlets everywhere, more than a few young kerman unexpectedly met their future in-laws for the first time at the local outdoor screen, introduced to them by a blushing, stammering partners.

At the Capital building, seven huge screens were hastily erected between its rearmost arches, and semi-circles of temporary bleachers set up in front of them. By the second day of *Pioneer 4's* flight, construction workers and the occasional curious tourist were camped out on the bleachers, watching the latest news from space.

By the end of the third day, the bleachers were full and by the end of the fourth day they were mere islands in a sea of green faces. Those with seats gradually gave them up for the elderly or parents with the youngest kerblets. A handful stayed where they were, unfocused

eyes staring unseeing through the crowds. In their minds eye, they too were strapped into a space capsule, Kerbin behind them, Mün to the fore; living vicariously on the very edge of kerballed experience.

Knowing this well, their friends simply smiled understandingly and gently led them away.

On the morning of the fifth day, the crowds watched in astonishment as a troop of kerbals hurried out from a side door and set up a lectern and set of twelve ornate chairs in front of the centre screen. Other discreetly dressed kerbals fanned out through the bleachers, murmuring into radio microphones clipped to their lapels. Then, amidst a sudden hush, the back doors to the Capital building opened and a group of figures emerged. Bowing to the crowds as they went, the Council of Twelve Pillars took their seats and like countless other kerbals across the world they sat in silence.

Watching.

Listening.

Waiting.

Flight Elapsed Time - 4 days, 3 hours, 42 minutes.

Munar orbit.

On board *Pioneer 4*.

"Radar is tracking. You're looking good from here, Pioneer."

"Thanks, Malmy," Jeb replied, "Jondun?"

"Descent orbit initiation and abort phasing burns entered and loaded," said Jondun.

Malmy cleared his throat. "You two take it easy down there, you hear me? Else I'll be getting Gene to yell at you."

"Oh, he'll be way ahead of you there," said Jeb. "We'll be fine, Malmy - see you back here in a few hours."

"Yeah, well, if I have to come and fetch you, I'll be yelling at you too. Good luck guys."

"Thanks, Malmy." Jeb turned to his instruments. "Okay, spacecraft alignment is good. Throttle mode zero, SAS in auto. Go for DOI at T minus sixty."

Jondun scanned her side of the instrument panel. "Attitude confirmed, guidance is green, descent engine is Go. Standing by for ullage burn."

A blue light blinked on above the flight computer screen. Jeb took a deep breath.

"Proceeding...RCS firing...ignition in three, two, one...and we're burning!"

Less than a minute later the descent engine shut down again. Jondun promptly punched in a burn status request. "Looking good, Jeb. Periapsis fifteen dot three kilometres - residuals nulling."

The lander juddered to a brief burst of computer controlled thruster fire.

“Residuals nulled. Fifteen kilometre periapsis.”

Jeb glanced at his sleeve checklist. “Okay, landmark checks. Time and sighting angle for the Gateway Craters please.”

Jondun turned back to the computer. “One second. You want the numbers for Mount Kelvey and Bill’s Rille too.”

“Yep - might as well get ourselves ahead of the curve.”

Geneney flipped a pair of toggles on his console, switching his headset to the private flight controllers loop and patching in the Rockomax crewed spaceflight centre.

“Okay team - this is Gene.”

He paused. “This is the big one, people. We’ve trained hard for it, we’ve got a great crew up there, a great crew down here and I just want you all to know that I have total confidence in you all. Total confidence that when this is done, I’ll be able to look each and every one of you in the eye and say ‘dammit - we really did something today.’ “

Geneney unclenched his hands. “So let’s make it happen.”

The flight controllers sat up a little straighter, adjusting their headsets and rechecking their console settings. In the back rooms, the support teams flipped through flight rulebooks, checked their communication loops and cast the occasional swift glance at the flight clock.

“Flight - Comms.”

“Go ahead, Comms”

“Acquisition of signal for Malmy, Flight. Picking up telemetry.”

“Thank you, Comms. Guidance, CapSys, please review.”

“On it, Flight.”

“Copy that, Flight.”

Geneney toggled his microphone. “Malmy, Flight. Standing by for acquisition on Pioneer. Do you have a status?”

“They’re just catching up, Flight. No hitches on descent orbit initiation, crossing all landmarks on schedule - they’ve been sounding pretty chipper on the way down to the Mün there!”

“Cool, calm and collected, Flight,” added Jeb cheerfully. “How’s that telemetry looking?”

Despite himself, Geneney grinned. “We’re working it, Jeb. Stand by.” He clicked his headset back to the flight control loop. “All consoles, give me a Go / NoGo please. FD?”

"FD is Go, Flight."

"Lander?"

"One moment, Flight."

"Copy, Lander. Control?"

"We're Go, Flight!"

"Comms?"

"Go, Flight."

"Thank you, Comms. You ready for me, Lander?"

"Lander is Go, Flight"

Geneney took a deep breath. "Pioneer, Flight. You are Go for Powered Descent."

Jeb couldn't quite keep the excitement out of his voice. "Copy *that*, Flight. Alignment check?"

"Alignment is Go, Pioneer. Descent engine ignition at two minutes on my mark... Mark."

Jondun's eyes flicked from the flight computer display to the descent engine readouts and back again. Jeb stared at the computer screen too, finger hovering over the Proceed button. Then the blue light came on.

"Flight, Pioneer. Proceeding at sixty seconds. Descent engine armed."

Jeb swiftly scanned the navball and rate indicators, one hand poised by the attitude hand-controller, the other by the manual ignition button. Beside him, Jondun checked the engine readouts one final time then fixed her gaze on the flight clock. Both kerbonauts felt the sudden burst from the manoeuvring thrusters.

"Ullage burn and three...two...one...Ignition!"

The descent engine rumbled into life, then throttled up to full power. Jondun's hands raced over the controls.

"Flight, Pioneer. Descent engine Go, throttle is in Auto-one. Rendezvous radar to standby, landing radar to auto."

Braking on a plume of fire, *Pioneer 4* fell towards the Mün, manoeuvring thrusters spitting bursts of flame to keep it on course. Thirteen kilometres above the surface, the little spacecraft rolled upright, the crew's view of grey craters replaced by black skies and the blue marble of Kerbin. Suddenly a high pitched warble filled the cabin, accompanied by a glowing red warning light on the instrument panel.

Jondun slapped the cut-off button. "Master alarm," she said urgently. "Flight - we have negative power-up on the landing radar. Repeat, no power to landing radar."

The response from Mission Control was almost instant. "Copy, Pioneer. Go to manual and cycle your breaker."

Jondun switched off the radar, pulled out the circuit breaker toggle and pushed it back into place, before flipping the radar switch back to its on position. Instantly, the master alarm warbled loudly in their ears. Jeb shot her a concerned look as she hit the cut-off button again.

"Not happening, Flight. What else have you got?"

"Four minutes to pitch-over," said Jeb urgently. "Gonna need a working radar before then, Flight."

"Working it, Pioneer. Stand by."

Jondun stared at the circuit breaker panel, mind racing frantically through schematics and onboard systems. The air to ground loop remained unnervingly quiet.

Jeb gripped the edge of the instrument panel. "We really need a call on that landing radar, Flight!"

Jondun's head snapped up. "Flight - the breakers for both radar systems have the same rating right?"

"One second, Pioneer." Geneney paused. "That's affirmative Pioneer. Lander recommends you..."

"Swap out the breakers for the two radar systems and use CSM radar as a backup for the rendezvous?!"

"Do it, Pioneer."

Jondun leaned forward and pushed the circuit breaker toggle into the panel. Using it as a handle, she twisted its mounting unit a half turn clockwise and lifted the whole unit clear. Swiftly, she slotted the replacement circuit-breaker into place, twisted and pushed...

The warning light blinked off; the computer display flickering for a second as data flooded in from the landing radar. Jondun stowed the broken circuit breaker and hastily tapped out a command. "Flight, Pioneer. We've got a delta-H... and woahhh, Throttling down!"

Pioneer 4 tipped forward, balancing delicately on the thrust from its descent engine. Inside the crew cabin, Jeb watched the Munar surface slide back into view.

"Sighting angle for the landing point please, Jondun."

"Forty degrees, Jeb. One thousand metres."

Jeb cursed under his breath. "That's about what I thought." He keyed his microphone.

"Flight, Pioneer. Debris at the landing site - I'm going long." He took hold the attitude controller and eased it back, pitching his spacecraft upright. "Gonna slow my rate of descent..."

"Got it, Jeb. Seven hundred fifty metres, down ten dot five, horizontal velocity off-scale."

"Two hundred fifty metres, down seven."

Mission Control was utterly silent apart from Jondun's running reports echoing from the main speakers.

"Two hundred metres, down six. Slow us up, Jeb."

Geneney's stomach tightened. "Lander, Flight. Fuel status?"

"Four minutes, Flight."

"One hundred fifty metres. Down four, forward twenty."

Geneney stared grimly at his console. *I got you out there, Jeb. Up to you now - nothing more I can do from here.* He clicked his microphone. "All consoles - aborts and fuel only."

"One hundred metres. Down one dot five. Forward twenty."

"Okay, cleared the rocks. Slowing us up." Jeb tipped *Pioneer 4* sharply back and throttled up the descent engine. Jondun's eyes were locked on the computer display. "Seventy metres. Down one, forward five. Fifty metres. Down point seven, forward three."

"Three minutes, Pioneer," Geneney said quietly.

Neither kerbonaut had time to reply. Jeb worked the attitude controller, canting *Pioneer 4* this way then that, letting the descent engine slow them to a hover.

"Forty metres, down one, forward one. Watch that lateral drift."

"Twenty-five metres. Down point five. Looking good. Fifteen metres. Ten metres...contact!"

Jeb's hand slapped down on the engine stop button. For a second, *Pioneer 4* dropped away from underneath him and then came to rest with a firm thud. The two kerbonauts waited tensely for a moment then, satisfied that they weren't about to tip over, flashed each other a quick, triumphant grin before starting the post-landing checklist.

"Abort stage override to auto. Descent engine arm off. ATO is in." Jeb paused to savour his next words:

"Flight, this is Pioneer. We are on the Mün. Repeat, we're on the Mün."

For a moment, they couldn't hear anything over the noise from Mission Control. Then Geneney's shaking voice came on the air.

"Copy that, Pioneer - we see you down. Fine flying you both - fine flying."

In the KBS studio, Leland lifted his head out of his hands and blinked at the cameras. He mopped his brow with a sodden handkerchief and summoned up a wan smile before visibly pulling himself together.

“The flight control teams will be working with the crew right now to check over the lander systems. The flight computer is already primed for an abort to orbit, or ATO, ready to get both kerbonauts off the Mün immediately if there are any problems with their spacecraft.”

Leland suddenly tapped his headset, a huge smile spreading across his face.

“And there we have it! Flight director Geneney Kerman has just given the crew a Go for the extended stay and surface EVA! They have quite a lot to do before then, so we’re going to take a break before bringing you the latest updates from the Barkton Space Centre and the Rockomax Crewed Spaceflight Centre. Then - and I can’t believe I’m saying this - in a little over four hours time we’ll be going live to the Mün.”

On a hundred thousand television screens across Kerbin, white noise and static abruptly gave way to an alien landscape of sharp-edged craters, stark grey plains and a midnight sky. The view shifted, the unseen camera panning past an expanse of crinkled metal foil, before focussing on the foot of a spindly ladder and behind it, the end of a jointed metal leg.

“Mission Control confirms - both kerbonauts are suited up and the hatch is open.” Leland’s voice rang with barely suppressed excitement. “Commander Jebediah Kerman is on his hands and knees...backing out of the hatchway...and he’s on the ladder!”

An orange and grey boot came into sight, followed by a heavily padded spacesuit leg and then the corner of a bulky backpack. Millions of watching kerbals caught their first glimpse of an orange, fabric-clad shoulder and then finally the reflective visor of a spacesuit helmet. Holding firmly on to the ladder rungs, the suited figure paused for a long minute, then took a step back.

Jeb took another cautious step, letting the ground beneath his feet take his full weight before letting go of the ladder and walking out onto the Munar surface.

“And there it is! Jebediah Kerman takes his first steps onto the Mün! We appear to have lost the sound - hopefully that’s just a temporary fault with our transmitter and not a problem with any of the spacecraft equipment.”

Jeb turned to face the lander hatch, head unseen inside his mirrored helmet. The camera tilted up to follow Jondun’s white and grey figure as she too climbed down the ladder and stepped out onto the Mün. She paused for a moment and then bounded away from the lander, camera tracking her as she went.

“And kerbonaut Jondun Kerman joins her commander. We still have no sound at this time but clearly that is not a problem at Mission Control and is not affecting this historic moment.”

Jeb retrieved a thin aluminium tube from one of the ladder rails before walking over to join Jondun. Before the puzzled eyes of the world, both kerbonauts turned their backs to the camera...

"Oh my. Would you look at that. Would you just *look* at that." Leland's voice caught in his throat. On the screen in front of him, two mirrored helmets faced one another across a landscape of grey. An orange glove clasped a white glove. And between them, in the background, the flag of all Kerbin flew proudly above the Munar plains.

The orange suited figure turned towards the camera:

"On this day we - voyagers from the planet Kerbin... first set foot upon the Mün. We came in peace for Kerm and kerbal."

Chapter 56

Starseed

Kerbals were walking on the Mün - and the world walked with them.

All across Kerbin, kerbals thronged around their television screens, smiling, cheering and blinking through teary eyes at the sight of two of their own taking their first clumsy steps on a new world.

They watched in wonder as clumsy steps became tentative two-footed jumps, the two kerbonauts struggling to find their balance in the stiff confines of their spacesuits. They watched in awe and then delight as tentative jumps turned into increasingly confident rolling lopes; two figures bounding foot to foot across the Munar plains. They laughed aloud at the orange-suited figure's exuberant leap, soaring high and then floating, unnaturally slowly, down to the ground.

For nearly an hour, Jeb and Jondun held an enthralled world in the palms of their gloved hands. Their high-technology suits, the harsh, ethereal beauty of the landscape around them and the disconcerting nearness of the horizon, all served as potent reminders of exactly where they were. In turn, that knowledge added weight to their every least action: walking, talking, climbing back up the lander ladder to retrieve equipment boxes, taking photographs or just simply standing next to the flag for a moment to catch their breath.

Jeb opened the largest equipment box and carefully unpacked a pair of delicate looking instruments and two spools of cable. He plugged one cable into a socket on the descent stage and carefully unrolled it over the ground, propping it up on a pair of small clips to keep it clear of surface dust. The camera zoomed in to watch him work, treating the watching kerbals to a view of two wooden clothes pegs, of the kind to be found on washing lines all over Kerbin, resting in the Munar dust.

Jeb bounced back to the lander, retrieved his instruments and, stepping slowly and carefully, made his way back to the end of the cables. He plugged in the larger, boxier instrument, laid it carefully on the regolith and pressed a button on its lid. Two photovoltaic panels popped free from its sides, there was a brief pause and then a green light glowed brightly from one corner. The second cable fitted into a socket near the opposite corner connecting the box to what appeared to be a bundle of rods, wrapped in gold foil at one end.

At the touch of a button the rods sprang open, unfolding into a gold foil umbrella mounted on a tripod. Jeb planted it firmly into the dust, bending over to inspect a panel attached to one of its legs. He straightened up, gave a thumbs up to the watching camera and loped away out of view. The camera panned right, zooming in on Jondun whilst the voiceover from KBS News busily explained that the boxy instrument was the first in a planned network of Munar seismometers for subsurface mapping, and that the golden umbrella was a combined radiation counter, thermometer and solar wind analyser. A different voice commented that the risk was low for Pioneer 4 but that the radiation data would be invaluable for planning longer stays on the Mün or even permanent bases.

Meanwhile, the camera zoomed in on Jondun, who was picking up a small chunk of rock with a pair of tongs and placing it in a plastic bag. She closed the bag and pressed one end against a fabric patch on her upper arm, where it joined the two other bags already fastened in place. Methodically, she worked her way around the landing site collecting samples as she went. From here, a scoop of dust and rock fragments; from there, a trowel load of smaller pebbles; from elsewhere a single, larger rock.

And then, all too soon, it was over. First Jondun and then Jeb climbed up the ladder and disappeared into the lander cabin, closing the hatch behind them. Very few of the millions of listening kerbals could make sense of the jargon-dense preparations for lift off but the import of the final four items on the countdown were clear to all.

“Ascent engine armed...abort stage...ignition... and lift-off!”

“Flight, Pioneer. We’re on our way.”

Malmy peered anxiously out of the rendezvous window. “The radar doesn’t lie but I’m just not seeing them, Flight. No - hold... hold that - I got something!”

Outside, a glinting speck arced up from the Munar surface, sliding across the sky towards him.

“Beautiful! Just beautiful, Flight! Coming straight for me like they’re on rails! OK, Flight - going three way on omni alpha.”

“Copy that, Malmy. Signal strength from Pioneer is good.”

Malmy flipped a switch on the communications panel and the capsule filled with voices.

“Got his light. Radar on and tracking. Platform?”

"Reference loaded, aligning for rendezvous."

"Not like Malmy to be this quiet. You sure about that breaker?"

"Breaker is in. Platform is green, loading circularisation burn."

"We'll get a double-check on that from Genie. Right, Genie?"

"You will, Pioneer. Be advised, Malmy is with us on three-way."

"Hey guys!"

"Malmy!"

Jondun tapped out an instruction on her computer keyboard. "Flight, I'm getting a fifteen dot two metres-per-second RCS burn, attitude all zeroes, burn start at apoapsis minus thirty seconds."

"That's what we're seeing, Pioneer. Two minutes to loss-of-signal."

"Got the mirror manoeuvre loaded, Flight. Ready to pick them up if the RCS stalls on them."

"Thank you, Malmy. Thirty seconds to LOS. Good luck."

The radio crackled briefly and fell silent.

"You still there, Malmy?"

"Right with you, Jeb - give or take a kilometre or two."

Jeb glanced at his navball and nudged the attitude controller, pitching the ascent stage forward. "Attitude - all zeroes. SAS to Hold."

Jondun stared at the flight clock and mentally crossed her fingers. "Ten seconds, Jeb."

"Thanks, Jondun... and burning." Jeb pushed the translation controller forward, his attention flicking from navball to velocity readout and back again. "Done." He let go of the controls, automatically swiping his gloved hand over the front of his helmet, before reaching down and turning up his suit fans. "OK, what's our periapsis?"

"Way ahead of you, Jeb. Eighty-five dot two - just a little short of a perfect circle."

Jeb grinned. "Not bad for a first try." He scanned the engine readout panel.

"RCS pressurisation still looks good - should be able to make this a lander-led rendezvous."

"Loading my intercept burn just in case," said Malmy. "You set with yours, Jondun."

"All set."

The glinting speck of metal slowly resolved itself into the boxy shape of the lander ascent stage. Malmy squinted along the sight line painted on the rendezvous window and grunted in satisfaction at the neatly bisected main antenna.

"Lined up nicely, Jeb. One hundred metres, closing at point five."

The two spacecraft drifted closer together, brief pulses of flame jetting out from the lander thrusters as Jeb made tiny, last minute corrections to their course.

"OK, slowing up. Point three...point two. Twenty metres out."

The lander bumped gently into the capsule's blunt conical nose, thrusters pulsing in response. All three kerbonauts held their breath, before the familiar and very welcome rattle of docking latches echoed through both spacecraft.

"Welcome aboard, guys!"

"You wouldn't be saying that if you could get a look in here," said Jondun, "This Mün dust gets everywhere!"

"Not a problem," said Malmy. "I've got the cabin pressure dialled up for the leak test. We'll open the hatch, let the overpressure blow all the dust to the bottom. Don't want you two Münwalkers tracking up my nice clean spacecraft."

"Don't want to be breathing in fragments of Mün all the way home either," replied Jondun. "Right - that's our hatch stowed. Cabin pressure holding nicely."

Jondun felt the faint clunk of withdrawing bolts through the lander hull. Air rushed through in a gentle blizzard of swirling dust particles. She waited for the cabin pressure gauge to settle and then, with a sigh of relief, she twisted her helmet free of its locking ring and lifted it over her head.

"Mmm - fresh air. Fresher air anyway." Jondun disconnected her suit from the lander systems, peeled off its grimy outer layer and wriggled through the open hatch. Silently, Jeb passed her the surface sample box before removing his own helmet. He took a last, long look around the lander cabin, shucked the outer layer of his suit and pulled himself up and out into the capsule.

Malmy was waiting for him. He held out a hand then, laughing at Jeb's expression, gripped his commander by the shoulders and hugged him.

"You made it, boss - you finally made it!"

Jeb coughed. "With a *lot* of help from Rockomax." He grinned at the startled, hastily hidden, look on Jondun's face. "Guess we owe them a hug or two as well."

Jondun raised an eyebrow. "I think I'll settle for just walking on the Mün," she said dryly. "Although right now, I'd settle for getting out of this pressure suit too."

Hours later, trans-Kerbin injection behind them, the *Pioneer 4* capsule and service module climbed away from Munar orbit on a homebound trajectory. By common consent the crew had broken with the tradition set by *Pioneers 1* and *3*, and were flying backwards, engine pointed along the direction of flight, capsule pointing back at the rapidly dwindling Mün.

"So what was it really like?"

Jondun stirred, eyes still fixed on the Mün. "I don't know," she said slowly. "The flying was a lot like the sim when it came down to it - complete with problems to solve. The Münwalk was...busy. Lots on the checklist and not really enough time. Downtime by the flag though...looking at that weirdly close horizon, no good way of judging distance..."

"No dust clouds," said Jeb. "Funny, but even more than the gravity, that's what really got to me. I'd scuff a boot through the dirt and all these little particles would shoot straight up and out and disappear. Makes sense when you think about it but... yeah, I think that's when I finally realised where I was." He eyed the radio. "I wonder what they made of it back home."

"According to Gene, the Capital came to a complete standstill," said Malmy, "They had a set of big screens up around the Capital Building itself - folks came to watch the launch and just stayed right through. They're probably still there now. Seems that you can't buy a radio for love or money these days either - anyone who couldn't be near a screen bought themselves one to keep up with the KBS broadcasts. KBS are still trying to work out the listening figures but apparently they gave up counting in real numbers and switched over to using percentage of total population instead."

Jeb blinked.

"Speaking of the Capital," Jondun murmured. "I wonder what the Council are doing right now?"

"I was wondering that too, " said Jeb. He shook his head. "Still figuring out how to sell the Duna program I imagine. Kerm knows how that's going to work."

The radio squawked in the sudden silence. "Pioneer 4, Flight. What's your status?"

Jeb scanned the instrument panel. "Board is green, Flight. We were just catching up on the news from home."

Geneney's voice sounded oddly tense. "Copy that, Pioneer. We think there might be some more news on the way if the reports from KBS are anything to go by. We're patching you through now - recommend you strap in and give this your full attention."

The radio crackled loudly, spattering static across the capsule, before an unknown voice came on the air, speaking with a Doreni accent.

"...have the grave and distinct honour to hear President Obrick speaking for the Council of Twelve Pillars."

A throat cleared. Privately, Jeb thought he could make out the sound of shuffling paper. Then, a familiar, commanding voice rolled out of the capsule speaker.

"Good kerbals.

"Time is the fire in which we burn.

"These are the words of one of our greatest and oldest philosophers but never have we felt their truth more keenly than we do today. In the Kerm Crisis, we face a challenge unprecedented in our history. One that will require equally unprecedented efforts if we are to overcome it. One that may force us to re-learn what it is to be kerbal.

"But here we can take consolation from another great philosopher. One who taught us that the mind is not a vessel to be filled but a fire to be lit! And never before have we witnessed a more glorious outpouring of that philosophy than in today's historic Munar landing! Pioneer 4 - you were well named indeed!

"But now we need more.

"We have ridden upon the shoulders of our space pioneers. We have mapped our world from orbit and we have taken the measure of the Kerm challenge in full! Now we call upon the spirit of Jebediah Kerman - the first leader of this Council - in the hope that we may use that knowledge wisely for Kerm, kerman and kermol alike.

"For we have also tasked our greatest scientists with a mission of peace. To understand why the Kerm are led to fight amongst themselves and learn whether we kerbals can help them to live together without conflict or Blight. Our very survival as a species depends on their success and for that we must buy them time. Which is why we now call upon the six Regionalities of Kerbin to unite behind this Council of Twelve Pillars.

"Together, we have watched in awe as the Kerbin Interplanetary Society took their first, faltering footsteps off our world. We watched as the Rockomax Corporation spurred them onwards in rivalry and then still further in friendship. We have watched their fledgling space program grow and blossom and triumph!

"But now we need more.

"We need a space program for us all - a *Kerbal* Space Program - tasked with nothing less than building us a new home amongst the stars. And here I can offer no better words than those of Jebediah Kerman - kerbonaut and Münwalker:

"Make no mistake my friends - this will not be easy. It will require all the skills and all the technologies we have built so far. We have rocket engines - but now we'll need bigger ones. We have spacecraft - but now we'll need better ones. But most of all, we need volunteers. Engineers and agronomists, young and old, kerman and kermol. Volunteers to forge our new path and lead us to our new home on another world.

"Volunteers for Project Starseed."

Here ends Part 3 - Kerbal Space Program. The story will conclude in Part 4 - The Age of Fire.

Part Four

The Age of Fire

Chapter 57

Engines and Engineers

Thousands waited anxiously by the shore, watching for a glimpse of orange parachute although, in their heart of hearts, they knew there would be nothing to see. Thousands more watched the recovery ship's triumphant return to port, scorched reentry capsule lashed to it's deck. They lined the streets, a clamorous, worshipful multitude jostling for a view of the three Mün voyagers. Three of their own, two of them born and raised in nearby Groves, ordinary kerbals-in-the-street to look at – but only to look at.

Three kerbonauts, hair still damp and smelling faintly of disinfectant, waved at the crowds through their car windows. Although the very idea had been roundly dismissed by most reputable scholars, the persistent fears of something living on the Mün and being brought back to Kerbin had proved hard to dispel. As a result, after a slow tour of the busiest streets, Jeb, Jondun and Malmy were whisked away to the Barkton medical centre for a week under observation, the medical centre staff keeping a close eye on the crowds of well-wishers waiting outside. Amusement turned to surprise which segued into disbelief followed by exasperation as the days dragged on, but eventually the few still remaining were rewarded for their patience. The KIS car drove away leaving behind a group of excited kerbals clutching signed posters and other crowning additions to their collections of space memorabilia.

By the time the car pulled up at the Space Centre, Kerbol was setting behind the Vehicle Assembly Building, casting long shadows over the stands and smaller buildings. Geneney unlocked the museum doors and waved the three kerbonauts inside. He flicked the lights on and stood quietly to one side, letting them take in the refurbished exhibits in their own time.

Jeb's eyes flicked over the first exhibit with it's familiar *Kerbal* and *Moho* capsules on their stands. Behind them, sets of photographs gleamed in new frames: Bill's original snaps of Kerbin taken from *Kerbal 1*, Geneney, Wernher and Lucan riding out to the launchpad and

the waiting *Kerbal 2*, photographs of half built capsules and ascending *Moho* boosters. He smiled faintly at the large 'First Steps to the Unknown' signboard suspended overhead before turning his attention to the second exhibit: 'Working Together in Space.'

There, the *Eve 1* capsule sat side by side with their borrowed Rockomax docking adaptor, still mounted on its mysteriously acquired dolly and facing an engineering mockup of the *Eve* docking ring on its stand. Photographs of the *Eve 1* and *Next Step* spacecraft joined nose-to-nose in orbit adorned the wall behind them, together with pictures of their crews floating together inside. Spacesuits and other pieces of equipment stood mounted in tall, glass fronted cabinets.

Despite himself, Jeb's chest swelled with pride at the third exhibit: 'To the Mün and Back'. Above the first of three large display boards, a plainly printed banner simply read: 'We, voyagers from the planet Kerbin...' Below it, pictures of the Munar far side taken from the *Muna 2* probe sat side by side with pictures of Kerbin framed in *Pioneer 1's* rendezvous window, and the first pictures of Kerbin rising over the Mün. Next to them, *Pioneer 2* floated high above the Great Tranquil Sea and Barrie stood atop *Pioneer 3's* service module, circling the Mün with Seanan's signpost clutched across her chest.

The second display board labelled: 'First set foot upon the Mün...' showed pictures of himself and Jondun working on the Munar surface arranged around a huge blown-up photograph of the two of them shaking hands in front of the flag of all Kerbin. Then Jeb turned to the third board and a shiver ran down his back. Labelled: 'We came in peace for Kerm and Kerbal', it didn't have any pictures of space or spacecraft. Instead it was full of kerbals.

Kerbals packed into village halls. Winding queues of kerbals waiting patiently outside cinemas. A great ocean of green figures surrounding the Capital building and its seven huge screens. The Council of Twelve Pillars themselves, seated in front of one of the screens, watching two space-suited figures walking against a backdrop of grey. And one blurry, pixellated photograph of a group of uniformed kerbals sitting beneath a pair of flags.

"We got that one in the post." Jeb jumped, head snapping round to see a sombre Geneney standing beside him. "Sent anonymously but with a letter inside. Those are Wakiran, Kolan and even Firesvarn soldiers, Jeb. All sitting together waiting for you to come around the Mün after MOI." Geneney swallowed hard. "We came in peace for Kerm and Kerbal. I don't where you pulled that from but it was nothing but the plain truth that day."

Muddy, trampled-down tundra, Val decided, did little to improve the view of grey mountains and grey sky. *Although at least its not raining. Or snowing.* A sudden clink of glass against metal caught her attention and she glanced down at her companion squatting by his open backpack and trying unsuccessfully to conceal an empty bottle.

"I'll take that, Sergeant."

The weatherbeaten kerbal stood up, staring carefully over her shoulder. "Ma'am?"

"The empty bottle, Sergeant. Appreciate you taking the weight off my back but I can lug my own litter thank you. Besides - wouldn't want anyone thinking you'd stolen my peace offering. Carrying alcohol on patrol or stealing it from an officer - either of those can land a kerbal up to his neck in trouble." Val kept her voice carefully neutral. "On the other hand, the regulations don't say a thing about a commissioned officer exercising his or her operational discretion; for example electing to share her valued personal stock of redfruit brandy with her fellow officers at an impromptu peace conference."

"Ma'am."

Val sighed. "That's an order, Sergeant." She held out her hand.

Stuffing the pale red bottle into her own backpack, Val stared bleakly at the empty rings of impromptu seats around them. "'They came in peace for Kerm and kerbal,'" she said. "What are we doing here, Sarge?"

"Making a difference, ma'am. Stopping things from getting worse,"

"And you believe that?"

"Wouldn't be here if I didn't ma'am. For sure I'm not here for the fresh air or scenery." He adjusted a strap on his backpack. "Tell the truth, I was never all that impressed by the space program. Sure it takes djo... it takes confidence to strap yourself to the top of a rocket, but going in circles 'round Kerbin just looked like sightseeing to me. Landing on the Mün though - now that was different. That was laying everything on the line. A lot of...stuff to go wrong and if it did go wrong?" He spread his hands. "Game over. Not coming home." He settled his pack into place and looked at his commander. "Think you could fly that Mün lander?"

Val shrugged. "I expect so. Can't be that different to flying a chopper." She sighed. "Got a tour of this Kerm-forsaken tundra to finish first and probably another one after that. You didn't hear that from me though, Sarge."

"Don't know what you're talking about ma'am, on account of me not hearing a thing over this Blighted wind." *Although once we're done with this tour, it might just be time to send little brother Al a letter.* "We'd better be getting a move on before it gets any worse."

Framed pictures of jet aircraft decorated the walls of an otherwise modestly appointed office. One soared above the clouds, two others flew in close formation, another dived dramatically whilst turning on a wingtip. Still more stood on the runway, bubble canopies open with a very much younger Al Kerman sitting in the cockpit, staring at the camera from behind mirrored sunglasses.

"... a Kerbal Space Program - tasked with nothing less than building us a new home amongst the stars." Al stared at his radio, unsure whether to applaud or laugh out loud. Obrick's voice turned suddenly serious. "Make no mistake my friends - this will not be easy..."

And that has to be the biggest understatement of all time.

“...Engineers and agronomists, young and old, kerman and kermol. Volunteers to forge our new path and lead us to our new home on another world... Volunteers for Project Starseed.”

Well at least they picked a proper name for their madness. Al stared at a picture of himself sitting in a prototype *Clouddrunner* single seat racer, remembering newspaper photographs of the same jets on the runway at Humilisia, torpedoes slung under their fuselages. His gaze turned bleak at the other memories. At television footage of Kerm saplings in grotesquely oversized planters being hoisted off a ship whilst armed guards escorted sullen villagers and frightened kerblets down the gangplanks.

Although their madness beats that madness every which way. And its going to take a whole lot of flying to pull off - they'll be looking for any pilots they can lay their hands on. Al picked up a pen and tapped it thoughtfully against his teeth. *Hah. Maybe they'll even need flight-qualified desk jockeys, even if they're not going to stick me in a Munar lander anytime soon.* He shook his head. *A thousand metres off the floor, barrelling in at Kerm knows what speed, radar crapping out and rocks all over the runway. Yeah, their flight director wasn't messing. That was good flying.*

Al put his pen down, pulled over his card index and began flipping through it. *And the President got one thing dead right. They're... no we're going to need better spacecraft. We ain't going to be lifting everyone to orbit three-by-three in a bunch of tin cans.* He grunted. *There it is. And I'll just bet that Mr Lodan is gonna be interested in an air breathing rocket engine right now.* He picked up his phone and dialled a number.

“Kerbin Space Agency. Director Lodan's office. How can I help you?”

The bomb exploded with a sharp, firecracker retort.

The torrent of flame pouring out of the SK2-G rocket engine flickered for a barely discernible instant before recovering. Thirty seconds later the engine shut down with a vast, sooty orange belch, leaving nothing but a dissipating cloud of steam and smoke and the pinking of slowly cooling metal. Hanbal turned to the engineers seated at the consoles beside him.

“Damping time?”

“Less than point one seconds.”

Hanbal pursed his lips. “Consistent with the rest of the test series then?”

“Completely.”

Hanbal nodded at Danfen, who was standing quietly by the door, then turned to face his test team. “In that case, I think we've got ourselves a new rocket engine.” He bowed his head in thought before straightening up with a smile. “Good kerbals, I give you the SK2-M ‘Mainsail’!”

There was a brief patter of applause and more than a few sighs of relief. Groups of serious looking kerbals nodded in satisfaction at a job well done, before congregating around the test consoles to study the data. Later, Hanbal knew, there would be time to celebrate, but

for the moment, there were reports to fill in and numbers to double check before any kerbal in the room would declare him or herself satisfied. *No quibbles about the name though.* He walked over to join Danfen. "We did it," he said softly. "Over twice the thrust of a Skipper and only a little less efficient in atmosphere."

Danfen was a picture of barely contained excitement. "The thrust assembly and tankage for the KDSS test flights are on schedule. We're recruiting heavily for the surface exploration teams - Bob's crew are busy with the landers for Pioneers 5 and 6 but we'll finally have the resources to build the Mark 2 - and rover - in parallel!" His eyes shone. "KDSS will be plenty for the new Endurance modules too. We're finally getting there, Han - bigger and better!"

Hanbal looked around and then shot Danfen a quick grin. "About that," he said. "Step into my office for a minute?" Danfen nodded eagerly and followed him inside. Hanbal closed the door behind them and turned to find Danfen already staring open mouthed at the diagrams pinned to the wall. "They other two are just rough obviously," he said. "but based on the numbers for the KDS and KDS Stretch, I think we can make them work."

He gestured at the wall. "The KDS Stretch. Extended tankage, bulked up thrust frame and central Mainsail engine but otherwise similar to the KDS. Four Skippers on lateral boosters, Poodle for the second stage." He spotted Danfen's raised eyebrows. "Sorry - team joke. But compared to the SK2-M, the 1G *is* a bit of a poodle." He cleared his throat. "Anyhow - the Stretch got me thinking - what if we replaced all five Skippers with Mainsails? We'd only need a pair of lateral Mainsails rather than four Skippers, which should make the thing simpler and lighter. Roncott actuators should be able to handle the extra weight on the decouplers."

Hanbal gestured at the third diagram. "But then I wondered if we should bother with lateral decouplers at all? Why not go back to an inline design and put all the engines on a single thrust frame. Simpler and stronger, although a five Mainsail first stage would be massively overpowered for a Poodle upper stage. So I figured we could go with a three stage design. Five Mainsails on the first stage, four, maybe five Skippers on the second stage and Kerm knows what on the third stage. Same expanded nozzle Poodle as the KDS most likely - it makes a decent enough vacuum engine."

"With the rest of the Mark 2 Pioneer stack on top," said Danfen, "Lander, rover, CSM - the lot." He shook his head. "Kerm - we could probably strap one of Ademone's habitation modules on there too and fire the whole lot off to Minmus!"

Hanbal chuckled. "It might struggle with the CSM but actually, I think it *could* handle the rest."

Geneney gestured at the door. "Anyway, the rest of the team should be waiting in my office." He turned to Jondun. "I expect you'll get all this from Ademone in a couple of days but you're welcome to join us anyway."

Jondun nodded. "I'd appreciate that, Gene."

Outside, it was beginning to get dark. Small, low-set lamps glowed in the dusk, marking the paths between the warehouses. Geneney led the way over to the old vehicle assembly building, ushering them inside and locking the door behind them. Jondun fell into step beside Malmy as they crossed the factory floor, both letting Jeb go on ahead by unspoken agreement. Light spilled out of Geneney's office windows and Jondun saw a group of kerbals inside, sitting around a table.

Bob and Wernher leapt to their feet, closely followed by Richlin and Ornie and for a moment, Jeb was mobbed by eager friends. Bill and Lucan stayed in their seats, Lucan beaming happily at everyone and, Jondun noticed, even Bill seeming to forget his normal reserve. Ribory and Seelan came over to congratulate her, Ribory's eyes shining brightly and a huge grin splitting Seelan's face.

For a long time, the conversation soared thousands of kilometres from Kerbin. The veteran kerbonauts in the room listened intently to details of the flight, occasionally nodding in agreement. Those that had yet to fly a *Pioneer* capsule paid particularly close attention, Lucan pulling out a notebook for a minute before grinning sheepishly and putting it back in his pocket. Bob and Geneney were most interested in the lander and how it handled, whilst Bill's questions were all about the radar and computer systems. But whatever their speciality, they all sat spellbound at Jeb and Jondun's pilots-eye description of the descent to the surface and the first Münwalk.

At last, Geneney tapped on the table for attention. "Much as I hate to break up the party," he said, "I have some news from closer to home." He paused. "Sort of. Depends if you count the Koluclaw mountains as close to home."

Jeb's mouth snapped shut. Ornie looked over at Geneney. "Ahh," he said, "Got a plan for us have they?"

"Us and Rockomax both," said Geneney. *Eventually to be called the Kerballed Spaceflight Division*, he added silently, *but I don't think you're quite ready for that old friend. Nor me for that matter.* "Probably easiest to think of it as Pioneer Plus. We're both getting a significant injection of funds to ramp up our manufacturing capabilities. He glanced at Wernher. "I gather we'll be getting a second VAB in time but for now the money is primarily to upgrade and expand our facilities here. That includes the machine shop, Assembly and Fitting, Propulsion and Testing, Kerbonaut training - everything. Rockomax are to focus on expanding their heavy lift capabilities, starting with more KDS boosters and moving onwards and upwards from there."

Jeb narrowed his eyes. "Upwards?" he said. "What exactly does Lodan have in mind?"

"If you'd give me a minute," said Geneney patiently. "Basically a complete Mün - and Minmus," he paused to let the words sink in, "prospecting programme. Enhanced satellite networks around both muns for remote sensing and communications. Extended surface expeditions for geological surveys. Trips to the Munar poles to search for usable ice deposits. In short, we're going to be the exploration and survey teams for Project Starseed."

Bob's eyes lit up. "Minmus," he said softly.

"That's going to take more than a Pioneer capsule," said Ornie. "Less you *want* the crew to get a bad case of cabin fever on the way?"

Geneney shook his head. "Ademone suggested adding an Endurance sized habitation module to the Pioneer stack," he said. "I'm not sure I like the idea of juggling four modules around but it should work in principle. Anyhow, it's not tonight's problem."

"Why though?" asked Jondun. "I thought we were going to Duna? Why so much effort on the muns?"

"Partly for practice," said Geneney. "We're gonna need a lot of trained kerbonauts for the Duna flights and munar flights are as good as it gets for that. Then there's hardware development - Minmus isn't much more than a short hop away compared to Duna but it's a sight further out than the Mün and gives us somewhere to figure out the details of interplanetary flights." He stopped at the look on Jondun's face. "Are you OK?"

"I'm fine, Gene," said Jondun slowly. "Just the way you're suddenly talking about interplanetary flights when we've only just been to the Mün. It's going to take some getting used to."

"Tell me about it," said Geneney dryly. "Anyhow - the main reason we're going to be putting so much time into the Mün and Minmus is for resources. Fuel at first but maybe metals and the basics of off-world industry later on. Sounds far-fetched I know but the KSA have been studying this for a while." He grinned at Jeb. "According to Lodan, after Moho 1, the Twelve Pillars were worried about the damage to Kerbin's environment caused by hordes of kerbals following your example."

Jeb blinked. "And their solution was 'go big or go home?' he asked incredulously.

"Apparently so," said Geneney. "I believe the exact phrase involved gronneks and bags but either way, they realised that if we could do it then other groups were probably going to try too - whether they liked it or not."

"So they decided to try for damage limitation rather than excess legislation," said Ribory. "That was...unusually enlightened."

"Not to mention lucky," agreed Geneney. "But on a serious note, Starseed is going to need a lot of propellant one way or another. The less of it we have to haul all the way up from Kerbin the better.

"It's going to mean getting a lot of kerbals to orbit too," Jeb pointed out. "Which is going to take a lot of rockets anyway - a couple of fuel haulers won't make a lot of difference."

"That's what Ademone and I thought," said Geneney, "but Lodan seemed almost cheerful about that part - for Lodan. He didn't say anything but we got the distinct impression that he has a plan in mind."

"He might even tell us about it one day," muttered Jeb.

Ornie coughed. "I'm wondering," he said, "what we're actually going to use as fuel? Ice'll be useful for plenty other things but it doesn't burn very well."

"Electrolyse it into hydrogen and oxygen," said Malmy. "Hydrogen is about the best fuel we could ask for."

"If we can keep it cold enough," said Ornie. "Which won't be easy."

"No," said Wernher slowly. "Better if we could just use the water. Which I think we can do but... Kerm. It's going to need Council permission at the very least." He looked at Jeb. "And even then, a nuclear engine is going to be a tough sell."

Malmy choked. "*Nuclear* engines?" he spluttered. Jondun and Lucan stared at Wernher in disbelief and even Ornie looked taken aback. Jeb however, burst out laughing.

"Go big, go home or go nuclear! I can't wait to see the look on our dear Director's face when we tell him about this!"

"Well, it makes sense," said Wernher defensively, "Depending how hot we can run the reactor, it should be more efficient than the LV-T30 or the SK1-G, even if we're only using water for the propellant. If we do work out a way of using hydrogen, a nuclear engine should be about twice as efficient as anything else that we have right now."

"Saving the world with steam powered rockets!" said Bob cheerfully. "Joking apart though, I think you're right, Wernher. Being able to use water as fuel would be a huge advantage - if we can find any water to use."

"Like I said," said Geneney, "that's why we've been given our next job." He looked at Wernher thoughtfully. "If you can give me the rough numbers - and outline designs if you have them - I'll have a word with Lodan and Ademone about using nuclear engines. We're very definitely going to need Council permission to work on fissiles though."

A rack of beaten-bronze watering cans stood by the open cemetery gate, next to a square stone pillar carved with sweetblossom vines. The taps jutting from each face of the pillar and the drain grates set into the simple stone trough around its base were also cast from bronze. Head bowed, Lodan filled his can and walked down into the grassy hollow.

Neatly trimmed, living sweetblossom vines swathed the memorial poles, anchored securely to the, now hidden, trelliswork underneath. Lodan sprinkled water around the base of the nearest pole, before stepping back to contemplate the plainly carved Kerm wood plaque, standing in front of the grave marker on its slender pedestal. He sighed and walked over to the next pole.

Al watched him from the gate. The other markers received their sprinkling of water and a suitably respectful pause by their name plaques, but weren't given the lengthier contemplation accorded to the first grave. *Poor fool - no kerbal's got shoulders broad enough for that load. Enley's death wasn't his fault - and there'll be more than one Kerm*

wood marker standing in for absent friends by the time we're through with this. He looked up at the sudden clink of a watering can being put back on its rack. "Director."

Lodan checked his watch. "Director. I trust I'm not too early?"

"Not at all. Security were a little surprised but that's what we pay them for. You're looking well, Director - surprisingly so in view of your recently expanded responsibilities."

Lodan looked at him. "To the general public perhaps. In practice, President Obrick's - dramatic - lifting of the secrecy surrounding Part 3 has made the KSA's task considerably easier." He smiled faintly. "I much prefer Project Starseed as a name too. Far more evocative than 'Part 3'."

Al frowned. "You knew about the President's announcement?" He stopped. "Of course you did. "We have mapped our world from orbit and taken the measure of the Kerm challenge in full.""

"Indeed," said Lodan. "And not just Kerbin. We have adequate maps of Duna and intend to map Laythe too, assuming the probes arrive safely."

"The Hope probes?" said Al. "An appropriate choice of... Oh, great Kerm." He gave Lodan a look of grudging respect. "How long have you been quietly planning this under everyone's nose?"

"Well before we first met," said Lodan. "and I believe the Council have been making plans for even longer, although I'm not sure precisely how long. The KSA was originally tasked with understanding the obstacles to expanded kerballed spaceflight in any case, so our new instructions were easily accommodated. The Kerbin mapping project was the first obvious departure from the KSA's goals at the time and at that point the Council didn't really have any choice but to give me the full story."

Al snorted. "Hard to get somebody to make a map for you if they don't understand what the map's for. But you mentioned an adequate map of Duna, Director. Is that where we're going - Duna?"

Lodan nodded. "It's closer than most of the alternatives and certainly closer than any of the reasonable alternatives. The atmosphere isn't as thick as we'd hoped for and the soil isn't much more than mineral dust but the Berelgan team think it has potential for supporting plants and eventually crops. It's not ideal," he added dryly, "but under the circumstances, we'll take what we can get. Then of course we need to get everyone there - but I presume you have some news for me on that topic?"

"I do," said Al. "We've made a substantial amount of progress since you were here last. No flight hardware yet but I think you'll be interested in what we do have." He led the way up the shallow rise leading out of the graveyard. "Infrastructure mainly and that was a headache all by itself. I didn't think our head of engineering even knew how to swear but faced with using liquid hydrogen as a fuel, he soon became remarkably proficient. Not that I blame him. Just making enough of the damn stuff was, to use his phrase, a non-trivial challenge. Finding alloys that could handle it without leaking or shattering was another one.

Then we had to building moving parts that stayed moving after they'd been soaked in it." The corner of Al's mouth twitched upwards. "His language got *creative* at that point."

Lodan followed him towards C7's main hanger. "Hydrogen for your heat exchanger too I presume?" he said. "I remember that you were using cryogenics for that and I'm struggling to think of another fuel that would be cold enough."

"Indirectly," said Al. "We use a helium loop between the hydrogen lines, the intake cooler and the compressor. High temperature helium from the preburner... never mind, you'll see it all for yourself in a moment." He unclipped his name card from his jacket and unlocked the hanger door.

Lodan remembered the heavy security door and the harshly lit, stripped concrete corridor inside. The test yard through the second security door however, looked very different. The cryogenic apparatus was gone, heavily insulated pipes emerged directly from the thick concrete wall and disappeared into various access ports in the... apparatus, mounted on the test stand. He stared. From the front, the thing did look like a high performance jet engine, with a shock cone intake leading smoothly into a streamlined nacelle. At the back, two rocket engine bells sat side by side, surrounded by a shroud that itself appeared to consist of four curved exhaust nozzles arranged around the rockets. And in the middle, jet engine met rocket engine in a bewildering tangle of turbines and plumbing. He tried his best to follow Al's explanation.

"...secondary hydrogen lines here supply the pre-burner, which drives the compressor, hydrogen pump and LOX pump via the helium loop. Exhaust from the pre-burner is vented through the four bypass ramjet nozzles here. They're more of a safety measure than anything else for the test unit but..."

A foolish grin spread across Lodan's face. "Bypass *ramjets*?"

"Yep. The intake cooler can only deal with so much volume - the rest is just bypass, like in a normal turbofan. The intake also needs more hydrogen for cooling than the rockets can burn off in atmospheric flight. So we put 'em both to good use. We figure it should help lift the service ceiling we can reach before switching over to internal oxidiser.

Dear Kerm above. If they can get this thing into the air without it exploding, they might just be able to build a spaceplane around it after all. Lodan fought to keep the eagerness out of his voice. "It certainly looks the part. Would it be possible to see it working before I leave?"

Al offered him a rare grin. "Naturally. I wouldn't expect the famously skeptical KSA Director to be satisfied with anything less. The test team should be here in a moment to set up. We'll be watching the whole thing from the observation room."

The last technician gave the camera a quick thumbs up before shutting the heavy test bay door behind him. Lodan saw a pair of red flashing lights came on over the door frame, before the camera switched to a view across the test stand, zooming in on the back of the engine. To their left, the two stand operators sat in front of a bank of monitors displaying

telemetry readouts and close up views of different parts of the engine. Al conferred with them briefly before turning to Lodan. "Okay. We'll run the MACE through a standard test routine. Startup, throttle up to take-off thrust and shutdown."

Privately, Lodan rolled his eyes. *What is it with engineers and acronyms?* "MACE?" he asked neutrally.

"Multi-aspect combination engine," replied Al. "Although in truth, we're still working on the multi-aspect part. Getting a smooth handover from external to internal oxidiser with the engine running is turning out to be yet another non-trivial challenge, but we can show you the MACE running in air-breathing mode." He nodded to the stand operators. "Could we get some sound please?"

The room suddenly filled with the scream of a high volume compressor, making Lodan jump. Al winced and made a sharp chopping gesture with one hand. One of the stand operators hastily twisted a dial, bringing the noise down to a level where Lodan could hear himself think.

Al raised his voice. "...standard start-cart. Once we have a steady airflow through the cooler we open the secondary hydrogen valves to the pre-burner and coolant loop!" A brief gust of flame spurted from the ramjets, which swiftly faded to a hazy shimmer around the exhaust nozzles. "Pre-burner ignition opens the helium feed to the intake cooler. As soon as the coolant loop is stable, the turbine spins up, the start-cart disconnects and the primary hydrogen valves open..."

Fire exploded from the main engine bells, glowing baleful orange and then settling into a watery, blue-white flame that seemed to start in front of the engines and taper to a brilliantly sharp point. The camera shook violently and even with the sound turned down, the roar of burning hydrogen sent thrills racing along Lodan's spine. The glare from the screen sparkled off his eyes and he found himself grinning fiercely at Al.

The MACE shut off in a cloud of superheated steam and a final judder from the camera. Al pretended not to notice the KSA director shake his head and retreat behind his usual impassive mask.

"You mentioned something about problems with the transition from air-breathing mode?" Lodan said at last. "What do you need to get through that problem?" He lifted a finger warningly. "Your honest evaluation please. The KSA is still answerable to the Council and its budget needs to cover a great deal more than transport to orbit, however vital that transport is." He raised an eyebrow at Al. "Besides - any funds that you spend on engine development are funds that you can't then spend on airframe integration and flight testing."

Chapter 58

A Thin Red Line

It was, reflected Dunney, a great convenience that some of the equipment had been left behind after the latest expansion to the Probodyne facilities.

A forklift truck rumbled slowly past, deposited its cargo and backed carefully away. Stacks of bricks and timbers sat on wooden pallets under lean-to shelters, their corrugated steel roofs extensively guttered. Other pallets held woven plastic sacks of sand, gravels and assorted other aggregates. Yellow-hatted kerbals squatted by the sacks, checking the labels stencilled on their sides in thick black type. Others were slitting open the sacks, dumping their contents onto shallow steel trays before wheeling them over to a row of heavy, free standing electric kilns.

A buzzer sounded. One of the workers hauled a kiln door open, pulled a tray out on its runners and began shovelling hot gravel into a wheelbarrow. Behind her, pairs of sweating workers loaded new trays into another kiln. Nearby, a row of smoking barrows stood by a pair of portable concrete mixers both resting on heavy weighing platforms. Directed by a clipboard wielding supervisor, a team of kerbals were busily loading the mixers, taking great care to shovel in just the right amount of sand or grit from each barrow.

Above their heads, a Hope interplanetary probe hung from its towering scaffold, jointed metal legs and folded sample arm looming over them. The last of the array of plateaus, steps and angled ramps used for the drop tests had finally been chipped away and the space beneath the scaffold now resembled nothing more than a kerblet's sandbox, albeit one large enough to satisfy even the most demanding kerblet. For the moment though, it was empty, with only traces of dark brown grit scattered over the neatly joined boards.

The rumbling, scrape-hissing noise stopped. With an effort, a pair of workers trundled the concrete mixers over to the scaffold and dumped their contents into the sandbox. The dirty gravel bore only a passing resemblance to Dunan soil but Dunney was unconcerned. *Good matches on mineral composition, rheology and particle size distribution are all I care about.*

We can throw some dye in later if we need it to look pretty too. He watched the simulation team spread the heap of gravel into an even layer, one of them walking slowly over it, stopping at regular intervals to jab a slender steel spike into the mix.

Dunney clambered over the newly built brick wall surrounding the scaffold and knelt down beside the sandbox. He scooped up a handful of simulated soil, letting the now cool, dry grains run through his fingers and listening to spadefuls of fresh aggregates thudding into the mixers behind him. Tracing a line in the dirt with one finger, he watched the edges of the shallow groove crumble and subside. Hmmph - doesn't look too bad. Let's see how it does on the sample arm tests.

Concrete gushed ponderously around the rebar, between the formwork panels, and over the heavy plastic sheeting that lined the bottom of the shallow, rectangular pond. The thick grey stream quivered jelly-like as it hit the already poured mass, too liquid to stand, too solid to splatter. A gang of kerbals armed with long-bladed spreaders, stood in the wet concrete, shovelling it into place and smoothing off the surface.

Erlin watched them work. Across the field, a group of great domed glasshouses were slowly taking shape, five arranged in a cloverleaf pattern, linked by tubular walkways, three others standing apart from the main complex. Cranes reared up against the skyline, steel girders suspended from lattice-work jibs, poised over the nest of scaffolding that surrounded the glasshouse frames. Construction crews swarmed over the steelwork, bright yellow hats dotted over the structures like clumps of flowers.

Rows of low-slung, corrugated steel sheds squatted at the edges of the construction site, providing equipment storage and temporary accommodation for the workers. Much of the fresh produce from the Berelgan agricultural research institute had been requisitioned for the on-site canteen and Erlin strongly suspected that the building work had been deliberately timed to coincide with the harvest season for most of their main crops. In the distance, a line of trucks wound slowly along the narrow country road leading to the Berelgan, bringing more construction materials for the Project.

Somebody coughed politely. Erlin turned to find Halsy accompanied by Gusemy and another kerbal, both very obviously equipped for outdoor work. He clasped Gusemy's hand briefly in greeting before studying his companion curiously, taking in the shortened grey cloak worn over a heavier jacket. "Erlin. Pleased to meet you, Keeper."

The stranger nodded. "And you also, Professor. Obrett Kermol, Accident Investigation Department."

"Obrett and her partner were the reason for my last visit," said Gusemy. "You remember the village we discussed?"

Erlin's features clouded over. "All too well," he replied. "And more often since then than I care to think about." He dipped his head respectfully. "Forgive me, Keeper, but the Kerm - was it...?"

Obrett shook her head. "We tried," she said sadly, "but there simply wasn't enough left to work with, even for our most experienced Keepers. We couldn't save the new sapling either - we think it was probably weakened by its battle with the older Kerm and by the time we got a team to it, it was beyond their ability to heal. What remains of the Grove is under quarantine - the Department was actually hoping for your advice on how best to reclaim it."

Erlin lifted his head. "Of course," he said, "I don't have any immediate ideas I'm afraid but I'll put a working group together as soon as we return from Barkton." He looked at Halsy. "Would you mind?"

Halsy nodded. "I'll get right on it, boss. Mallas is away until next month and most of Lowig's group are at that conference. Willin and Lenoly are just back though and I don't think they have anything else on for a while."

"They certainly don't now," said Erlin. "We can do without Lowig for the moment I think... but we can discuss this later." He looked at Gusemy. "We do have time for a short tour of the Project before we leave? Not that there's a great deal to see at the moment."

"All the better for a short tour then," said Gusemy. He eyed the cement truck behind them, concrete still pouring from its hose. "It's a lot bigger than I was expecting for all that."

"It's bigger than I was expecting," said Erlin ruefully. He pointed at the glasshouse frames in the distance. "We'd been working on it for quite a while of course - the KSA commissioned the Project after Pioneer 2, as a facility for developing biological life-support systems for long duration spaceflight. Director Lodan carefully avoided saying too much about the flights he had in mind but from the size of the facilities he wanted and the system specifications that he asked for, we had a pretty good idea that we were looking at voyages to Minmus and quite probably a Münbase of some description."

Erlin gave a short laugh. "Then came Pioneer 4. And Obrick's Speech. And all the updates to the Project plans." He flicked his fingers at the construction crews busily levelling the freshly poured concrete. "Welcome to the first of our eventual low pressure laboratories."

Obrett frowned for a moment and then nodded slowly in understanding. "Yes - and it would make more sense to have two."

"A reduced pressure and a low pressure," agreed Erlin. "Crop plants aren't going to grow at six percent atmospheric but the lower the pressure we can grow them in, the easier it's going to be. And if we can get anything to grow at six percent - we're thinking lichens at the moment - it'll be a valuable boost to soil conditioning and nutrient capture."

Gusemy's face cleared. "*Duna*," he said incredulously, "you're talking about building a Duna simulator?"

"Yes," said Erlin simply. "Self contained glasshouses - or as near to a glasshouse as we can manage for the low pressure lab. We may have to use artificial light to compensate for the smaller window area, although that might just make for a better mimic of ambient lighting on Duna." He shrugged. "That's one of the first things we'll need to test once it's built. Anyway, the idea is to have self contained buildings, isolated from the local environment -

especially the local soil - that we can use to develop a Dunan agronomy. I suspect the KSA will also want to use it for kerbonaut training at some point."

"What are you planning to use for soil?" asked Obrett. To her surprise, Erlin just grinned.

"The KSA have got a whole research team mixing up sands and gravels to put under one of their spare space probes. According to Dunney, they're testing each mix using the same set of tests that they've already run on Duna and comparing their results with the data they got from Hope 4. He thinks they should be able to whip up the next best thing to actual Dunan soil at the actual colony site."

Obrett blinked. "That sounds...feasible," she admitted.

Erlin nodded. "Even if Dunney's crowd don't get it quite right, it should be a pretty good approximation." He checked his watch. "Anyway, we'd better get moving if you want to see any of the Project up close before we set off."

Think that's about all I can do for now. At least the gingergrass is good for cooking even if it's not crowding out the damsonwire as well as I'd hoped. Or the wretched knotweed. Seem to spend half my life keeping that under control. The kerbal's eyes snapped open and automatically turned towards the ceiling, checking for spots on the leaf clusters overhead. Its hands fumbled for the tap on the pedestal in front of it and then, more confidently, reached out for a mug.

Jonton sipped his water, scratching absently at the ridged weals running across his stomach. He briefly contemplated refilling the mug then, with a sigh, put it back on its shelf. *Four mugs a day keeps the green spots away. But they don't do a thing to balance the pollinator beds. They'd survive for one more day though. Bet the breadfruit fields could use a good working over instead. Hmm - just like the sapwoods needed checking last week. And the leatherbarks the week before that.*

He shook out his branches. *Guess I'm starting to run out of excuses and Fred'll never forgive me if I let the prickleberry season run late again.* Reluctantly he let his awareness drift outwards through leaf and root and then down, down through the myriad scented soil. The kerbal's head slumped against its shoulders, eyes closing.

That's odd. Jonton floated amidst the invisible latticework, brushing gently against its strands, letting its forms and patterns come to him, feeling for a balance that already seemed to be there. He shifted, testing the food webs, the scented gossamer threads of prey and predation, nutrients and water; alert to any ragged patches, any unravelling or over-tightening. *The pollinators are fine. Better than fine in fact. Maybe I am building that muscle memory because I definitely don't remember doing any of this.*

Carefully, Jonton drew back from the lattice, slipping wraithlike through its nets, then letting them fade into his subconscious. He cast his thoughts back to the breadfruit vines and sapwood trees, to the herbs and newly blossoming sunfruit. Something tugged at a corner of his mind - something about the sapwoods taking longer than usual - but the more he

tried to remember, the more his thoughts slipped out of reach. The memories seemed curiously soft somehow, like a half-remembered tale of something else long forgotten.

Jonton shook his head. *However I managed it, I certainly made a good job of it. A pity there won't be any silverlace for Joenie's birthday though - I'll have to find something else to show her. His branches rustled in happy anticipation. Which reminds me - I'd better have a look at Gerselle's worm trap.*

Gusemy leaned against the gate and inhaled deeply, letting the mingled scents of leatherbark and sweetleaf fill his lungs. The scene was as idyllic as any on Kerbin, clouds scudding across a clear blue sky, casting dappled shadows on the meadows below. Kermol working the fields, their ponchos distant splashes of brown against the greenery. Insects dancing in the grass, flitting from flower to flower, their soporific droning a melodic counterpoint to the rustle of branches in the wind.

And none of it made the slightest bit of sense. Least of all the star poppies by his feet.

Gusemy stared at them, curving away into the woods and, he knew, out the other side. Behind him, the trail of scarlet flowers marched unbroken across the landscape, shrinking to a thin red line before vanishing over the next hill. He caught a flicker of movement from the corner of his eye and looked up to see Erlin and Obrett walking slowly towards him, eyes down, following the line.

Erlin squatted down, running his fingers over the nearest poppy, tugging gently at its petals. Obrett shook her head and joined Gusemy at the fence. She saw his raised eyebrows and spread her hands helplessly. "As far as we can tell, they're absolutely fine." She picked at a splinter of wood. "Even the sapwoods - and their surface roots are normally the most vulnerable."

Erlin straightened up. "I'd want to take samples to be sure," he said, "but everything looked fine to me too. Trees looked healthy and well cared for, good mix of undergrowth species, no obvious fungal overgrowth, dead spots or insect attackers. No trace of Blight at all in fact."

"We are in the right place aren't we?" said Gusemy. "These are the right woods?"

Obrett nodded. "No question. That new Grove was exactly where we expected from the KSA map. These woods should be dying but it seems that the KSA were right about that as well.

"Jonton," murmured Erlin. He looked at the others politely enquiring expressions. "The Keeper that we're due to visit. According to Lodan - and Kerm knows how he got mixed up in it - Jonton survived a Blight incursion but became 'unusually dependent' on his Kerm in the process." He tapped his fingers against a fencepost. "I got the distinct impression there was more to it than that - and Lodan admitted that that was his impression too but he'd told me everything he knew."

"Maybe it was bad enough that he managed to persuade his Kerm to pull back from a second battle," mused Obrett. "Drew up a border and agreed to keep out of the other Kerm's way." She saw Erlin's bewildered expression. "I know - it doesn't make any sense to me either. The poppies are at about the right distance from the new village and they'd make a pretty distinctive border from a Kerm's point of view. I just don't understand why Kerm would need such a visual borderline."

"It sounds too good to be true," said Erlin. "We've been searching for a Kerm repellent ever since the first Blight reports - and now it turns out you can just ask them nicely not to fight?"

"Yes," said Gusemy thoughtfully, "And you contacted us before Pioneer 4 and, more to the point, before Obrick's speech. Project Starseed wouldn't be such a priority if we could prevent any further Blight that easily."

"Agreed," said Obrett. "I think there's more to this than we - or Lodan - have been told. I'm very much looking forward to talking to this Jonton."

"I can't see them, Daddy - I can't see the worms!"

"I know, Joenie, I know. Let me think for a minute." *Kerm, learning to see again is even harder than learning to not see. Okay, soil and worm trails.* Jonton let the earth scents fill his mind, leaning back into the synaesthesia that he'd taught himself to suppress. Colours bloomed in the darkness; blurred pastel greens, blues and greys rapidly overlaid by a dizzying lace filigree woven from a hundred clashing hues. Hastily he clamped down on his link to Joenie.

"Sorry sweetheart - are you alright?"

"I saw rainbows, Daddy but they're gone now." To Jonton's relief, Joenie's mental voice just sounded disappointed. "Do the worms live under the rainbows?"

"Sort of, Joenie." *Right - soil only. Minerals, water, humus. Nothing else.* He let the pastels wash over him, struggling to stay focused. Dimly, in the background, he heard ragged breathing, which gradually slowed to a more measured pace. Gathering himself, he opened the link again, feeding a thin trickle of colour along it. "Can you see anything?"

Joenie sounded puzzled. "I can see the sea, Daddy but worms don't live in the sea."

"It does look like the sea," Jonton agreed. Slowly the colours drifted past, blurring and streaking. "Do you remember the little sandpit you made with Mummy last week?" He sensed Joenie nodding. "Well this is what the sandpit looks like to the tree." He and Joenie floated over a rectangular patch of greenish grey. "Sand looks grey and water looks green. Your sandpit is nice and wet after the rain yesterday, so it turns into that funny greeny-grey colour. Now let's get a bit closer."

Jonton let the rectangular patch swim towards them. Closer up, its edge was ragged, almost frothy, with shades of blue churned up and swirling into the grey-green; here like the foam on the crest of a wave, there like stirred milk, spiralling into a glass of sapwood. Feathery,

pastel tunnels insinuated themselves deeper into the sand, twisting and turning for no readily discernible reason. Joenie stared entranced at the patterns. Gently, Jonton steered them towards the nearest tunnel, before checking their slow drift and waiting patiently. Before them, the tip of the tunnel turned blocky, jumping forward into the soil in abrupt fits and starts, grey-greens fading into colourlessness and emerging again, some distance away, all churned up and flecked with blue.

"Why is it going longer, Daddy?"

"Because it's a worm tunnel, sweetheart. Can you see where it changes colour? That's where the worm is - it's eating the sand and mixing it all up before... passing it back out again."

"Where's the worm?" said Joenie, "I wanted to see the worm."

"I'm afraid the tree can't see the worms," said Jonton gently. "It can only see where they've been, where they've eaten the soil or where they've been talking to each other."

A sudden wave of curiosity washed over the mental link. "What do the worms talk about, Daddy?"

"Mostly about food," said Jonton. "Or sometimes one worm wants another worm to chase it." He sensed Joenie frown as she turned the idea over in her head.

"Do the worms want to play, Daddy? Like when I want Mummy to play chase with me?"

"I think they do, sweetheart. Or maybe they just get lonely and want another worm to keep them company. Shall we see if we can listen to what they're saying?" Jonton felt the link flicker suddenly. "Remember to talk to me please, Joenie. Moving your head too much will pull the leaves out." Carefully he reached out into the sand, straining to find the subtle chemical cues without letting the great clamour of other signals intrude on his thoughts. Slowly, a string of irregularly shaped amber beads appeared along the worm tunnel, most of them pale and transparent, a few dark and rich where one of his sensory fibres happened to cross the pheromone trail.

"There you go sweetheart. The worm is playing chase - it leaves the yellow beads for the other worms to follow."

Joenie giggled. "I want some yellow beads for Mummy to chase!"

"Well, you'll have to ask her first, " said Jonton. The image of the worm tunnel flickered for an instant. "Hello, love."

"Mummy! Look at the worm talking, Mummy!"

"I can see it, sweetheart but we have to say goodbye to the worm now. It's lunchtime for intrepid explorers and Daddy needs to get ready for his important guests."

Cinnamon. Nowhere near as bad as at that first village but bad enough. Obrett listened to Gerselle with half an ear, staring curiously at the rows of bunk beds as they walked past and into the sleep room. A pleasant-faced if somewhat careworn looking kerbal greeted them from his place by the Kerm trunk, legs and waist mostly hidden by unusually dense foliage. He raised a hand in greeting.

"Everyone, this is my partner, Jonton," said Gerselle, "Jonton, this is Professor Erlin Kerman from the Berelgan Institute, Keeper Obrett Kermol from the Accident Investigation Department..." Jonton looked up sharply as Gerselle continued, "and Ambassador Gusemy Kermol," She looked at Gusemy apologetically, "Although I'm afraid I didn't catch the name of his Grove."

"Welcome to our Grove," said Jonton, "Forgive me for not coming over to join you but I'm rather indisposed at the moment."

Obrett eyed the water stand placed conveniently next to him. Jonton noticed the direction of her gaze and sighed. "We might as well get this over with I suppose. How much have you already been told?"

"That you and your Kerm survived a Blight incursion," said Obrett carefully, "and that you'd become unusually dependent on your Kerm as a result."

Behind her, Gerselle snorted softly. Jonton nodded. "That's one way of putting it," he conceded, "even if it's a little simplified." He twitched his branches to one side and Obrett's eyes widened. Gusemy's jaw dropped for a moment, snapping shut with an audible click. Erlin swallowed hard, staring at the vines wrapped around Jonton's torso and legs. Tentatively, Obrett stepped forward.

"They look like healing vines," she said, voice only betrayed by a faint tremor, "but I've never seen them so developed. Was there an accident?"

Jonton shook his head and Obrett's eyes widened again at the mass of Kerm leaves anchored to his scalp. "Not a physical one, no. The vines attend to my ker... to my needs whilst I remain in Communion."

"You're in Communion *now*?" said Obrett, "Whilst you're still talking to us?"

"In a manner of speaking," said Jonton, "It's a long story."

"But one we need to hear I think," said Gusemy quietly. "Especially if it concerns the line of star poppies along the edge of your Grove, Keeper."

"It does," said Jonton, "but please - take a seat. I have water here if anyone needs it." He waited until his visitors were settled before clearing his throat. "Before we start, you should know that the Twelve Pillars - through Chief Ambassador Donman - are already aware of the early parts of this story and have passed judgement on it. You see, it all begins with me breaking the Law of Territory and it doesn't get a great deal better from there."

Jonton sketched out the struggle against Gerselle's Kerm, watching Obrett wince at his description of the sparks. He described the decision to plant a thirty-eighth Kerm in his

Grove, the black leaf spots, the Shattering and it's aftermath. He told his horrified listeners about the melting shards, the beginnings of his slide into madness and eventual decision to go an-Kerm. Gerselle blinked back tears as he described the silverlace, Joenie's birthday and the anchor to kerbal reality that she was to provide. Finally he described the long process of learning to be Kerm, the mass Communion and planting the thin red line.

Gusemy rubbed his eyes. "That," he said, "is a catch and a half." He saw Jonton's raised eyebrow. "Sorry - we were discussing your poppy line before we arrived. It seemed like such an easy solution to the Kerm crisis that we thought there had to be a catch somewhere."

"Jonton," said Erlin. "You deliberately pulled back your territory to give that other Kerm room. I don't suppose you know any way of doing the opposite - of peacefully repelling a Kerm from your own territory?"

Jonton shook his head. "I'm afraid not," he answered. "Not without causing it permanent damage."

Erlin sighed. "We were beginning to suspect as much," he said. "My team at the Berelgan have been searching for a repellent - something we can use to close-plant Kerm whilst keeping them apart - but without any appreciable luck."

"I'm not sure how much this helps on a Kerbin-wide scale then," said Gusemy. "With respect, Jonton, I think you've been extremely lucky." Jonton nodded in heartfelt agreement as Gusemy ticked off the points on his fingers. "Assuming we could get enough volunteers to try going an-Kerm and even assuming they were all successful, there's a huge moral and ethical issue here." He looked at Jonton. "For a Kerm of thirty-eight trees and one kerbal, you seem remarkably kerbal-like to me. Which makes me wonder what happened to your awakened Kerm personality." Gusemy lifted his hands. "You weren't to know and you did your best, but to even contemplate the possible destruction of nascent Kerm minds on a global scale." Gusemy's voice shook. "Nobody could - or should be forced to - countenance such a solution."

Jonton and Gerselle stared at him bleakly. Erlin was pale. Obrett just looked grim. "That might be an easy choice if it comes to it." She nodded at Jonton and Gerselle. "I've seen the aftermath of Kerm struggles that did not go as well as your own. Better one dead Kerm than two dead Kerm and a pair of insane or dead Keepers."

Erlin swallowed the bile at the back of his throat. "Then let us hope it does not come to it." He cast about for a change of topic. "You told us about learning about your umm, duties, as a Kerm, Jonton. I would very much like to hear about that if you had the time. Kerm micro-ecologies are a study of mine you see - actually being able to discuss them with a Kerm face-to-face would be a tremendous boon."

"And I," added Gusemy, "would be extremely interested in visiting your history of Kerbin if we had the time."

"That's another long story I'm afraid," said Jonton. "Although you'd be more than welcome to stay the night and sit in with the first group tomorrow."

"First group?" asked Gusemy.

"Yes," said Gerselle, "Somehow, word got around after he shared our history with the rest of the village. Ever since then, we've had a steady stream of visitors hoping to see it too." She pointed at the rows of bunks lining the wall. "We had to make special arrangements."

Gusemy's face cleared. "Ahhh," he said, "I think we spoke to some of them on the way here. They were looking for the Sage of Barkton - I presume we've just met him?"

Jonton stared at his feet. "Yes," he admitted. He looked up at Erlin. "You wanted to know about being a Kerm? If you don't mind a rather simple example, I could show you that now?" Erlin nodded enthusiastically. "In that case please take a bed and make yourself comfortable," Jonton looked at Gusemy and Obrett, "Please - you're welcome to join us, although I'm sure it'll be nothing new to you, Obrett."

Obrett was the first to lift her head into the leaf cluster above her pillow. Encouraged by her example and by Gerselle's assurances, Erlin and Gusemy followed suit. Even communing with her own Kerm hadn't - couldn't have - prepared her for Communion with two other kerbals by her side and Erlin and Gusemy were thunderstruck. The link wavered, began to fragment, blown this way and that by excited tempests of thought and spiralling emotional storms. Eventually, aided by Obrett, they were able to form a stable bond and Jonton fed them a first tentative thread of colour.

"As I said, it's a little simplistic," Jonton said apologetically, "but Gerselle and I only intended it as a first lesson for Joenie. Our daughter," he added.

Obrett decided not to comment. *What is there to say - I'm communing with two kerbals and some kind of... Kerm, whatever Jonton is now. Communing with children seems almost normal compared to that.* She turned her attention back to Jonton, who was describing Joenie's sandpit. For a fleeting second, the landscape around her flickered into a familiar tangle of colour and she sensed Erlin and Gusemy reeling back in shock. The colours blanked out, replaced by a thick scattering of orange droplets.

"Worm pheromones," said Erlin wonderingly. "You know what this means, Gus? With enough time we could unravel everything. Entire micro-ecologies, mapped out to the last detail, ready for us to duplicate on Duna." His voice glowed with enthusiasm. "Experimental ecology - like this sandpit here, with an experimenter who can tell us what's happening in real time! No more clumsy sampling. No more fiddling around with chromatographs!"

"An experimenter who still has an entire Grove to tend," Gusemy reminded him. A wave of awed disbelief rolled through the link. "But still - today we learn that the deepest secrets of the Kerm are ours to decipher. Yesterday we watched kerbals walking on the Mün. And tomorrow we visit the forgotten depths of our history. We live in an Age of wonders my friends - I only wish it were a more tranquil one."

"Imagine how much the kerbals could learn about their history, or their environment! This could be as big a paradigm shift as the day a kerbal sets foot on the Mun."

- JakeGrey.

Chapter 59

Children of Kerbin

The liberation turned out to be easier than any of them had expected.

Admittedly, the site for the seed bank had been well chosen; the north-eastern promontory was both sufficiently remote from the major Spierkan population centres and close enough to a neighbouring economic redevelopment zone that one more construction project had gone largely unnoticed. Even then, the cover story had been impeccable, the renovated cold storage facility for the local fishing villages being politically popular, easy to hide one more freezer room in, and conveniently located to receive the occasional small shipment of Kerm seeds.

Security had been another matter of course, although to be fair they'd had limited options. A cold store and its contents were valuable enough not to be left wholly unguarded but even so, excessive security around what was essentially a fish warehouse would almost certainly have attracted too much attention to be worth the trouble. In the end, they'd decided to rely on additional physical measures and discreet reinforcements to the Kerm freezer, rather than increasing the numbers of guards around the building.

Besides, finding enough *acceptable* guards would have been a challenge in itself.

Even before the politically disastrous Maldonian annexation, Confederacy sympathies had mostly lain with the President's - and Chief Ambassador Aldwell's - strong pro-Kerm stance. The resulting Wakiran skirmishes, the raft of new Veiidan trade tariffs, and the heightened border tensions with Doren, had only served to cement that stance in the public mind.

The figure chuckled sardonically. *Yeah, us politically neutral types are rarer than greenback herring these days. With good reason.* He glanced at his companion who stared back at him expressionlessly, breath fogging in the oppressively chilly, fish-scented air. Both kerbals knelt and heaved open an access panel in the floor, exposing cable runs, pipes and a pair of subtly modified junction boxes.

Two keys slipped into place and turned as one. With a faint click and a hiss of escaping gas, a section of wall panel slid open, revealing a shallow steel rack holding half a dozen white plastic trays, which were swiftly emptied into a pair of heavily insulated backpacks. Working with exaggerated, fastidious care, the figure knelt again and placed a small laminated card in the very centre of the open doorway before he and his companion calmly walked out of the freezer room, through the warehouse reception and out into a pleasantly warm Spierkan evening.

The bemused fisher-kerbs, who found the card the next morning, puzzled over it for a moment, before shrugging their shoulders and handing it in to the guard at the front desk, not noticing the sudden tightening of her expression when they explained where they'd found it. She waited until their van was safely out of sight before locking the front door and racing down to freezer room four.

The open wall panel told it's own story. The guard turned and sprinted for the nearest phone. Behind her the card landed face up on the polished concrete floor, displaying a circle bisected by a wavy line. A stylised kerblet smiled from one side of the line, facing a stylised Kerm seed on the other. And underneath the circle were printed three words:

Children of Kerbin.

—————

A door slammed and at long last, the truck in front rumbled through the checkpoint. Corrod hastily swallowed his mouthful of *djan*, jamming the half-empty packet into his door tray and flicking off the radio. The traffic light overhead turned green and Corrod obediently edged his own vehicle into the inspection bay. In his wing mirror the queue of assorted trucks and wagons stretched back as far as he could see. A grey-uniformed kerbal tapped on his window.

"Import permits please."

Corrod retrieved a stack of forms from the passenger seat and, wordlessly, handed them over. The Doreni flipped through them, scrawling an illegible signature across the bottom of each page before stamping the top page twice, tearing it off and handing it back.

"Manifest please."

Corrod clenched his jaw, passing a second, much thicker, stack of forms through the window with exaggerated courtesy. The border official merely glanced at him before continuing to peruse his paperwork. "Step out of your vehicle, please sir. I need you to unlock your trailer."

"May I ask why?" said Corrod pleasantly.

"Routine inspection, sir."

"I have a lot of cargo to inspect."

"I'm aware of that, sir but I must insist."

Corrod ground his teeth. "Very well," he said. "Will you need me to open all the containers too?"

"Your cooperation would be appreciated, sir."

Corrod stared at him flatly before climbing out of his truck cab and pointedly slamming the door behind him. Two more officials were waiting for them behind his trailer, one wearing an oddly shaped device strapped across his chest, a stubby wand on a curly black cable plugged into its side. The other was restraining a large and enthusiastic guard-beast on a leash, which snuffled at him as he walked past. Its handler pressed a cloth pad over its nose and for a moment Corrod thought he could detect a faint breath of cinnamon. Resisting the urge to pat the creature on its furry head, he undid the long row of buckles holding the side curtain of his trailer closed. Sensing the three pairs of eyes crawling across his back all the while, he hauled the curtain open, not caring whether the rattling hid his muttered oaths or not.

The guard-beast sprang onto the trailer and began nosing around the double row of containers strapped to it. Corrod climbed up behind it and walked slowly down the rows, opening the inspection hatches on each container as he went. Hopping off the tailgate he stood silently to one side and watched one of the officials scramble awkwardly onto the trailer behind him and poke his wand into the nearest hatch, studying a screen on his device as he did so. Carefully, he closed the hatch again and then, to Corrod's bemusement, methodically subjected each container to the same peculiar inspection.

Finally the official clambered down from the the trailer and whistled sharply for his guard-beast. Catching Corrod's eye he jerked his hand across his chest and pointed at the trailer curtain. Corrod nodded and began closing up his truck. None of the three officials offered to help.

"Your manifest, sir. Thank you for cooperating with Doreni border security and have a safe onward journey."

Corrod stared at him expressionlessly then turned away and climbed back into his cab. As he started the motor and drove off, the next truck in the queue rumbled to a stop beside the inspectors.

"Oh Kerm. Ed - are you seeing this too?"

"That cluster of returns heading north-east? Yep, I see them."

"What are you thinking - Forseti?"

"Reckon so. Nothing big due from Doren and they'd be calling in first anyway. Likewise any private vessels, unless they're being more than usually stupid."

Gilbin sighed and picked up his microphone. "Attention, unidentified vessels. This is Gilbin Kerman of the Wakiran Coastal Service. You are approaching Wakiran designated waters; please set your transponders to VTS and respond on channel zero seven." He covered the

microphone with one hand. "Better send the contact up the chain, Ed, if they're not for turning."

Edbur looked up from his keyboard. "Already on it."

Gilbin nodded. "Attention, unidentified vessels. This is the Wakiran Coastal Service. You will shortly be in violation of Wakiran designated waters; please adjust your course immediately and set your transponders to VTS, repeat VTS. Be advised that failure to comply will be treated as an act of aggression."

"Dammit, Ed, I thought this sort of thing wasn't supposed to be happening any more! Home amongst the stars, everyone uniting behind the Council - all that good stuff?"

"Guess they missed that broadcast," said Edbur. "Not that surprising given that they don't seem to have a working radio on board. We going to call in a patrol?"

"No choice," said Gilbin heavily. "If they are Forseti we'll have to escort them back to port. Like it or not, we've got to keep Doren sweet until the CoastGuard line is finished, so we can't dump the problem on them. Likewise we can't let them go north unless you want to tell Command why they've suddenly got Firesvar breathing down their necks as well as Kolus." He glanced at the radar, swore to himself and picked up the microphone again. "Attention, unidentified vessels! You are now in violation of Wakiran designated waters. Be advised that we have armed patrols en-route. You will adjust course immediately and return to your port of origin otherwise you will be fired on."

"Gil?"

"Yeah?"

"What happens if they're not Forseti?"

Gilbin gave him a long look. Edbur stared back at him grimly then turned back to his keyboard. The atmosphere in Radar Outpost One suddenly felt very chilly.

—————

Two lines of patrol boats swept in from the east, the low afternoon sun sparkling from their wakes. Cursing deck gunners scoured the horizon for contacts, eyes hidden behind mirrored shades. The Wakiran flag fluttered from their sterns, white diagonal slash clearly visible against a green background.

A cluster of dark specks on the horizon resolved themselves into a loose formation of vessels unhurriedly steaming to the northeast. The Wakiran boats swung wide, skirting around the invaders, then coming at them again from the west, out of the sun. Deck officers peered through binoculars, searching in vain for any identifying marks or signals. The captain of the largest Wakiran vessel frowned as his third hailing attempt met with nothing but static. *I don't know who you are my friends, but it's time you woke up.* "Warning shot - maximum range."

A single flat crack from the deck gun echoed across the waves. Seemingly indifferent, the unidentified vessels steamed steadily onwards. The captain grimaced. "Helm - stand by evasive. Gunners - second warning shot. Across their bows."

Two shots whistled overhead. Abruptly, the loose formation broke apart, the air suddenly heavy with the roar marine engines at full throttle, punctuated with flat thunder of gunfire. Fountains of water erupted around the Wakiran forces.

"Evasive action! All crews - return fire!"

On board one of the unmarked boats a grim-faced figure watched the battle unfold. Satisfied that the enemy patrols were fully engaged, he raised one hand and brought it down in a short, chopping gesture. His helmskerb reacted instantly, swinging the boat round due east and making best speed for the Wakiran coast. Behind them, twin columns of smoke rose into the sky, two Wakiran vessels stopping to pick up the survivors, the others scattering in pursuit of the fleeing invaders. He closed his eyes briefly. *They did well. We will mourn them later.* He stepped over to the chart table, studying it intently for a moment. "Bring us round; east by north-east."

The boat sped onwards, slipping around the fringes of the Wakiran radar line, its captain calmly watching the oncoming cliffs. "Make your course due north. Stand by decoys." Another chopping gesture and the deck crews released their net. A cascade of decking fragments, fittings and spare equipment, tumbled over the side, swiftly followed by the contents of an oil barrel. The deck officer studied the dark slick and floating debris with satisfaction before heading forward to the main cabin.

"Decoy deployed, Captain."

The figure turned to face him. "Very good." A gesture at the chart. "The cliffs will hide us from the remaining radar stations. By nightfall we'll be headed for Firesvar." The figure patted the insulated box by his feet, the bisected-circle emblem on his shoulder clearly visible for a moment. "Where our mission will truly begin."

Enely drew the worn square of cardboard from his pocket and rubbed his thumb over the embossed gold seal. Just hope these things don't have an expiry date.

The check-in assistant watched the stooped figure approach, pack slung over one shoulder, clutching a glinting something in his other hand. Her eyebrows rose at the sight of his dusty green-trimmed collar and rose still further at the wrinkles around his eyes and weary expression on his face.

"Can I help you, Keeper?"

Enely looked up. "I'm not sure," he answered. "Do you have any seats on the next flight to Barkton?"

"Let me check that for you, Keeper. Do you have a ticket or will you be purchasing one today?"

Enely pushed Donman's token across the counter. "I think I have a ticket," he said. "I was told to present this but it's been quite a while since I was given it." He looked at her apologetically, "I hope it's still valid?"

The assistant shut her mouth with an audible click. "I expect it will be," she said faintly. "Please, one moment, sir." She reached under her desk, pulled out a ring binder and quickly flipped through it, before picking up the phone and dialling a number with a trembling finger. "Yes, I'll hold. Hello? Yes, the number is zero one four, two zero nine, one four six. It is? T-thank you very much. Good day to you too, ma'am." She turned back to Enely. "If you could wait one moment, sir, I'll have somebody take you straight through to the priority lounge. Your flight will be leaving in thirty minutes." A sudden shy blink. "And on behalf of Trans-Kerbin Air, I wish you all fortune at your journey's end."

Well that certainly worked. Enely smiled at her to cover his confusion. "You're very kind - thank you."

Another assistant bustled up. "Can I take your bag, sir? If you'd like to follow me please."

Chapter 60

Shrinking the Ellipse

The cradle slid over to the next section of wall, revealing the lower half of a freshly painted tilted-rocket logo, flames underlining the familiar text. Jeb leaned against his car door, smiling faintly at memories of a drainpipe and a very much smaller signboard hidden behind an old bed sheet. *An empire so humble in fact that most of you were probably blissfully unaware of it*, he murmured to himself. *I think that rocket has long since flown*. He watched the organised chaos enveloping the assembly and fitting warehouse for a moment. *It's been a while since the old junkyard days. Might even be time to think up a new name*. He grinned. *But not until Lodan has had a chance to admire our shiny new sign*.

A truck edged past him, carefully backing a laden flatbed trailer through the main gates. A crane swung into position overhead, lowering a complicated bundle of chains into position. Kerbals clambered onto the trailer, unbuckling thick restraining straps from a plastic shrouded pallet, reaching for dangling carabiners, making them fast. The foreman jumped up onto the trailer, checked the fittings then, stepping back, raised a portable radio to his mouth. The drooping chains slowly tightened, then lifted, hauling the heavy machine tool effortlessly into the air, swinging it clear of the trailer and setting it down next to the others. A second team of kerbals set to work unfastening the chains.

Scaffolding criss-crossed the gap between the Assembly and Fitting building and the KIS's newly acquired warehouse. Shouting kerbals, most of them dressed in dark blue coveralls with CMB stitched in yellow across one pocket, struggled to make themselves heard over the steady din of hammering, scraping, and construction machinery. Jeb waved at the few workers he knew as he walked past. One of the CMB workers turned to see what was happening, eyes widening as he recognised the kerbonaut. A cheer went up, swelling as it rippled over the scaffolding, head after head swivelling round to watch Jebediah Kerman walk past.

Grinning, Jeb flashed the crowd a quick double thumbs-up before making his way to the kerbonaut training building. The warehouse doors were wide open, a small procession of engineers wheeling computers and other electronic equipment in on steel trolleys. An electric hand-truck rumbled past, carrying what looked like a modified Eve capsule on a wooden pallet. Jeb spotted Calzer standing by one of the doors, deep in conversation with another kerbal.

"Morning, Calzer."

Calzer looked up. "Afternoon, Jeb. You met Geoff yet?"

"I don't think so," Jeb stuck out a hand. "Jeb Kerman - pleased to meet you."

The other hesitated for a bare instant before shaking hands. "Geofkin Kerman, Steadler Engineering."

"Please thank your team for pulling this together on a short schedule," said Jeb. He swept his arm out, "We're having to pick up the pace a bit and we couldn't do it without a proper training facility. Speaking of which, Calz, how did the integrated sims go this morning?"

"Not bad," said Calzer. "Lucan's all settled in over at Foxham and I'm thinking Sherf lit a couple of fires under everyone at Alpha site because they got their share of the set-up work done double quick."

"That doesn't surprise me," chuckled Jeb. "Training session go alright?"

Calzer waggled a hand back and forth. "I've seen better but considering that Tommal had to step up and replace James at the last minute, it went pretty well. Their other pilot, Fredner, seems like a solid sort - he'll work well with Lucan I think."

Jeb frowned. "Jim still not shaken that virus?" He looked at Calzer thoughtfully. "Can I grab an hour with you tomorrow morning? Time we started up a reserve crew rotation too I think, now that we've got the hardware." He turned to Geofkin. "Another reason that we're very glad to have Steadler on board. Hasn't much mattered up to now if one of the crew was out sick for a couple of weeks. But now..."

Geoff nodded. "Waste anything but time, Director Lodan said."

"Exactly," Jeb agreed. "And on that note, it's about time I did some work today. I'll see you good kerbals at dinner - if anyone needs me before then, I'll either be wedged into a brand new Whirligig capsule or buried under a pile of hydraulics. Pleasure to meet you again, Geoff." And with a brisk wave, Jeb set off in the direction of the simulator room.

"I tell you, Genie, there hasn't been this kind of buzz around here since Kerbal 2!" Jeb shovelled a forkful of meatcake hash into his mouth, grimaced and reached for the ketchup bottle. "Pains me to admit to it but Lodan is certainly making things happen!"

"Who knew all that bureaucracy would be so good at organisation," said Geneney straight-faced.

Jeb made a face at him. "Depends if it's Institute bureaucracy." He shook his head with grudging respect. "I'm betting Lodan can push pens with the best of them but at least he isn't trying to micromanage the whole thing to death."

"Says the kerbal who wouldn't go near a monthly report with a two metre strut," said Geneney dryly. "You might get a distinctly single-digit reply to that from the Accounts team too."

"Since when did we have an Accounts *team*?"

"Since we started sub-contracting with CMB and the rest," said Geneney. "Not to mention putting out tenders for booster manufacturing. And before you ask, no, Rockomax couldn't take up the slack. Ademone's got enough on holding up her end of Pioneer, along with everything else."

Jeb slowly stirred ketchup into his hash. "How did Wernher take it?"

"Pragmatically," said Geneney, "But then I'm only tendering for the Minmus probes. Anything with a capsule on top still gets built here." He grinned. "We owe the Probodyne team a round of drinks too, next time we're over at Alpha. Turns out they were having problems with their landers - they were very respectful when they asked Wernher for help."

Jeb laughed. "That would help."

Geneney nodded. "And he came through for them too! Brushed off the old LV-1 plans, adapted it for pressure-feed instead of turbo-pumps and rigged it up with one of those toroidal tanks that Seelan was playing around with. No need for landing legs - Minmus gravity is low enough that it can land on the tank. Put a minimal instrument package on the top - basically just a seismometer and a radio - and there you have it. Probodyne are calling them buttons and Wernher reckons an Eve booster should be able to lob a decent sized comsat and a handful of buttons into Minmus orbit."

"Excellent," said Jeb, swallowing another mouthful. "Should have a decent early warning system up and running by the time we get a crew out there. Reckon we'll need another controller to watch for outgassing?"

"That's the plan," answered Geneney."

Jeb pushed his plate away. "Who won the tender by the way?"

"Kerbodyne Space Projects Ltd," said Geneney, "Not a company I'd heard of but Ademone's worked with them before and was happy enough with their work. They're basically the old Steadler propulsion department who struck out on their own when..."

"Steadler decided to focus on capsules," finished Jeb. "Sounds like they're worth keeping an eye on. It's not that long since Steadler reorganised and if they've gone from a standing start to contracting for Rockomax in that time..." He nodded. "Definitely worth watching."

"Got them both," reported Bobrie. "Orbiter systems look good, lander's on it's way down."

"Propulsion looking good," Ferlan called out. "Valves, line heaters and helium pressure are Go." He scanned his console, eyes flicking between the flight clock and the engine readouts. "Coming up on engine relight."

Germore checked her own console, watching the altitude and velocity indicators flicker past. One green light came on, then a second. The velocity indicator began to slow and Ferlan confirmed what she already knew.

"Ignition confirmed, Autopilot on and holding."

Germore tapped a button, patching her console readouts through to the main screen. The three controllers - and the cluster of Probodyne engineers crammed into the Deep Space Operations Centre behind her - watched them unblinkingly. *I don't know which is worse. Waiting minutes for any telemetry at all, or watching the whole thing in next to real time.* She stared at the rapidly unwinding velocity, altitude and fuel readings, mentally following the lander along the trajectory she'd calculated weeks before. *Any time now.*

Bobrie's quietened tones matched her thoughts. "Approaching pitchover..."

The attitude indicators abruptly shifted and there was no disguising the relief in Bobrie's voice. "Terminal descent initiated. Autopilot is green."

Germore heard more than a few gusty sighs of relief from behind her. Somebody started to applaud then stopped in embarrassment. The fuel quantity light glowed a sudden green on her console, matching the autopilot and thrust status lights beside it. *Fifty metres. Down point six. Forty metres...thirty. Haven't hit anything yet. Twenty metres.* Germore unclenched her fists. *If the engine gives up now, we'd just bounce. Ten metres...*

The three lights winked out.

"Touchdown!" Bobrie pushed her chair back from her console. "Solid contact on all three legs!"

"Engine shutdown confirmed," Ferlan reported. "Safing RCS. Overpressure valves open." He turned to Germore and Bobrie. "And we're on the Mün!"

"Let's see if it was worth it," said Germore calmly. "Beginning start-up sequence."

Probodyne OCTO v. 1.105.

Vehicle designation: Unity 1-L

KCOM.....OK

BIOS..... OK

MEM1.....OK

MEM2.....OK

>Loading surface operation modules.....

SOM_chksum.....OK

>Starting PLST sequence.....

CBatt.....82%

PV-A.....DEP

PV-B.....DEP

Germore felt herself relax as the familiar litany of system module reports scrolled up the screen.

XRPS_dat.....OK

CAM_con.....OK

CAM_pow.....OK

CAM_dat.....OK

>System set.

Behind her, the applause began in earnest.

—————

"Yaw manoeuvre complete," Lucan held his breath for a long half-second. Then the computer display flickered, new data filling the screen. "Landing radar on-line!"

"Copy, Pioneer." Lucan was certain he could hear a faint undercurrent of relief in Nelton's voice. "FD requests a delta-H check."

"On it, Flight." Lucan tapped out the command. "OK, Delta-H absolute is negative three hundred. I read plus forty off-plan."

"FD concurs, Pioneer. Convergence?"

"One moment," Lucan worked the computer. "Abort guidance matches primary, Flight. Or near enough. Suggest we re-check delta-H at pitchover minus two."

"Confirmed, Pioneer."

"We're feeling the RCS down here, Flight," said Tommal calmly. "I figure the computer knows which way it's going. Throttle holding steady in auto-one, electrics are good, capsule systems in the green."

For a minute, Lucan stared at the stars outside the lander window, feeling the muted rumble from the descent engine through the soles of his feet. Then he turned back to the instrument panel. "Pressures looking good, propellant gauges on the line. Ready for the delta-H check, Flight?"

"Go ahead, Pioneer."

Lucan fought to keep the relief out of his voice. "Copy. Absolute is negative one-fifty and we're a whole five metres off-plan."

"We hear that, Pioneer. Don't look now but FD just cracked a smile."

"Going to ride this rocket *all* the way down," said Tommal. "Standing by for throttle-down."

"Thirty seconds, Pioneer."

"Be good to see where we're going again, Flight. Here we go... throttle at fifty-five...starting pitch-over. Give me a sighting angle please, Lucan."

Lucan watched the Mün slide back into view. "Twenty degrees, Tom." He stared at the craters, trying to fit the view from the window with his mental image of the training map. Beside him, Tommal shuffled his feet in their restraints, knees bending slightly as he peered along the sighting grid.

"And the computer has it, Flight! Trajectory team nailed us right to the tip of the Arrow!"

"Got some comm noise here, Pioneer," said Nelton dryly. "Say again, please."

"Gateway craters dead ahead, Flight. We're coming down right on the tip of Jeb's Arrow - left to right, three little craters, just as neat as you like!"

—————

Triangle. Left to right. Germore stared at the screen, tracing arrows in the air with one finger. *Got it!* Her hands raced across the console. Panoramic selected, tilting up, slew angle...*Come on, come on. Who built this hunk of junk anyway?*

Oh, right.

The image slid past, streaking in places, breaking up into rough blocks in others. It stopped, sharpened as the data stream caught up with the camera movement, and then tipped up ever so slightly. A small boxy shape appeared in the top corner, falling towards the cratered grey plains below.

Not falling - slowing!

"Great Kerm above - it's *them*!" Bobrie sprang to her feet, an incredulous grin lighting up her face. Across the Deep Space Operations Centre, heads snapped round at the sudden outburst. With a small, satisfied smile, Germore tapped at her keyboard, centring the camera on the descending *Pioneer 5*, before silently crossing her fingers under the console. On the screen, a faint haze began to play around the base of the spacecraft.

—————

"Forty metres, down one dot five, forward point five. Plenty left in the tank."

Tommal's eyes flicked from navball to horizon and back. Calmly he tapped the throttle control, coaxing a fraction more thrust from his descent engine.

"Thirty metres, down one, forward velocity nulled." Lucan glanced out of the window. "Tip crater right where we want it. Kicking up some dust." A warning light glowed on his instrument panel. "Twenty-five metres, quantity light on. We're good, Tom, we're good."

Dust swirled outside the cabin. Tommal peered through the window, willing his hands to hold steady, searching for landmarks through the clouds. He eased back on the attitude controller, tipping his spacecraft level.

"Fifteen metres. Down point five. Bring us on in, Tom. Ten metres, down point two. Fi...contact!"

Nelton slumped in her chair. *Just like the training*, she thought dimly. *Just another integrated sim.*

"...descent engine arm off. ATO is in." The radio crackled. "Flight, this is Pioneer - and we're down on them dusty plains, Flight!"

Nelton hauled herself upright. "Copy that, Pioneer - we see you down. Excellent work!"

"You too, Flight. We owe the trajectory team a big one - outstanding navigation, just outstanding."

"Lander just gave you the all-clear, Pioneer. Looks like you'll be kicking up some of that dust yourselves."

Lucan knelt on the cabin floor, legs bending reluctantly in his stiff pressurised suit. He shuffled backwards, looking down through his knees as best he could without bumping his helmet on the ascent engine cover.

"Feet clear, Lucan. Left a bit...easy does it - watch that backpack."

I would if I could. Lucan dropped a little lower, bending at the waist, feet fumbling for the topmost ladder rung.

"Almost there...you're looking good. There you go!"

Clutching the chunky ladder rungs tightly, Lucan climbed down hand-over-hand. He felt a brief moment of panic, foot sliding past a missing step before hitting the ground with a thud. For a long minute he hung onto the ladder, heart pounding so loudly in his ears that he half-expected a warning call from Nelton. Then, exultant grin hidden behind reflective visor, he opened his hands and took a step back.

His boot print was razor sharp, a perfect impression stamped into the powder-fine regolith. Lucan stared at in fascination then, unseen by the watching millions, shook his head and tottered over to Tommal.

"The long lope that Jeb and Jondun used works pretty well," said Tommal. "Don't worry - plenty of time in the schedule for getting our Mün legs." He squeezed the stubby, fabric-wrapped cylinder in his hand, watching the spring loaded feet and cross-pole snap out. "But first, I guess we'd better face the camera." He pushed the flagpole firmly into the regolith, rocking it back and forth and then twisting it as hard as he could to wedge it in place. The two kerbonauts shook hands and turned towards their spacecraft. Tommal cleared his throat, the familiar whispering of a suddenly live microphone suddenly filling his helmet.

"Today we stand not merely on the Mün but on your shoulders. You, the countless kerbals who trained us, watched over us on the journey, built our magnificent spacecraft, and most

of all, made the Pioneer Program possible with your support and enthusiasm. And for that, we can never thank you enough."

There was a click and then a storm of applause filled his ears. "Nice speech, Pioneer," Nelton called over the noise "And to the two kerbals on top of the heap - we'd do it all again!"

"We know it, Flight," Tommal said simply. "OK, I'm starting the recon loop."

"The good people at Probodyne say they left you a toy-box to play with too," said Nelton. "Let us know if you see it." She paused. "And they pass on their congratulations for the landing - apparently it looked pretty good from where they were sitting."

From where they were sitting, muttered Tommal to himself. "Hope they managed to set the toy box down nearby, Flight," he said. "Too much walking is going to eat right into the schedule." He rounded the lander, stepping into the shade. "I don't believe it!"

"That sounds good," said Lucan. "I think."

"Better than good!" said Tommal. "Kerm, is that pretty! Can't be more than a couple hundred metres away - just around the crater rim, neat as you like!"

"Copy that, Tom," said Nelton, "We're patching Alpha Station in now. Time to do some Munar prospecting - and maybe a bit of science on the side."

The first thing Lucan noticed on waking, was the aching in his fingers. The second was the crude hammock that he was lying in. He blinked the sleep out of his eyes, vaguely aware that something around him was creaking and popping. Liquid gurgled through a pipe next to his ear and a fan blew a tepid stream of metallic smelling air over his face. Gradually his eyes adjusted to the gloom, taking in the metal walls illuminated by firefly lights and softly glowing patches. Light crept into the room around a pair of window blinds, oddly lambent for daylight, reminding him more of...

Munlight!

Lucan jerked in his hammock, remembering at the last minute not to sit up too suddenly. Automatically he glanced over at the flight clock just as a burst of music filled the cabin.

"Ohhhh they're gonna walk. Gonna walk. Gonna walk on the Mün..."

"Good morning, Pioneer. Sleep well?"

"Like a kerblet in its pouch, Flight," replied Tommal below him. "These hammocks make a pretty good bed in one-sixth gee."

"Could just use a good hot bowl of natas and a smoky sapwood to set us up for another fine day on the Mün," added Lucan cheerfully. "But I'm sure we can rough it on ration cubes and water."

"Just as long as they're not the spicy ones," said Tommal, "Doubt the environmental systems can handle the uhh... after-effects of any more of those."

"I'll keep those for the EVA then," Lucan laughed. He retrieved two ration packs from the mesh bag stuck to the wall behind his head and tossed one down to Tommal. "Sunfruit surprise suit you?"

"Suits me fine," said Tommal. "How's Fredner doing up there, Flight?"

"Sleeping like a kerblet too, Tom," said Nelton. "We'll wake him up once we've chased you two out the door. By the way, you'll be pleased to know that the plane correction burn went as planned - FD confirms that he'll be right where you need him this afternoon."

"That's good to know, Flight," Tommal said around a mouthful of ration cube. "Any update on the EVA."

"No changes, Tom. Probodine got some good data from yesterday's samples and recommend we just keep with the planned procedures."

"Works for me," Tommal stowed his empty ration pack and swung his legs gingerly out of his hammock. "Time to suit up."

Lucan lowered himself from his own hammock, rolled them both up and secured them to the cabin wall. He retrieved Tommal's life support pack, checking the water and oxygen gauges on the back and held it out for Tommal to wriggle into his chest harness. He watched his commander unplug himself from the lander systems and connect up the hoses from the backpack to his spacesuit, mentally ticking off items on the checklist as they went. "Let me just check those hoses, Tom. OK, they're locked in tight. Ready for your helmet?"

Tommal nodded. Lucan lifted his helmet into place and locked it onto his neck ring. Tommal looked down and twisted a pair of control knobs on his chest. "Fan started. O2 and CO2 levels nominal. Water flow on minimum." He shrugged his shoulders, settling the backpack into place. "Right, let's get you set."

Ten careful minutes later both fully-suited kerbonauts stood awkwardly in the confined lander cabin. Lucan checked his gloves one last time before un-caging a switch on the instrument panel. "Flight, Pioneer. Opening de-press valve."

"Copy, Pioneer."

The cabin pressure gauge dropped past the egress mark and a soft chime sounded in both helmets. Tommal knelt down and carefully eased the hatch open. "That worked better the second time, Flight. Exiting cabin."

"Don't lock the door on the way out, Pioneer."

Tommal chuckled, legs already out of the hatch. "I can see the headlines now, Flight. 'Munwalking kerbonauts break into own lander.' OK, found the first rung. Lets get to work."

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"Left a bit, Lucan. Watch the antenna. OK, lock bracket, check power switch, plug in the umbilical..."

Germore drank her coffee and listened to the two voices from the Mün. On the main screen, Pioneer 5 stood by the crater rim, an incongruous kerbal-made object amidst the rugged grandeur of the Munar plains. She smiled to herself, drinking in the view and watching the almost surreal sight of two tiny figures at work by their spacecraft.

"That's got it, Flight. Antenna is tracking freely. My locator is on."

"I'm on too, Flight."

"Picking you both up loud and clear."

"Well alrighty then. On my way to sample point one, second traverse. Lucan has the tray and is heading for Unity."

"On my way, Flight!"

Germore's smile broadened into a delighted grin at the suited figure loping towards her and waving at the camera. Uncaring who might see her, she waved back enthusiastically before the figure moved out of camera shot.

"Getting toasty in here, Flight - gonna turn up the cooling for a minute. These gloves really weren't built for this kind of close-up work. C'mon you sla...bs of plastic. Get in there would you." The figure bounced into sight carrying a fan shaped, ridged plastic tray, which he set down in front of the Unity lander. Lucan paused for a moment and adjusted it's position slightly, before unclipping a long handled tool from his belt and using it to drop a clod of regolith into one of the tray channels. "Pioneer, Unity. Ready for scoop test?"

Germore cleared her throat and toggled her microphone with a trembling finger. "Alpha copies. Loading test program." Text scrolled up her console screen, accompanied by a row of rapidly flickering lights. "Checksum matches. Starting test."

Unity 1's sample arm swivelled round, unfolded, then dipped towards the tray. The scoop tip pulled back, dragging through the regolith sample, piling it up against a stop that had been placed there for that very purpose. The arm folded back on itself, tip curling upwards and inwards, then swung clear. Lucan skirted around the tray, careful not to scatter any dirt on it, then inspected the scoop contents.

"Pioneer, Unity. Sample capture confirmed."

"Thanks, Lucan. If you could empty the tray first, I'll get rid of this."

"Will do, Unity."

"Good work both," said Nelton. "How are you doing, Tom?"

"According to the map, I should be right about at the first stop, Flight."

"Understood, Tom. Science team have your bearing. Unity?"

Germore glanced at her console. "Unity has a bearing. Standing by." She tapped out a command and her console screen promptly blanked out.

>beacon_trace loaded

>listening...

>listening...

>listening...

"Copy that, Flight. Copy, Unity. Transmitting ranging ping."

>ping received

>extracting timestamps

>range 231m

Germore pressed a key, saving the data for later analysis. "Unity reports range two three one."

"Thank you Unity," said Nelton. "OK, Tom, we've got a fix on you."

"Understood, Flight. I've got a couple of pretty good sized boulders here. Going to see if I can break a chunk off one of them, maybe do a little sampling underneath it."

"Science team are saying they'll make a geologist of you yet, Tom. Go ahead."

No sooner had the pressure warning light blinked off, than Lucan unlocked his wrist cuffs and pulled off his gloves with a sigh of relief. He and Tommal busied themselves unplugging hoses and reconnecting their spacesuits to the cabin environmental systems, before shucking out of their life support backpacks. Quietly, Lucan set about securing the sample boxes and loose equipment whilst Tommal piled up the backpacks and other EVA gear, for disposal.

After their initial exuberance, conversation with Mission Control became steadily more businesslike as Tommal and Lucan worked through their checklist. Surplus gear was thrown overboard, communication systems were checked, guidance and radar systems were double checked, engine readouts were scrutinised by Mission Control and kerbonauts alike. As their preparations for lift-off continued, Lucan's acknowledgements and comments grew increasingly terse. Tommal glanced over at Lucan in concern, but he carefully avoided making any comments over the air.

"Copy that, Flight. We're Go to proceed in twelve thirty seven, we get ascent engine armed, abort stage, ignition - and that's it."

"That's affirmative, Pioneer. Up to orbit for a rendezvous with the Fredner Express and a leisurely cruise back to Kerbin."

"Sounds good, Flight." Tommal clicked off the air-to-ground loop and turned to his copilot.

"Reckon we did a solid job of work out there, Lucan. Got everything we came for, left a bunch of extra samples for Probodyne to scoop up and poke at, once we're gone, proved out the trackers. We done good." He saw the look on his co-pilot's face. "That engine's gonna fire. Damn thing only has about four moving parts in it, including backups. You're

gonna press that button, that decoupler will pop right off and then we're out of here. Leisurely cruise back to Kerbin, just like the good lady said."

"And what if it doesn't?" Lucan said flatly.

Tommall gestured at the ascent engine cover. "Then I open a can on that can, apply a little percussive maintenance to the motor, we wait for Fred to swing past again and catch him on the second time around." He shrugged. "And if that don't work neither, we take a long look at that magnificent view out there, pop the hatch and go out with a smile. Not much else we can do."

Lucan nodded slowly. "I guess not." He straightened up. "And those moving parts were built by the best kerbals in the business. They won't let us down."

Tommall clasped his shoulder briefly. "No they won't - neither parts nor kerbals. Now get your game face on - Nelton'll get nervous if we don't speak to her before the lift-off."

The minutes dragged past. Lucan stared fixedly at the mission clock, shuffling his boots securely into their restraints.

"T minus two minutes on my mark, Pioneer... Mark."

"Marked, Flight. Proceeding at sixty."

Lucan stared straight ahead, counting down the seconds in the silence of his own head. He saw a flicker of blue from the corner of his eye, saw Tommal reach across the instrument panel in response. "Forty seconds, Flight. Pioneer is Go."

Twenty seconds. Twelve. Ten...nine...eight...

The explosion kicked through the soles of his feet, followed immediately by a burst of fire from the RCS thrusters. Then the ascent engine lit.

"Ignition - and lift off!" Tommal flashed him a quick smile. "Ascent engine at rated thrust, tank pressures nominal."

Lucan squeezed his eyelids together briefly, blinked hard and then automatically tapped out a command on his computer keyboard. "Flight, Pioneer. Primary guidance is green. Abort is aligned."

"Copy that, Pioneer. See you in orbit."

Chapter 61

Journeys

"Horizontal velocity looking good, Flight. Almost there...almost there...and shutdown. Engine off, engine arm off. How're we looking, Lucan?"

Like we've got one less thing to worry about, thought Lucan. "Ninety five kilometres by seventeen, Flight," he reported. "No quantity light on the ascent engine but the gauge is hovering right around empty. RCS propellant within expected levels."

"Understood, Pioneer - that's good to know. Please switch to three way comms."

Lucan flipped a switch on the instrument panel. "Copy, Flight. Everyone receiving us?"

"Loud and clear Pioneer. Fredner, how do you read?"

"You're a bit fuzzy, Flight," replied Fredner. "Picking up Pioneer just fine. How's it going down there, guys?"

"Not bad for a flying bag of charcoal, Fred. Hope you haven't cleaned up specially, because this is one filthy spacecraft."

"It certainly is," said Lucan. "You could maybe pack a clothes brush for the next crew, Flight."

"Noted, Pioneer. CapSys is wondering how much dust you're getting on the instrument panel?"

"Not enough to matter, Flight. Nothing seems to be working its way behind any of the dials. Keeping the spare gloves bagged until the last minute sure helped - they didn't get a chance to get junked up like the EVA gloves."

"Copy, Pioneer. FD has a circularisation update for you. No changes to attitude, delta-v fifteen dot five metres per second."

"We'll take that, Flight, said Tommal. "Pretty close to our first-pass calculation."

"Got them on radar now, Flight," Fredner announced. "I make their distance to be three hundred seventy kilometres, closing at one twenty two metres per second."

"Agreed," said Lucan, "Three hundred seventy, closing at one twenty two."

"Forty second to loss of signal, team. Good luck."

"Thanks, Flight. See you on the next pass." Tommal waited for the expected rush of static before flipping his radio back to a direct link to the *Pioneer 5* capsule. "You still with us, Fred?"

"Way ahead of you, Tom, just like always." Fredner paused. "So what was it really like down there, guys?"

Tommall stared at his microphone for a moment. "Spectacular," he said at last. "The flying matched up pretty well to the sims in the end but that gravity...nothing could match up to that. The training team did their best but that harness just isn't the same. All of you feels light and when you take a jump - you just keep going and going and going."

"That scenery too," said Lucan, "which is not something I thought I'd get excited about, especially after listening to Jeb and Jondun go on about it. But yeah - even without Kerbin hanging in the sky, it really was like walking on another world." He laughed. "Which sounds pretty stupid put like that but I can't think of a better way of describing it. How about you, Fred? What was it like being the lone explorer?"

"Peaceful," said Fredner wryly. "Definitely the best thing about the Far side - not having Mission Control in your ear the whole time." His voice shifted subtly. "Actually, that's not true. Being on your own did make it different. Kerbin somewhere over *there*, you guys on the surface somewhere down *there*. And Kerm knows what else out of the window. Stars by the thousand, most of them prob'ly with their own planets, even if we can't see them, maybe even other life on some of them. We're not really so far out here, guys. Just barely paddling in the shallows." He coughed. "But enough of this. You two had better get set up for circularisation."

Tommall checked his navball. "We're good. Attitude all zeros. SAS holding steady."

Lucan tried to ignore the unwelcome queasiness in the pit of his stomach. Busy with the lander computer, he didn't notice Tommal's quick glance. "Burn program loaded. Delta-v, fifteen dot five on RCS. Guidance on primary."

"Sixty seconds," said Tommal calmly. He flicked his microphone over to their private channel. "These old RCS thrusters are even tougher than that ascent engine, Lucan. We're gonna be fine." He flipped back to the air-to-air loop. "Go at twenty."

The reaction control system fired for a handful of seconds, its meagre thrust still more than sufficient to propel the lightweight lander - fuel expended and barely more than a cabin - and its two occupants. Lucan's feet settled against the cabin floor and then, as quickly as it

began, the burn was over. Lucan stabbed out a command on his keyboard. "Ninety-five by ninety-three dot seven," he said in relief. "How does that compare with you, Fred?"

"You're not quite with me," Fredner answered, "but the shaping burn shouldn't be more than a metre per second at most. Quick dab of the thrusters ought to do it."

"You weren't fooling about that bag of charcoal!" Fredner exclaimed, peering down through the lander hatch into a hazy dark-grey cloud. "Dust bags coming through!"

Lucan stepped into his bag, stripping off his filthy spacesuit amidst a shower of debris. Pulling the drawstring closed, he passed the bag up to Fredner, who stowed it under the navigator's couch in the capsule. Lucan emerged from the lander to find his crewmate waiting for him with a squeeze tube of water and a pack of wipes, both pleasantly cold.

"Stowed them both next to the outflow pipe from evaporator A." Fredner reached into the open access panel and retrieved another squeeze bottle. "Flight thought you'd both appreciate a cold one after a hard day's work on the Mün."

Lucan took a long drink, sighing with pleasure as the chilly globules splashed over the roof of his mouth. "Certainly do - thanks, Fred. Why don't I get that access panel back on, whilst you stow Tom's suit."

Fredner grinned at him. "That was the plan." He pulled himself over to the hatch. "You about done in there, Tom?" A bagful of spacesuit drifting towards the hatchway was his only answer. Deftly he snagged it from midair, manoeuvred it under the commander's couch and passed Tommal his squeeze bottle. Tommal raised his eyebrows at the chilled bottle and the sight of Lucan twisting the access panel latches closed. He opened his mouth to speak, thought better of it and contented himself with a swallow of water.

"When you two have finished putting my spacecraft back together, you might want to check the high-gain alignment before reacquisition time."

"Already checked," said Fredner, "Should be picking them up any time now."

"...ight, Fr...r. Co...n....ner."

Fredner ignored Tommal's pointed expression.

"...Fredner. Come in, Fredner."

"Pioneer, Flight. Both prospectors safely on board!"

"Copy that, Pioneer. Got a lot of smiling faces down here."

"Three big ones up here too, Flight," said Fredner. "Okay, I've got Lucan here looking for TKI updates, so I'm going to hand you over to him, whilst I head back and help Tom with the lander."

"Understood, Fred. Please remind Tom to leave the lander computer in REMOTE for the de-orbit and seismometer calibration test."

"Will do, Flight." Fredner unplugged his headset and lowered himself into the equipment bay. Working in companionable silence, he and Tommal began to unload the lander, pausing occasionally to consult an equipment list taped to the wall. Finally, he poked his head through the lander hatch for last, long look around the dusty cabin. He nodded to himself, fitted the hatch back into place and pulled the locking lever closed with a clunk. Lucan looked up as Fredner climbed into his couch beside him, settled his headset into place and reached for the environmental system controls. "Pioneer, Flight."

"Go ahead, Pioneer."

"Hatch secured, Flight. Tom's squaring everything away down in the equipment bay. Ready for re-press test?"

"We're ready, Pioneer."

Fredner flipped a switch. The cabin pressure gauge edged upwards, accompanied by a more insistent drone from the environmental system fans. "Overpressure holding at fifteen percent, Flight. Vent after jettison?"

"CapSys confirms, Fred. Lucan has the attitude data for the jettison manoeuvre, to be followed by a five second plus-z from the RCS."

"Five second plus-z," Fredner repeated. "Got it, Flight. Looks like we're about to lose you, so we'll get set up for jettison and see you on the next pass."

"Speak soon, Pioneer."

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Pioneer 5 disappeared over the Munar horizon, the radio link to Mission Control crackling and then cutting out precisely as Tommal and his crew expected. Shortly afterwards four puffs of flash-frozen vapour appeared at the join between capsule and lander cabin, before the two spacecraft drifted apart, the lander slowly tumbling as it went. With a brief burst from the service module thrusters, *Pioneer 5* pulled away. Unseen lights sprang on across the lander's instrument panel and, the autopilot systems checking the tumble with short rattling pulses from its manoeuvring thrusters.

The two spacecraft flew on around the Mün. Then, with another flicker of hidden lights, the lander cabin pivoted in space, aiming its thrusters along an invisible line. The thrusters came on - and stayed on, slowing the fragile metal shell, breaking the delicate balance between speed and gravity, and letting the Mün claim it once more. As the crew of *Pioneer 5* began their final orbit, the spacecraft which, mere hours before, had brought two kerbals back from the Munar surface, began its final journey.

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"Gimbal drives are Go on pitch, roll and yaw. Tank pressures nominal, all valve controllers drawing power."

"Thank you, Fred. How's our guidance, Lucan?"

Lucan unclenched his fingers from the edge of his keyboard and quickly scanned his checklist again. "Burn program loaded, platform aligned for TKI. Gimbal angles set for ignition. SAS in AUTO, RCS propellant levels safe above reserve and balanced across all quads."

"And the spacecraft alignment is green," finished Tommal. *Correct end pointing forward*, he added silently, eying Lucan's taut expression and whitened knuckles. "Six minutes to ignition. Everyone strapped in for the burn?"

"Navigation station ready," Lucan said briefly.

"Engineering station ready," added Fredner. "Not looking forward to getting squashed after floating around this tin can for so long."

Tommall grunted. "You're in for some real fun then, once we get back to Kerbin." He ran his eye over the instrument panel. "Three minutes to ignition. Proceeding on blue light at sixty and if we don't get a light we're going with backup plan B. Engine stop, SME override ON, SAS to HOLD. We reestablish contact with Mission Control, check the systems and go for the manual burn on orbit TKI plus two." He paused. "Not that we'll need it. We'll be catching the first train home."

Lucan watched the flight clock count away the seconds.

"Blue light!"

The reaction control thrusters nudged him in the back.

"We got ullage..."

The service module engine slammed him into his couch.

"Ignition! Clean start - tank pressures good, chamber temperatures holding nicely."

"SAS report please, Lucan," said Tommal calmly.

Lucan's eyes darted to his computer display and rate indicators. "Attitude holding," he said. "Minor excursions in yaw but they're damping. Pitch and roll are good."

"Chamber pressures steady," added Fredner. "Burning at one minute."

Lucan stared fixedly at the velocity readout. *Twenty-two-forty, twenty-three-forty... come on...* Cold sweat pooled at the small of his back. *Twenty-four-forty...*

"Burning at two minutes," said Fredner. "Twenty five seconds to go."

Twenty-five-forty. Twenty-six...forty!

"Shutdown!" Tommal called. The thrusters clattered. "Residuals coming out...done."

Lucan blew out his cheeks, letting the tension drain from his body. "And thank the Kerm for that." He cracked a small smile which rapidly split into an ear to ear grin. "We did it! First train home, one stop only - the Great Tranquil Sea!"

The train creaked and juddered its way to a stop, threatening to spill the contents of the luggage racks over the carriage floor. Enely shouldered his pack, patted his pockets to check for anything missing, and stepped onto the platform. This far down the line from Barkton, the station was barely more than a pair of platforms and a waiting room. Greenery ran riot; the colourful vines trellised up the outside wall enthusiastically competing with the profusion of blooms bursting through a nearby fence. Enely mopped his brow on his poncho sleeve and looked around for the exit.

The next carriage along disgorged a group of chattering kerbals, some of them struggling to squeeze their backpacks through the train doors. Enely caught snatches of conversation, frowning at the occasional unfamiliar word, the local Kolan accent still very strange to his ear.

"...well there is a bus but it's only a couple of days on foot. We'd planned to just walk it - you'd be welcome to join us. What's that? Oh - riverside's the quickest way - nice and shady in this heat. Good swimming too in places. Yes - yes, me and Tivie came this time last year - met most of this sorry bunch along the way!"

Enely heard laughter accompanied by other, mock indignant, comments aimed at Tivie's partner, followed by a mumbled question that he couldn't quite make out.

"Oh, Kerm yes. Expect we'll all be back here next year too, sooner if we can manage it. Communing with the Sage..." The voice fell silent for a moment. "The story - our story - would be enough by itself but with Jonton telling it..." Enely's ears pricked up. "Television is the nearest I can get to it - except you're right there in the picture, smelling the fish and salt air, feeling what it was like to really be there. Sometimes I could almost feel the cobbles under my feet, the wind on my face..."

Hesitantly, Enely approached the group. "Um, excuse me."

The other spun round to face him, raising his eyebrows at the darker skinned, weather-beaten figure in front of him. "Can I help you...?"

"Enely. I'm sorry to intrude but I couldn't help overhearing. Did you say you were on the way to see Jonton?"

"Well not in so many words but yes. Yes we are."

"You mentioned a Sage," said Enely carefully. "Is that the same person as Jonton?"

The other kerbal looked at him quizzically. "That's right. Jonton Kermol, otherwise known as the Sage of Barkton."

Enely nodded. "I think I'm looking for him too. Do you know where I might find him?" He saw the curious looks around him. "A friend told me I should meet him but he's not from around here and his directions were rather vague. " He smiled, "I am fortunate to find others going the same way."

"You're not the first lost pilgrim we've met along the way," came the cheerful reply. "Fairly got a name for himself, Jonton has - we've met all kinds on the road this year." He looked at Enely frankly. "You've come quite a ways too, if I'm any judge of accents. Southern Wakiran?" He stuck his hand out. "But I'm forgetting myself. Calfrey Kerman - call me Cal!"

Enely shook hands. "It is good to meet you, Cal. You were nearly right about my accent too. I'm from mid-Wakira originally - a small Grove on the edge of the Hazachi desert."

Calfrey whistled. "Your folks sure picked a tough row to hoe there." He settled his pack onto his shoulders. "Day's a wasting though. We can show you to the bus stop if you like, though you'd be welcome to join us. It's a couple of days walk to Jonton's Grove but I don't reckon a little walking is going to worry a Hazachim."

"No," agreed Enely. "And that would be most kind - thank you." He picked up his own pack. "I'm ready when you are."

"So, Enely - what on Kerbin do you farm next to a desert? Can't think much of anything would grow well there."

Enely watched a pair of birds flitting over the river. "Cacti mainly," he said. "Malkaball is our staple crop but we grow pepper cactus too, as well as kerbahusk and a couple of others. Although if we could eat speargrass then we'd never lack for food - it's all our Kerm can do to keep it out of the fields. It's not even any good for brewing." He looked at Cal solemnly "If you really want to go blind of course, it's up to you. But there are many quicker and less painful ways of doing it."

Cal laughed. "Something must eat it. Have to admit though, I never thought of farming cacti. Guess I've seen too many films - I always think of two, maybe three cacti in the middle of a load of sand."

"Oh no," said Enely, "You should see the malkaball fields when they're ready for harvest. Hundreds of brown balls all lined up in rows. Looking very much like the real thing but neater."

"The real thing?" said Cal curiously.

Enely stared at his feet, flushing slightly. "It works better in the Hazachim dialect," he explained. "You know about mallek of course. Four legs, humps, bad temper. Malka is our word for bad tempered, so most of the time we just call the mallek, malka." He glanced at Cal's puzzled expression. "So a malkaball is a small brown ball that..."

Cal hastily covered his mouth, stifling laughter behind a cough. "Sounds appetising," he said at last. "Do they taste as good as they look?"

"Much better than they look," said Enely. "Bake them in a sand pit with the right spices and they're actually quite sathy."

"Sathy?" asked Cal.

Enely frowned. "How to explain?" He scratched his neck, working a finger under his poncho. "It's like the word Kerm. Lots of different meanings depending on how and when you say it. He tugged at his backpack straps letting a trace of irony creep into his voice. "This pack is sathy, especially in this heat. The meal I had on the train was quite sathy all things considered. And this view," he swept out his arm. "All the green, no sand, or mallek in sight. That is definitely sathy."

"Well then," said Cal, "That gravel spur looks like a sathy enough place for lunch. What do you reckon folks?" he called.

Everyone agreed that the spur would indeed be a fine place to stop for a, much overdue, lunch. Packs were doffed, blankets and towels spread out on the ground and parcels and bottles unearthed. In short order, a party of hungry kerbals were sprawled companionably by the river, making serious inroads into their provisions. Enely sat cross-legged on his towel, munching a greenleaf roll and staring at the river banks in fascination. Clouds of insects hovered by the water's edge, to the obvious delight of the tiny iridescent birds that darted back and forth, eating their fill.

A green lump, which Enely had assumed to be a rock suddenly fired out a long sticky tongue that snapped back into its mouth coated with dark specks. Other creatures hooted and squawked, hidden amongst the trees. A large hairy something, poked its nose out of the undergrowth, seemed to sniff disapprovingly at the green skinned figures sitting on the gravel and retreated amidst a crackling of disturbed foliage. Enely sighed contentedly and took another bite of greenleaf. He was startled from his reverie by a sudden splash and a shouted "Come on in - the water's lovely!" Two more of his companions threw themselves into the river after their friend and set to splashing as much water over her as they could. Sparkling droplets filled the air, scattered through with the green and blue wings of the bolder birds.

"You joining us, Enely?" Cal stood over him, wearing nothing but an eye-watering pair of shorts that somehow managed to clash with everything else around them. He saw Enely's hesitant expression. "How about a paddle then - bit of cold water is right sathy on the feet."

Enely laughed. "You're getting the hang of it," he said, "but what is 'paddling'?"

Cal looked at him nonplussed. "What's paddling? Well, I guess you wouldn't get much of a chance on the edge of a desert." He pointed at his feet. "It's this - walking in the water. Nothing like it after a hard morning's walk."

Enely nodded slowly. "I can imagine that. I'm afraid I didn't bring any paddling shorts though."

It was Cal's turn to laugh. "Oh these are just for swimming later. Just take your boots and socks off, maybe hitch up that poncho a little - you'll be fine."

Inwardly, Enely shrugged. He unlaced his boots and arranged them neatly by his towel with his socks stuffed in the tops. From long ingrained habit he quickly glanced round to fix his position, then followed Cal into the river shallows. The gravel crunched underfoot,

pleasantly massaging the soles of his feet and, he decided, Cal was quite right - the cold water was most sathy on the feet. He waded out up to his knees, feeling the slow-moving river gradually washing the aches and tension out of his legs. Then he stopped and turned to watch the others cavorting in the deeper water.

"Coin for them?"

Enely jumped, the sudden movement splashing water over the hem of his poncho. "I'm sorry, Cal - you startled me."

"You did have a real thousand metre stare going there," said Cal quietly. "Everything alright, Enely?"

Enely sighed. "Not really," he replied, "but they're better than they have been for a long time. Thank you, Cal."

"I'm not sure what I did but you're very welcome to it," said Cal.

"That's the point I think," said Enely. "You didn't need to do anything but you did." He looked at Cal. "Wakira is not a quiet place at the moment. Too many borders and too little trust. My Grove got caught up in the fighting." He saw Cal wince in sympathy. "Things happened that I don't really want to talk about - and probably shouldn't talk about if I did - but, if you'll excuse the expression, there's nothing left for me there now. As I told you, a friend suggested that Jonton might be able to help although I don't know how."

Enely dragged his toes through a patch of mud. "I like Kolus. It is a strange place and a wonderfully alive place after my Grove. But it is not home." He took a deep breath. "Which is why it is good to be reminded that there are still good and kindhearted kerbals in this world, even in such times as these."

Cal stared awkwardly at his feet. "I think we mostly are still," he said. "Kerbals, that is. Somebody would have helped you at that railway station if we hadn't happened by." He looked at Enely nervously. "Anyhow - this paddling is something you need to work up to. Time we were getting back on the road."

The sun threw shadows from their feet as Enely's tired but excited group of companions approached the marquee field. Enely noted the overflowing strips of flowers around its edges, their colours muted in the lambent afternoon light. But before he could ask Cal or Tivie about them they were greeted by a cheerfully no-nonsense kerbal, who quickly sized them up, and her young son.

"Good evening and welcome to our Grove! Marquees only tonight, I'm afraid - our spare rooms are all taken. They're not much but they'll keep the rain off your head and we can give you your own bit of space, privacy screen if any of you need one, and a bite to eat or drink. Moss rooms are round the back under the square tents if you need to freshen up. For anything else, just speak to anyone in a straw hat and tell them Meleny told 'em to sort you out!"

Cal stepped forward with a smile. "Canvas over our heads and a space to stretch out will do us fine, Meleny. Anything after that'll be yellow clover on the stew. I'm Cal by the way."

"Pleased to meet you, Cal. Head on in and make yourselves at home."

"Thanks, Meleny. Come on folks - lets go find ourselves a space."

Inside, the marquee was pleasantly dusky, lit only by a handful of portable electric lanterns. Enely's nose twitched at the scents of old canvas and woodsmoke, the fainter resinous tang of newly sawn timber catching in the back of his throat. A row of pallets stretched down either side of the enclosure, each with a pillow, a folded blanket and a small trunk at its foot. A small group of kerbals sat in the central space, a Tiles set laid out between them. Others lay on their pallets reading by lantern-light.

"Let's take the far end," said Cal softly, "Half of us one side, the rest on the other. There's a bite to eat out the back once we're unpacked, unless my nose is lying to me."

Enely waited for the others to take a pallet before shrugging out of his pack and choosing a space for himself. He emptied his possessions onto his bed and set about re-folding his clothes and placing them carefully into the trunk. A minimal wash bag and mess kit followed them. A few treasured or items were taken out, inspected and stowed away inside his poncho, along with a leather coin purse, then Enely stood up, finger combing his hair into place.

"Light traveller huh," said Cal, closing the lid on his own trunk. "C'mon - lets go find that bite to eat. Rest of the unpacking will go easier with a full stomach."

"If we're lucky, he'll be just about done by the time we're leaving," said Tivie, standing up herself. "My partner is the world's worst packer," she explained to Enely, ignoring Cal's mock-wounded look. "Takes forever and he always manages to forget something."

"Well it's a good thing that I always go hiking with the world's most organised kerbal then," said Cal cheerfully, slipping his arm around her waist and steering her deftly towards the marquee opening. Outside a camp kitchen had been set up under an awning and Enely's stomach rumbled at the smell rising from a large pot. He looked around in embarrassment but Cal and Tivie had already joined the dinner queue and were waiting, bowls in hand, by a long table. Enely went over to join them.

A smiling kerbal took his bowl and filled it with a generous ladleful of thick stew before sprinkling it with small yellow leaves and adding a hunk of dark bread. Enely thanked him politely, looking around for his friends. A radio chattered away in the background, Enely caught snatches of conversation about parachutes and welcoming somebody home, much to the evident and noisy relief of a large group sitting around a nearby table.

"Ah yes - the Munwalkers," said Cal. "Saw the launch on television before we set off - incredible sight, just incredible. Forgot they were coming home today but it sounds like they're back in one piece. Wonder if they'll be going to Duna too?"

"Probably," said Enely, inspecting his dinner. The stew seemed to consist of some kind of white bean, mashed up and mixed with sliced mushrooms and shredded green vegetables, and topped with yellow leaves. He shrugged and picked up his spoon, eyes widening slightly as he took his first mouthful. "This is...very good."

Cal swallowed his own mouthful. "Yep. Good old white bean stew. Can't go wrong with it." He tore off a piece of bread, scooping up more stew with it. "The Kolan Klassic, my mother used to call it." He chewed his bread approvingly. "Whoever baked this, Mum wouldn't have kicked them out of the kitchen either. 'Spect we'll be waiting a day or so before seeing the Sage but I don't think that's going to be much of a hardship."

The boat rode at anchor off the coast of Firesvar; no harbour in sight but close enough to shore for protection from the worst of the ocean swells. Its crew moved with quiet purpose, filling backpacks with supplies, taking inventories of tents, camping gear and other materials and lowering them into the waiting dinghies. Finally, all was ready. The Captain nodded at his chosen companions and, one by one, they scrambled over the side into the dinghies, the fabric swaddled tools - and weapons - on their backs thudding dully against one another. Ropes slipped free, gloved hands shoved hard against varnished planks and the landing craft edged away from the larger boat, waves slapping softly against inflated rubberised fabric.

A hand signal and four pairs of oars dipped into the water with barely a splash. The vessels glided soundlessly through the night, the scant sound from the oars hidden by the noise of wind and wave and occasional lonely seabird.

A sudden gust of rotting seaweed and the rattle and hiss of wave-dragged shingle marked their distance to the shoreline. A last powerful stroke from the rowers and both dinghies hit the beach with a crunch of pebbles against fabric. Their crews leapt clear, seizing grab handles and carrying their now cumbersome craft swiftly up the beach towards the waiting caves. The narrow entrance to one hid a much larger interior and the Captain quietly ordered them to leave the dinghies there. He trekked a short distance along the beach, checking that the cave mouth was sufficient to hide its contents from casually prying eyes, before rejoining the rest and leading them inland at a jog.

By the time they reached the trees, the sky was beginning to lighten, the trills and whistles from unfamiliar birds greeting them as they plunged into the forest. The first crimson fingers of dawn found them in a clearing, quietly putting down their burdens. The Captain pulled a white insulated box from his pack, the circular design on its lid cast into sharp, cerise-tinged relief as he set it on the ground. Reverently, one of the waiting kerbals unwound the blanket from the spade he was carrying and handed it to her leader.

Working swiftly, the Captain dug a hole, measuring its depth against the spade handle. He opened the box and gently lifted out a small fibrous gourd, releasing a puff of chilly, cinnamon laced vapour into the morning air. Carefully, he placed the gourd in the hole, packing earth around and over it before tamping it down with his spade. He stood, accepting a bottle from another of his companions.

The rising sun sparkled from a handful of water - the traditional gift to a new Kerm from its Keeper.

Chapter 62

Hopes

Enely stared at the multi-storey Keeper's hut, its three stacked rings braced against the trunk of an enormous Kerm tree; the upper tiers built from a pale wood that stood out sharply from the Kerm bark and darker, more substantial lower tier. He looked up at the mesh of ropes suspending each level from the ring of branches above it and the ropeways winding round the trunk between them, and shuddered.

"That third storey is new," said Cal happily. "Wonder if they'll let us up there afterwards? I bet the view is just sathy from that height." He noticed Enely's fixed expression. "Don't worry - plenty of bunks in the main hut and there's almost no queue yet. With a bit of luck we may even snag a bunk in Jonton's room and you'll get to meet him!"

Enely fingered the square of cardboard in this pocket. "I hope so," he said. "But if we don't, perhaps I can meet him anyway whilst you're enjoying the view from upstairs." He and Cal reached the top of the hill and stopped to wait for Tivie and the rest of their group to catch up. Cal checked his watch, bouncing up and down on the balls of his feet. The others strolled up the hill in ones and twos, talking amongst themselves and enjoying the relative cool of the early morning. Enely suppressed a smile as Cal grabbed Tivie by the hand and trotted off along the winding path leading to the hut, before following them both at a more sedate pace.

Closer to, he noticed that the irregularly interlocking planks making up the hut walls were peppered with odd whorled designs between a more regular pattern of knots. Puzzled, he traced one of them with a finger, the tightly wound spirals a rich dark black, stained by layer upon layer of varnish. Then he started in sudden understanding. *Kerm wood - the whole thing is built from Kerm wood. But nobody's done that for... How old is this place?* The hut door opened and for a fleeting instant Enely found himself face to face with a tired looking kermol. Her eyes swept the gathering crowd in front of her, tiredness banished behind a warm smile.

"Greetings, good kerbals and welcome. My name is Gerselle - please come in."

Enely braced himself and followed the queue inside, looking around curiously at the plainly decorated kitchen and eating room. The kerm wood walls were polished to a soft glow and colourful homespun rugs littered the toy strewn floor. A brightly painted and, so far as Enely could see, empty chest stood in one corner. Cinnamon tickled the back of his throat and he frowned.

"This way please - excuse the mess." Gerselle opened another door and the tickle became an insistent rasp against the roof of his mouth, making him cough. Embarrassed, he covered his mouth with one hand and followed Gerselle into what was very obviously a sleep room. He looked up from another muffled cough and clamped his hand to his face in shock. Jonton? *Must be - but what...?* Surreptitiously he stared at the figure leaning against the trunk, trying to make out where Kerm ended and kerbal began. *All the leaves around his head - he must be Communing already but he's still watching us. How on...*

"Thanks, love. Welcome everybody, and for anyone who's visited before, welcome back." Jonton smiled. "Please - take a bunk and join me. We don't have too many guests this morning so Gerselle and I won't need to keep you waiting long." Jonton gestured at the nearest bunk. "Each bunk has two pillows but if you need another one, do let me know. For now, just make yourselves comfortable so that the leaf clusters are just resting against your forehead. The leaves will tickle a bit to start with but that shouldn't last long."

Enely sat down on the nearest bunk and removed his shoes. Across the room he saw Cal doing the same. He flashed Enely a quick thumbs up before lying back and wedging a pillow under his head. Enely looked around the room as more kerbals took their places and the enormity of the situation finally struck home. *We're going to do this. All of us - Communing with one Kerm.* He flicked a glance at Jonton. *Or so Cal said but he's not a Keeper. And something about that Keeper doesn't look right to me.*

With a mental shrug, Enely lay back on his own mattress and propped his head lightly against the overhanging leaves. There was a brief pause followed by a familiar tickling against his scalp and then a soothing white light. He barely had time to wonder at the unfamiliar sensation before the expected rush of images, emotions and then, shockingly, mental voices, rolled over him.

Well that... explains... explains everything. Tears trickled down Enely's cheeks but whether they were from the emotional backwash from his brother and sister kerbals, the story he'd just witnessed or the raw-edged memories of Communing with his own Kerm slicing their way to the surface, he couldn't tell. Automatically, he ran his fingers gently through his hair, checking that the Kerm leaves had properly disengaged. *And Pillars preserve me, I can understand why Cal and Tivie came back to see that again.* He sat up and swung his feet off the bunk, relieved to see that his weren't the only moist eyes in the room.

Cal walked over to him, eyes red-rimmed, sniffing against the back of his hand. "That was even better second time around." he mumbled thickly. "Our story...sharing it with Jonton

and everyone else. Worth every step of the walk and everything we put aside to get here again." He cleared his throat. "Think me and Tivie'll get some fresh air - along with everyone else I'd expect. You still wanting to talk to Jonton?"

Enely nodded. "If he'll speak to me. I think I might be some time - shall I meet you back at the marquee."

"That would be lovely," said Tivie, draping her arm over Cal's shoulders. "Good luck, Enely - I hope Jonton can help you with whatever you were looking for."

"Me too," said Cal, "He'd better not go malka on you, Sage or no Sage." He clapped Enely on the back and joined the small queue of kerbals still filtering out of the sleep room.

Enely waited patiently on his bunk, eyes downcast. He fished Donman's token out of his pocket and sat quietly, rubbing his thumb over the gold embossed seal. He heard the faint click of the door closing behind the last pilgrim and then a soft, enquiring cough. He looked up to find Jonton staring at him curiously.

"Can I help you?"

"I'm not sure," said Enely, "but I was told you could." He stood up and proffered the token to Jonton. "And sent to find you."

Jonton's eyebrows rose and he looked at Enely more speculatively. "This looks official," he said. "Who sent you, if you don't mind me asking?"

"Chief Ambassador Donman," said Enely. "It is a long story I'm afraid."

"They always are somehow," remarked Jonton, half to himself. "but a strange kerbal sent on a mysterious errand from Donman is the longest one yet, I'm thinking." He peered at the square of embossed card. "Even if you weren't carrying this, I'd be curious. Did Donman give you any kind of message to bring?"

"I don't think so," said Enely slowly. "He just said that if there was one person on Kerbin who could understand what I'd been through, it would be you. Then he told me that he'd communed with you." He paused, eyes roaming over the top of Jonton's head. "At the time I thought he was just talking about communing with your Kerm - which was strange enough - but after this morning, I'm beginning to think that he meant exactly what he said."

Jonton nodded. "That's another long story," he said. "But yours first I think if Donman has sent you halfway around Kerbin to tell it." He smiled at Enely's surprised look. "You're not the only Wakiran visitor we've had since this began." He reached over to his pedestal and poured Enely a mug of water. "Something to wet your throat before we start."

Enely sipped his water for a moment, gathering his thoughts, before putting the mug to one side. "They were looking for volunteers," he began, "to help start new Groves. Hazachim especially - I suppose they thought that desert farmers could make a Grove work nearly anywhere. For my village, the timing couldn't have been better. Our Kerm had just seeded and we didn't know what to do; we're right on the edge of the Hazachi, we couldn't think of anywhere to plant a new Grove and our Keeper was at her wits end. So going with them was

an easy decision, although if I'd known there'd be quite as much sea travel involved I might not have been so keen."

Jonton listened politely to Enely's description of his voyage to Dazji island and the founding of his new village, only starting to pay attention when the tale moved onto details of Kerm cuttings and planting what would become its second year saplings, interjecting the occasional question of his own. His face darkened, branches rustling in anger at Enely's description of the Forseti invasion and by the time the uprooted Kerm saplings were being loaded onto their ship, the sleep chamber was thick with flying Kerm leaves and the cloying stench of cinnamon. Outrage gave way to a brief smile as Enely described his first Communion, which rapidly turned into horror and then deep mourning as he finished his story with his conversation with Donman at the sunset pyre.

Enely looked up at the muffled sob from the doorway and saw Gerselle drying her eyes on her poncho sleeve. Behind him, he heard Jonton blowing his nose vigorously. "I can see what Donman sent you here," he said at last. "Although I think he was being optimistic about the understanding part. But what about you, Enely?"

"He can stay with us," said Gerselle firmly. "And when the memories get too much, he can Commune with you. It'll be close enough to be good for him but not close enough to remind him." She and Jonton shared a look. "Whatever else Donman may say, you are definitely the only person on Kerbin that can do that for him, Jonton Kermol."

Enely looked at them both. "That would be extremely kind," he said softly. "Thank you. But 'not close enough to remind me?' Who are you, Jonton? And what happened to your Kerm? I didn't get much time as a Keeper but that Communion with you and the others...that wasn't anything like any Communion that I remember."

"No," agreed Jonton. "It wouldn't have been. And I think it's time you heard my long story if you'd like to join me again?"

"I would," said Enely, lying back on his bunk and adjusting the pillow under his head. "I would like that very much."

"Flight, Payload."

"Go ahead, Payload."

"Fairing jettison confirmed, Flight. Receiving telemetry from all four button sats."

"Copy that, Payload. Status please, Booster."

"Looking good, Flight. Second stage engine is Go. Passing through one-ten kilometres."

"Thanks, Booster." Geneney watched Lucan make a note in his logbook, headset plugged into the console alongside his, switching from one communication loop to the next, completely absorbed in the ebb and flow of conversation from the flight controllers. He clicked his own microphone over to their private channel. "What's your reading, Flight?"

Lucan started, eyes flicking rapidly over his console. "Uh, concur with Booster. Engine is Go. Guidance is... one moment." He toggled his headset. "Guidance sounds pretty relaxed, boss. Can't tell for sure without going on-loop, but I think we're Go."

Geneney glanced at the repeater displays on his own console. "Recommend you check your rate indicators, Flight." He saw Lucan frown for a second before his expression cleared.

"Copy that, boss. Attitude control stable - minimal vehicle excursion in roll and yaw. Pitch looking good."

"Chamber pressure?"

"High but stable, and under redline."

"Booster call?"

Silently, Geneney counted down the seconds, watching Lucan from the corner of his eye. He reached zero just as the other kerbal looked up. "Negative, boss. No change, no call."

Satisfied, Geneney nodded. "Always watch your own repeaters. The comm loops are good for situational awareness and gauging flight team mood but never get lost in them. You have the critical figures right in front of you so *use* them. Now - what's your recommendation on that overpressure?"

"Wait for controller report at SECO minus two minutes," said Lucan promptly. "Check pressure at SECO minus one, wait ten, call for throttle-back if required."

"Good. Why?"

"Midline pressure at SECO-1 to mitigate hard restart."

Geneney's headset crackled. "Flight, Booster."

"Go ahead, Booster."

"Chamber pressure high and holding at SECO minus two, Flight. Recommend throttleback shutdown."

"Noted and confirmed, Booster. Thank you."

For the rest of *Minmus 1*'s climb to orbit, Lucan flipped back and forth between the Booster and Guidance loops, eyes glued to his repeater displays. The second stage engine shut down on time at the correct pressure and he hastily stifled a sigh of relief. The checkout orbit flew past in a stream of status reports from the Payload and Comms teams, confirming vehicle startup, deployment of the PV arrays and the successful activation of a host of other critical systems. Then Geneney leaned forward in his chair and Lucan gripped the edge of his console.

"All stations report in for TMI."

One by one, the controllers gave their go-ahead. Lucan let go of his console with an effort. *Would you relax*, he told himself. *It's not like there's a crew up there.*

"Booster is Go. Starting re-press and ullage sequence."

Lucan's gaze flicked from his console to his Flight Director and back again. Geneney sat calmly in his chair.

"Tank pressures nominal. Igniters armed. Go at thirty."

"Ullage motors firing...and we have ignition. Thrust at ten percent... throttling up..."

Everyone in the control room turned to watch the main screen, currently showing *Minmus 1*'s orbital track around Kerbin. On a smaller screen to one side, velocity and projected apoapsis readouts both raced upwards and then suddenly stopped. A light on Geneney's console winked out.

"Flight, Booster."

"Go ahead, Booster."

"Injection burn complete, Flight. Payload deployment confirmed."

"Thanks, Booster." Geneney reached for his coffee cup and took a long drink. "Good work team. FD - let's get those trajectory numbers firmed up before we hand the vehicle over to Probodyne."

Twin spacecraft raced through the outer reaches of the Kerbol system. Far beyond the orbit of Duna they flew, their passage through the asteroid belt marked by a solitary speck on a pair of photographs, both long since transmitted home to Kerbin, itself reduced to a pale blue dot against the vast blackness. Sending that picture home would be a task for another spacecraft on another day and in time it would become an iconic image of the space age. For now, the need to conserve fuel overrode all other considerations; even the tiny quantities of propellant needed to spin the spacecraft around being saved for the rigours to come.

Onwards they travelled whilst other spacecraft made landfall on Duna, probing its soils and atmosphere and finding them suitable for life. Outward they soared whilst, far behind them, kerbals walked on the Mün, making light of the impossible and sparking the all-consuming efforts of Project Starseed. And now, at last, their long journey was finally drawing to a close.

A dot against the starscape gradually expanded into a luminous green disk attended by three darker dots, each long studied by kerbal astronomers who named them Laythe, Tylo and Vall. Now ragged bands of shadow and brightness could be seen across the face of the disk, lending perspective and revealing it as a colossal sphere streaked by complex patterns of cloud and lashed by titanic winds. The two spacecraft raced the emerald behemoth, leading it then swinging past; letting its immense gravity brake them onto a new trajectory. Now they spun, obeying long-ago programmed instructions, engines pointing forward at a carefully calculated angle. Streams of glowing gas erupted from one, slowing it still further

and closing it's path; a tiny Joolian mun on a collision course with it's bigger cousin Laythe. The other spacecraft flew on, its fate decided by a pair of wires.

Accidentally placed too close together, a pulse of electricity through one wire was enough to melt a bridge to the second. Onboard systems sensed the short circuit, shutting off the power and preventing a possible fire. But the damage had been done. A relay failed to close on command, starving a heater coil of power. A frozen fuel line remained frozen to the end, starving its rocket engine of vital propellant. Pressure sensors detected the lack of fuel, triggering backup programs within the probe core. Attitude control thrusters fired to compensate but the moment had passed. Too little, too late, the smaller rocket engines too weak to slow the spacecraft enough for even a gas giant to snare it. Eventually it would skim past a pollen grain shaped boulder, before breaking free of the Jool system and flying onwards into the outer reaches, trapped in a long lonely orbit about distant Kerbol.

The discovery of a hitherto unknown Joolian munlet provided scant compensation for *Hope 1*'s builders, now watching anxiously from many millions of kilometres as *Hope 2* sped towards its destination.

Thrusters fired, turning a collision course into a grazing pass through Laythe's atmosphere, or what the Laythe Observation and SpecTroscopy team hoped would be a grazing pass. With no time for a pathfinding flyby mission to supplement observations from Kerbin and allow more precise trajectory calculations, the best the LOST mission planners could do was to err on the side of caution, recommend an increased margin on the heat shield and hope for the best.

Hope 2 broke apart, aeroshell base gliding away from spindly upper body. Thrusters fired again, nudging the upper body onto a flyby trajectory, doomed to endlessly loop back and forth between Jool and Laythe, sporadically transmitting data back to Kerbin until its batteries could no longer hold the meagre charge gleaned from its photovoltaic cells. Meanwhile, the base shell plunged onwards towards its own fate.

Days passed, then hours, then mere minutes. Tiny rockets around the rim of the base shell fired again, making final attitude adjustments. The first faint wisps of gas ripped themselves apart against the onrushing spacecraft in a rapidly building, nacreous glow. The glow turned sullen red, swiftly ascending through orange and yellow, then flaring back to white.

The fire faded.

With a crack, the aeroshell split open. Drogue parachutes streamed out behind the plummeting spacecraft, jerking it away from the charred remains of the heat shield before fluttering free. Jointed metal legs unfolded, a second set of parachutes blossomed, held, and fell away. Then with a final burst of rocket fire, *Hope 2* came to a gentle stop on the surface of Laythe. Photovoltaic panels unfolded, trickle charging onboard batteries. The main antenna unfurled, swung round then tilted, aiming at a precise point in the sky above. *Hope 2* sent a single burst transmission back to Kerbin and then fell silent.

"Oh for a lump of plutonium and the fins to cool it."

"Will you stop moaning about that Kerm blighted radioisotope generator," snapped Jernie. "I know it was the sensible option - *everyone* knew it was the sensible option but we didn't get a choice. As you know very well so would you please, for the love of little kerblets, just shut up!" She jabbed a finger at Sidbo. "And before you say it, *yes* they knew we were trying to save the world and *yes* 'not scattering radioactive junk over our new home,' was a stupid excuse, but we just have to live with it." She snorted. "Although I'd love to know what they thought we were going to *do* with the plutonium. Plate it over the heat shield presumably."

Sidbo squirmed in his chair. "Sorry, Jernie. No more complaining - promise."

Jernie sighed. "It's not that I don't agree with you, Sid. RTGs on the orbiters shouldn't have been too much to ask for and might have given us enough juice for a proper telemetry feed from Hope 1. How are we supposed to fix things without data?"

"Speaking of data," Sidbo said cautiously, "the Jool spectroscopy was pretty spectacular. Looks like it's even managed to stump Dunney."

"Hah. He's not stumped, he's 'working through an interesting problem'. Or half-problem, given that he was predicting methane before we even launched."

"It has to be some kind of scattering effect," said Sidbo. "Methane wouldn't make it such an obvious green." He drummed his fingers on the edge of his console. "Wonder if we could grab some spare computer time - put together a model of particle size against composition, try and figure out what's in those clouds."

"In our spare time," said Jernie dryly. "It'd probably be quicker just to launch another probe and take a closer look. I'll let you figure out how to deal with the radiation though." Her console bleeped. "Ahh - finally!" She frowned. "Strange - looks like we've got an image file too. There shouldn't have been enough bandwidth for that and the atmospheric data."

"No, there shouldn't," said Sidbo. "Let's have a look."

A black circle appeared on the main screen, fringed with a bright white ring. Sidbo stared at it, scratching his head. "Well that would compress down to a nothing, but what on Kerbin... oh you *have* to be joking? Are you thinking what I'm thinking, Jern?"

Jernie banged her head gently on the edge of her console. "We send a probe Kerm knows how far for Kerm knows how long - and end up with a stuck lens cap."

"Maybe a couple of day-night cycles will shake it loose said Sidbo. "I don't think we're missing much though - this atmosphere is definitely no prize. Just look at that sulphur trace - and I'm pretty sure there's chlorine in there too."

Jernie looked over his shoulder. "I'll take your word for it," she said. "Another fun problem for Dunney I'd say."

"He'll have plenty of time," Sidbo noted. "If we hadn't already picked out Duna for Starseed, I'd be getting real depressed about now. I'll work through this mess properly with Dunney but at the moment I'm thinking we can just file this one under 'interesting puzzles' and be done with it."

Chapter 63

And Fears

The Minmus landing trainer squatted on the launch pad, four angular girders supporting a central jet engine. A cage of struts over and around the engine held an array of fuel tanks, reaction control thruster blocks, radar antennas and a pair of LV-9T throttled rocket engines. A symmetrical set of booms, jutting out from the cage, sported another set of thruster blocks and the pilot's ejection seat protruded from the front, surrounded on three sides by corrugated iron panels.

Standing at a safe distance, behind a prominent yellow line on the ground, Jeb watched the preparations for Ornie's next test flight. Barely new enough for its concrete to be certified for flight operations, too new for the launch tower sections and other supporting infrastructure to have arrived, Pad 3 marked the far edge of the rapidly expanding Barkton Space Centre facilities. The ground crew climbed aboard their truck and Jeb hastily clamped a pair of heavy ear-defenders over his head.

The start-cart's high pitched scream broke the quiet, startling a flock of birds into flight. As they scattered, squawking silently over the mechanical din, the ascending howl of a jet engine spooling up added to the noise levels. Ornie raised his arm, a pneumatic hose fell away from the underside of his ungainly aircraft and the ground support truck peeled away. Ornie watched it cross the yellow line, waited another minute for safety, then fed power to the LV-9Ts and floated into the air.

Jeb watched the MLT accelerate into a zig-zag ascent, canting sharply left then right at impossible angles, only kept airborne by its gimballed jet engine and constant thruster inputs from the autopilot and fly-by-wire system. Ornie climbed higher, side-slipping far away from the launchpad, before bringing his vehicle to a hover. Eyes intent on his instruments, he tipped the trainer back into pitch-over attitude then began a simulated powered descent.

Curving low over the scrub grass and weeds around the launchpad, the noise from the training vehicle scared another pair of birds out of the undergrowth. To Jeb's sudden horror, they flapped past the intruder, screeching indignantly and missing the pilot enclosure by metres. Startled, Ornie reflexively jammed his throttle wide open and hauled back on his attitude controller. The MLT lurched skywards, nose pointing vertically up then tipping over backwards. Instantly, Ornie cut the power to his engines and slammed the attitude controller hard forward, but instead of obediently pushing nose-downward, the MLT continued its backward roll. Without pausing to think, he wrenched the joystick sideways, rolling his aircraft upright, other hand pulling back on the throttle lever...

One of the protruding thruster booms dug into the ground, shearing straight off and sending the MLT cartwheeling into the air, before flipping over and slamming back to earth. The superstructure crumpled under the impact, driving twisted steel spears through the jet engine housing. Pressurised fuel tanks ruptured in a concussive blast, spraying out a blazing mixture of jet fuel and high test peroxide. The ejector seat shot free, trailing flaming debris behind it before smashing into the ground, tumbling over and over and finally coming to a stop.

Jeb was already racing for the ground support truck. Grabbing an extinguisher from the back, he thumped on the cab window, jabbing his finger at the distant Space Centre buildings, then miming a telephone call. The white-faced driver nodded and, no sooner had Jeb sprinted clear, than the truck screeched away, laying down thick streaks of rubber against the concrete. Pausing only to douse a handful of grass fires with his extinguisher, Jeb dashed along the trail of metal fragments and churned up earth until at last, he came to the wrecked ejector seat on its side with Ornie still strapped in. Mercifully his eyes were closed and miraculously he seemed to be intact, although large areas of his flight suit were soaked with blood. Jeb approached on suddenly watery legs, set his jaw and reached out to touch his friend's throat.

His legs gave way at the faint, fluttering beat under his fingers and he sank to the ground, turning his head away from Ornie's battered face.

The airborne rescue team found him sitting by the ejector seat, arms wrapped around his knees, watching the still-burning MLT through tear-blurred eyes. One medic wrapped a blanket around the shivering kerbonaut, pressing a flask of hot djeng into his hands and talking to him in low, soothing tones. Behind them, his grim-faced colleagues began cutting Ornie free of the wreckage.

Hesitantly, Wernher stepped through the side door of VAB Two, taking in the organised chaos within. The spare Minmus landing trainer stood in one corner of the room surrounded by blueprints and engineering drawings pinned to the wall. Bill, Lucan and other members of the electronics team sat hunched over a table, studying a set of heavily annotated flowcharts. Much of the remaining floor space was taken up with the painstakingly recovered remains of Ornie's MLT. So far as Wernher could see, every last kerbal in the Propulsion and Structural Engineering teams, overseen by blue-uniformed investigators

from the Kerbin Air Accident Board, were sifting through them, labelling even the smallest fragments of metal and piecing them together. A few of the pieced together parts resembled components of an MLT.

Most of them didn't.

Wernher walked over and tapped Jeb on the shoulder. "The medical centre just called," he murmured. "We should go."

Jeb nodded heavily. "I'll round up Bob and Gene. You get Bill and Lucan."

Geneney shoved the stack of folders into his safe, locked it and then hurried out of his office to find Bill, Bob, Lucan and Wernher waiting outside. "Richlin?" he asked.

"Can't find him anywhere," said Bob. "Jeb's had him on make-work all day to keep him out of the VAB, but there's no sign of him."

"That might be for the best," said Geneney reluctantly. "We should get moving - I'll send Jeb back to find him once he's dropped us off at the medical centre." He opened the warehouse door, only to be greeted by a flushed and breathless Richlin clutching a large paper bag.

"Sorry, Gene. I finished pulling out all the Eve capsule schematics to send over to Rockomax like Jeb asked, so I thought I'd take a break." He gave Geneney an embarrassed smile. "I stopped off on the way back to get some fruit for Ornie." Richlin shook the bag. "I got him some of his favourite blueberries - he likes the Doreni ones best you know."

"I didn't know that," said Geneney gently "We were just about to go visit him, Richlin. Would you like to come too?"

Richlin's face lit up. "That would be great - thanks, Gene! He'll be so pleased to see everyone." He looked around. "Hey - what about Jeb? Isn't Jeb coming too?"

"Jeb's just fetching his car, Richlin. Look here he comes now."

Jeb wound down his car window. "Hi Richlin - they found you then?"

"My fault," Richlin replied cheerfully. "I was out getting blueberries for Ornie!"

The corner of Jeb's eye twitched. "That's great, Richlin," he said carefully. "He'll like those. Squeeze in people - we'd better be going."

The journey to the medical centre passed in awkward half conversation, nobody having the heart to ignore Richlin's chatter entirely. Jeb cast around desperately for something to say. "So - how did the KDS Stretch test flight go?" he asked at last. "That was supposed to be today wasn't it?"

"It didn't," said Bob briefly. "They got bad pogo on the lateral boosters although everything held together until staging. Core stage dropped on schedule but something must have shaken loose somewhere because the upper stage blew itself to pieces just after start-up."

Jeb's knuckles turned white on the steering wheel. "Oh," he said. "Un-crewed test, wasn't it?"

Bob nodded. "It was. Fortunately."

"No harm then," said Richlin, "Wernher can work some redesign magic and Ornie can lend a hand too, as soon as he gets out of hospital!"

There was an uncomfortable silence.

"I don't know, Richlin," said Wernher at last, "It was a bad crash - it might be a long time before they let Ornie out."

"Oh, it'll take more than that to stop Ornie," said Richlin confidently. "You haven't known him as long as I have - he's one tough kerb you know. Besides, he'll have the Kerm to fix him up - he'll be good as new!"

Bob stared out of the window to hide the tears at the corner of his eyes. Wernher just nodded. "I'm sure they'll do their best, Richlin. And you're right - he'll have the Kerm to look after him too."

Jeb pulled up outside the Barkton medical centre. Silently, everyone climbed out of his car and made their way over to Reception, Richlin carrying his bag of fruit and humming softly as he walked. The receptionist looked up as Jeb approached the desk, a flicker of recognition and sympathy crossing her face; quickly replaced by a professional smile.

"Visitors for Ornie Kerman?"

Jeb nodded. *Wait till you see him, Jeb. No sense getting your hopes up yet.* "We are, yes. Could you tell us where his ward is please?"

The receptionist's smile slipped a notch. "He's still in the moss room I'm afraid. You can find it down the corridor to the left there, through the doors, then second on the right. Room number three."

Jeb summoned up a small smile of his own. "Thank you."

Moss room number three turned out to be an airy, pleasantly air-conditioned chamber dominated by the Kerm trunk growing through the centre of the domed ceiling and the circular pool in front of it. A figure floated in the middle of the pool, body obscured by a blanket of sweetmoss, a thicket of tendrils emerging from the water around him and burrowing into the soil around the base of the Kerm trunk. Richlin darted forward with a happy cry, waving his bag. "Ornie! How they treating you? Bet they won't have brought you any blueberries!" Two medics hurried towards him, a third, dressed in a wrinkled grey robe walked over to the others. One look at the Keeper's bloodshot eyes told Jeb everything he needed to know.

"I'm so sorry. Believe me, we tried everything we could but the damage was simply too great to repair."

Jeb nodded blankly. He heard Richlin's puzzled question from across the room.

“What? No, no - that can’t be right. Ornie’s tough you know. He’ll just need to rest a bit longer but he’ll be fine - you wait and see.” The medic knelt down beside Richlin, murmuring something too faint to hear. The sudden bewildered plea in his voice tore at Jeb’s heart.

“Tell them they’re just being silly, Ornie. Tell them you’re going to be alright!”

“Ornie? Please wake up, Ornie.”

“Ornie?”

Chapter 64

Black Stripes

"It *would* be fitting but have we got time?"

"I think so. Jeb had a couple of quiet words with people at the medical centre and they've agreed to keep him in a cold room for as long as we need. He'll be embalmed too, just like...just like anyone else going home to their Grove."

"I thought the embalming was only temporary?"

"It is. But in a cold, mostly sterile capsule? It could keep him preserved almost forever."

"What about the hardware?"

"That's the easiest part. We've still got a spare Moho booster in storage back from the beginning of Pioneer, when we were launching docking targets for Rockomax. We've certainly got no shortage of recovered Moho capsules that we can refit. Shroud the windows, extra insulation in the crew compartment - it should work."

"No sponsors obviously - that goes without saying - but did Jeb have any other ideas about paint jobs?"

"I have his sketches right here. I think everyone's going to find them very fitting too."

"Thank you, Tomass." Lodan took the tray, waited until his aide had left, then set it down on the table. He poured water for everyone, before locking the conference room door and returning to his place. Across the table, the Chief Investigator took a quiet sip and glanced down at his papers. Jeb, Geneney, Ademone and Nelton stared at the thick, spiral-bound reports before them, the front page of each discreetly stamped with the Seal of Twelve Pillars and the wings and crossed feathers of the Kerbin Air Accident Board.

Lodan nodded at the Chief Investigator, who knocked on the table for attention, opened his own copy of the report and pressed a button on the small tape recorder set in front of him.

“By order of the Kerbin Air Accident Board, as authorised and instructed by the Council of Twelve Pillars, I hereby open this review and recommendation session of accident investigation nine two zero two. Here today are: Ademone Kerman, company manager, Rockomax Corporation; Geneney Kerman, Flight Director, Kerbin Space Agency; Jebediah Kerman, pilot, Kerbin Space Agency; Lodan Kerman, Director, Kerbin Space Agency; Nelton Kerman, Flight Director, Rockomax Corporation.” The Chief Investigator’s gaze rested briefly on each of them as he spoke. “All present are reminded that by Council order, this record shall be deemed accurate and inviolable with any false statement made today constituting a betrayal of that Council and punishable consecutively, to the fullest extent possible by law, in each of the Six Regionalities of Kerbin.”

“The Kerbin Air Accident Board notes, with appreciation, the full and open assistance rendered to this investigation by those present, the Kerbin Space Agency and the Rockomax Corporation. That investigation is now complete and the Board wishes to place its conclusions on the public record, to make diverse recommendations therefrom and to place those recommendations also on the public record.”

The Chief Investigator’s shoulders relaxed slightly as he took another sip of water. “Good kerbals, I suggest we begin with a summary of the events underlying accident nine two zero two before reviewing my recommendations for mitigating the risk of each on future flights. Copies of them can be found in the reports in front of you. We can then take a short break before reconvening to discuss a timeline and action plan for each recommendation. Does anyone have any questions?”

He glanced around the table but nobody spoke up. “Very well. From the facts before me, I find that the accident was due to poor wildlife management and risk assessment, pilot error, and faulty or inappropriate hardware design compounded by insufficient design and flight qualification for test vehicle MLT-01.”

He looked up at a circle of carefully neutral expressions. “Witness reports are unanimous that the primary event leading to the crash was a near bird-strike event on MLT-01 on approach to landing. In response, the pilot initiated a routine go-around manoeuvre intended to increase both altitude and speed of his vehicle. In a conventional fixed-wing aircraft this would have been the proper course of action. Regrettably, it was not the correct choice of manoeuvre for a vertical take off or landing aircraft.”

The Chief Investigator bowed his head for a moment then continued. “The pilot then attempted to regain control of his aircraft but was unable to do so. Data from the telemetry recordings and recovered flight recorder indicates that the vehicle attitude and commanded pitch angle was sufficient to bring the onboard inertial measurement unit near to gimbal lock. The IMU went into recovery mode in which the locking gimbal is driven to a safing angle and the unit is restarted. By design, pitch authority was transiently halted during reset to avoid generating spurious control signals and unfortunately this loss of authority coincided with the pilot-commanded nose down manoeuvre. The vehicle therefore

continued to pitch over, reaching an attitude where safe ejection was no longer possible. From here, the pilot responded correctly, cutting power to the primary jet engine and initiating an emergency roll. Regrettably there was insufficient altitude remaining to complete the roll, resulting in the loss of pilot and vehicle.

The Chief Investigator took another sip of water. "Control logic analysis using test vehicle MLT-02 indicates that the MLT-01 fly-by-wire system was operating near the edge of its safety envelope due to the increased gravity compensation required to simulate a Minmus landing. Additional wind tunnel studies found a number of dynamic instabilities at high pitch angles which tend to magnify the effect of sudden rapid pilot inputs. In short, a vehicle designed for simulating VTOL flight in a Munar gravity field, did not have the required safety margins for equivalent simulated flight in a Minmus gravity field and vehicle qualification procedures were insufficient to correctly determine those margins before starting simulated landing operations."

Jeb and Geneney exchanged grim looks with Nelton whilst everyone else around the table flipped over the next page of their reports.

"We will now take each contributing factor in turn. Section one begins with recommendations for KSA test flight facilities and airspace management..."

The conference room door closed behind Lodan with an audible click. Ademone finished scribbling a note in the margin of her report and looked up at him. "This will need to be a joint effort," she said bluntly.

Geneney nodded. "I agree," he said reluctantly. "Led by the KSA's Kerballed Spaceflight Division." He gave Jeb an apologetic look. "I'm truly sorry old friend - this is *not* the way I'd hoped to discuss this." Everyone braced themselves for an explosion but Jeb just stared down at the table. When he looked up again, Geneney bit his lip. For once in his life, his friend had no reply. The veteran kerbonaut and irrepressible founder of the Kerbin Interplanetary Society just looked old, tired and defeated.

"I think so too," Jeb said at last. He glanced at Lodan and for a second, ingrained defiance sparked in his eyes, only to be quickly stifled. "So what did you have in mind?"

"A merger," Lodan said quietly. "Between the KIS and Rockomax's Crewed Spaceflight Division. To be charged, amongst other things, with all aspects of crew selection and training. I know this isn't how you run things, Jeb." He tapped his own copy of the air accident report, "but apart from anything else, I think it's the only way to address the Board's recommendations."

"A Kerballed Spaceflight Division will need a leader," said Geneney softly. "And with respect to all the other kerbonauts, I can't think of a better one than the first kerbal in space - and the first to walk on the Mün." To his surprise, Jeb shook his head.

"I appreciate the gesture, Gene but I don't think I'm suited." He managed a faint grin at Lodan. "Politics never was my strongest point. If you're asking, then Sherfel would be my

choice. Nobody's going to argue with her flight record, she's a natural diplomat and she knows both us and Rockomax inside-out. Ribory would be good option too, I'd say Bob, but he doesn't have the flight experience yet."

Lodan looked at him. *Well there's something I never expected to see. Although Geneney makes a valid point too. You're no politician, Jebediah Kerman but you are a powerful figurehead - and we're going to need that too.* "You might be right," he said. "and your recommendation is noted. For now though, I think our first task is to persuade everyone that a merger is necessary at all. In the meantime, I think we can move ahead with the Board's airspace management and test facilities recommendations."

The final, melancholy, strains of the Lament for the Lost Explorer faded into silence. Corvan shouldered his instrument and led the rest of his pipers, all of them bedecked in formal Spierkan funeral garb, in a stiff-legged march to the sweetblossom pole. Row upon row of mourners faced them, almost every last member of the Kerbin Interplanetary Society, and dozens more from the Rockomax Corporation, from Barkton and Foxham, and their surrounding Groves.

Wernher and Jeb walked slowly down a gap in the rows, carrying a small casket between them. Richlin followed them, dressed in a black poncho and carrying a pair of small spades crossed over his chest. At the front of the crowds, the officiant waited by a stele of dark grey stone. Two small kerm wood plaques were affixed to one corner with brass screws, each bearing a name written in finely inlaid gold script. For a moment, the officiant wondered who Enley Kerman was but then the casket bearers came to a halt in front of her. She cleared her throat.

"Good kerbals. We are gathered here today to celebrate the life and mourn the passing of Ornie Kerman. He was kerbal, and as he came forth from his Grove, so in the presence of us all, shall he return to his Grove."

Solemnly, she took the two spades from Richlin, knelt and presented them to Wernher and Jeb, who began to dig a small trench at the foot of the trellised pole. Slowly, she stood up, withdrew a carved wooden figurine from inside her robes and held it up to the crowd. "Like us all, Ornie was a child of the Kerm. And though his body is not with us today, this poor marker shall stand in its stead. For it too is of the Kerm, and also of Ornie's Grove."

Jeb and Wernher put down their tools. The officiant stepped forward, knelt, and gently placed the figurine into the trench. The casket lid tipped open and a cascade of soil tumbled out over the grave marker. All three casket bearers stepped back and bowed. The rhythmic thudding of spade against earth punctuated the silence.

"Thank you."

"Ornie meant many things to each of us. If anyone here today wishes to speak, to share their memories of him, we would be honoured to hear your words."

Richlin stepped forward, took the radio microphone from the officiant and clipped it to his collar. Blinking hard, he turned towards the sea of faces. "Good afternoon," he said haltingly, "My name is Richlin Kerman and Ornie was my best friend."

Unconsciously, Richlin straightened his poncho. "Before I met Ornie, I was just a greasebucket on the circuit; fixing up planes at the local aerodrome. I met him on the day before our airshow - he asked if I could help take a look at his plane engine which was making 'a mighty lot of noise but not goin' nowhere fast.' We managed to get it working in the end, in time for Ornie to compete the next day. The afternoon after the show, he offered to take me up myself, by way of a thank you."

"We went out for a drink that evening. We got to talking and by the end of the night I was going with him to the next show on the circuit. Ornie showed me the world, taught me to fly, became the best friend I ever had. When I got to fly in space before him it just didn't seem *right*. Not that he ever seemed to mind. He helped me with all the training, drove me out to the launch pad that day, helped Bob strap me into the capsule. Gene told me afterwards that he was watching over me for the whole flight - didn't leave his console until I was safely home. I just wish I... wish I could have done the same for him."

Richlin hid his face in his hands, small, choked noises coming from the microphone. Blindly, he unclipped it from his collar and thrust it towards the officiant. Jeb hurried over and put his arm round his shoulders, murmuring something too faint for the watching crowd to hear. As Jeb led Richlin away, Wernher stepped forward and solemnly accepted the microphone.

"Good afternoon. My name is Wernher Kerman and Ornie was one of my dearest colleagues." Wernher took a deep breath. "One of my lasting memories of Ornie was his calm good humour under pressure. He'd always laugh with you - but never, ever at you. I remember once losing a prototype engine on the test stand. This was back in the early days you understand, we didn't have many spare engines left to use and I was not in a good mood. Ornie came out to see what was wrong, let me blow off some steam - and then took me out for lunch. 'I'll tell you what we'll do, Wernher,' he said, 'We're going to take a walk, we're going to grab a bite to eat and then we're going to come back, check the data and figure out what went wrong.' "

"And we did. But it was something else that Ornie said that day has stayed with me ever since. 'Better that they blow up now,' he told me, 'than on the launch pad.' He lived by that philosophy and, to our deep and lasting sorrow, he died for it."

"So this is what we're going to do. Learn. Move on. Never give up. Find out what went wrong and make sure it never happens again. Ornie would expect nothing less. And to do anything less would dishonour the memory of a brave kerbonaut and one of the finest kerbals that I ever knew."

Wernher bowed and passed the microphone to the waiting and shiny-eyed Jeb before walking over to stand by Richlin. The crowd silently watched Kerbin's first Munwalker fumble nervously with his collar before beginning to speak.

"Good afternoon. My name is Jebediah Kerman and Ornie was my mentor."

Richlin looked up in surprise as Jeb continued. "The very first time I met Ornie, I was trying to sell him some old engine parts. Bill, Bob and I were only just back on dry land after Kerbal 1. Ornie was one of the first to see Bill's photos once they were done and we literally wouldn't be where we are today without him and Richlin. And as the KIS bloomed beyond our wildest dreams, Ornie was always there for *everyone*, with a kind word or sound advice. Smoothing the way, getting the very best out of people - and teaching me everything I needed to know about that."

"He was the beating heart of the space program. He built the LVT-20 that put the first kerbals into space. He played a vital role in building the LVT-30 and LV909 engines that took us to the Mün and helped to test them both as the copilot and flight engineer for Eve 2. And that's how I'd like everyone here today to remember him. Ornie Kerman: mentor, engineer, explorer, and above all else, a beloved and irreplaceable friend."

One person after another came forward to share their memories and stories. As the last of them returned to their places, the officiant coughed discreetly. "Good kerbals, I thank you all for sharing your Ornie Kerman with us. Today we have honoured him in the traditional way, with music, stories, seeds and pole. Now, I beg you to join me in observing a new tradition for a new age of explorers." She clicked a switch on her microphone and a familiar, but restrained, litany washed over the crowd.

"Guidance?"

"Go, Flight."

"Booster?"

"Go, Flight."

"Spacecraft?"

There was a sudden choked sob. "Spacecraft...spacecraft is Go."

"T-minus two minutes. G-Go for engine start."

As one, the funeral crowd turned towards the distant rocket on its launchpad. Unadorned by logos or sponsored slogan, the only marks on the gleaming white booster were a set of thick black stripes painted down its flanks.

"...six...five...four...three...ignition...and lift-off."

Smoke and fire erupted over the launchpad. From their midst the Moho booster rose majestically into the sky, carrying Ornie Kerman on his final journey to the stars.

Chapter 65

Prospecting

"Good afternoon and welcome to this month's Starseed Special. With me in the studio today are three distinguished guests who have all kindly made time in their busy schedules to bring us the latest Space Program updates and, if we have time, to answer some of the many questions from our audience and from our viewers at home. My guest on the left will be a familiar figure to Engines and Engineers regulars but, as always, it's a privilege to welcome him back to the studio. As chief propulsion engineer for the Rockomax Corporation, he's been instrumental in all their many spaceflight successes including the Muna probes, the Endurance space station and of course, the joint Pioneer Program with the Kerbin Interplanetary Society. Good kerbals, please welcome Hanbal Kerman!"

Hanbal smiled at the camera before turning back to the presenter. "It's good to be back, Tom. And as always, thank you for your kind introduction."

"My pleasure, Hanbal. Now on my right is a kerbal who will need no introduction. Astronomer, founder of the field of planetary geology, and leader of the Probodyne deep space operations team, please welcome Dunney Kerman to the studio." Tom waited for the applause to die away. "And sitting next to him is Probodyne's Head of cis-Munar operations. She's an accomplished astrophysicist, now turned flight director at the Probodyne Deep Space Operations Centre, and most recently responsible for the highly successful Unity 1 Mün landing and joint mission with Pioneer 5. Good kerbals, I give you Germore Kerman!"

Germore looked surprised at the enthusiastic round of applause. Dunney just smiled and leaned back in his chair. Tom looked at his three guests solemnly. "After the tragic events befalling the crewed space program and the unfortunate end to the KDS Stretch test flight, a lot of us here today would be glad for some good news. Dunney - is there anything you can tell us?"

"Nothing that will make up for our loss," replied Dunney soberly. "Incidentally, I think I can speak for the whole Kerbin Space Agency when I say that I was particularly moved by the

eulogy from Capital News. 'Going on leave amongst the stars' was a beautiful way to describe Ornie's final flight." He blinked, one hand unconsciously reaching for the folded handkerchief in his top pocket. "But to answer your question, yes, we *do* have some good news, or rather Germore does."

Germore glanced at Tom, who nodded back. "Thank you, Dunney," she said quietly, adjusting the microphone at her collar. "On behalf of the Probodyne cis-Munar team, I can confirm that Minmus 1 has arrived at its destination and successfully completed its mission objectives. All four button probes have successfully reached the surface and, as of last night, the instrument packages on all four probes have started up on schedule and are transmitting data."

"Well that is good news," said Tom. "But for everyone listening at home, perhaps you could tell us a little more about those uh... button probes?"

"Certainly," said Germore. "They're simple, very lightweight probes, really not much more than a radio transmitter and a seismometer on the smallest lander we could build. We're going to need a lot of them for a complete Minmus network so we wanted to be able to send multiple buttons there on a single booster."

"Seismometers? Are you looking for earthquakes - or I suppose that should be munquakes - on Minmus, Germore?"

Germore smiled. "It does sound a little farfetched when you put it like that, Tom but yes we are. One of the first things we discovered with our original Minmus Explorer probe was that Minmus is actually a captured comet. How it got to Kerbin is a long story - and we're still not quite sure of all the details - but the important thing is that it's still active. It hasn't been in orbit around Kerbin for long enough to lose all its ices and other volatiles and, as we discovered, they're all boiling away still, giving Minmus a very thin atmosphere. Which is why it looks blue from a distance, just like Kerbin's atmosphere." Germore sipped at her water. "Now the problem is that the boiling isn't uniform. Quite the opposite in fact - we've spotted some quite spectacular eruptions from Minmus Explorer."

Tom nodded. "So you need an early warning system to spot them before they go off under a crewed lander. Which I suppose brings me on to my next question. Why is the KSA going to Minmus, or even the Mün for that matter? Shouldn't we be spending all our time on Duna?"

"Fear not, Tom," said Dunney, "If all goes well, we'll be launching a veritable flotilla of spacecraft to Duna when the next launch window opens. Hope 5 and Hope 6 from Barkton, Hope 7 and 8 from Foxham and we're hoping to launch a pair of communication satellites from the new Doreni launch site too. Launched on Doreni boosters no less - they're not as powerful as an Eve or a Rockomax Type Six - but they'll get a small satellite to Duna and getting the Doreni into the space launch business is going to be vital for Starseed."

"That sounds more like it," said Tom, "but why all the probes?"

"If you'll excuse this old astronomer ducking a technical question, Tom, I think Hanbal is better placed to answer this one."

"Propellant," said Hanbal succinctly. He leaned forward in his chair. "The biggest question we need to nail down before we can choose a colony ship design is; what *engines* are we using? Lots of options Tom, some of them better than others and none of them perfect. One thing's for sure though, if we could live off the land, in other words find a way of making propellant out at Duna, it could make everything a lot easier. We'd still have to work out how to make it of course, not to mention figuring out a way of refuelling our colony ships, and neither of those are going to be trivial problems to solve. But not having to lift each and every drop of fuel into orbit from Kerbin is such a huge advantage that we can't afford not to explore that option."

Dunney nodded. "And to do that, we need to know what's out there to work with. Minmus Explorer already found water and ammonia, which are both good starting materials for making rocket fuels and, at a pinch, we could use them directly. We know there's a lot of hydrogen on Duna from the Hope 3 and 4 data and our best guess is that it's water ice, although we can't rule out sub-surface ammonia ice either. Hope 5 will be targeting a Duna polar orbit and tasked with extending and updating our current survey data."

Dunney took a sip of water. "Now Ike, on the other hand, we know almost *nothing* about bar some very tentative observational data from Kerbin. So Hopes 6 through 8 will be carrying out a detailed survey, dropping landers if necessary for a close up look at any interesting sites that we spot from orbit. All the probes will be carrying updated versions of the gamma and x-ray mapping instruments used on the Muna flights.

"A real prospectin' mission then," said Tom, putting on an exaggerated Spierkan accent, "Och, you'll be hopin' for rocket fuel in them old plains." He cocked his head, "But how did you plan to use *water* as a rocket fuel?"

Hanbal looked at him. *Here goes nothing*. "By using a nuclear rocket, Tom." He lifted his hands hastily. "And before we start, you should know that the LV-N programme is being run under strict oversight from the Kerbin Nuclear Standards Agency. I think everyone here can agree that the KNSA is not known for cutting corners with nuclear materials or for having any sense of humour whatsoever when it comes to health and safety. For one, it has already flatly forbidden us from flying nuclear rockets in Kerbin's atmosphere."

Tom blinked. "LV-N is the wrong name then," he said weakly. "It can't be a launch vehicle engine if you can't use it till you get to space."

Hanbal laughed. "Only on Engines and Engineers, Tom. Only on Engines and Engineers." His face turned serious. "Think of this as another option we can't afford not to explore. Water is a bad example actually - an LV-N running on water wouldn't be much more efficient than an ordinary rocket engine burning hydrogen and oxygen. Not that building one of those would be easy either but at least it wouldn't be radioactive. For a lot of other propellants though, a nuclear engine should be a lot more efficient and the more efficient our engine, the less reaction mass we need to get to Duna and the more actual cargo we can take with us."

Hanbal rolled a gulp of water around his suddenly dry mouth. "Like I said, Tom, we're under strict oversight from the KNSA and the colony ships will only be using nuclear propulsion if

there's a rock solid case for it and if the risks to crew safety can be made acceptably low." He looked the presenter in the eye. "I'm not going to lie to anyone here - there *will* be risks. We'll be using a high powered nuclear reactor with as little shielding as possible in order to minimise launch mass. But there are plenty of other risks to consider in a flight to Duna. If nuclear propulsion can offset some of those, then it might even make the overall flight slightly safer. That's a *big* If, Tom and at the moment I'm not about to promise anything either way. All I can say is that we're looking at all the options for our colony ship designs. Now, I'm happy to answer any questions as best I can but please bear in mind that I'm not a nuclear engineer."

For the fourth time in as many minutes, the pilot checked her heading, altitude and transponder settings. Then, glancing at her copilot, she keyed her microphone. "Wakira ATC, KSA zero-six-zero requesting permission to enter Wakiran airspace."

"KSA zero-six-zero, Wakira ATC. Please confirm flight plan and manifest."

"KSA zero-six-zero is a Skyway inbound from Barkton at five, bearing two-nine-eight for KSA Site D. Manifest is VIP transport."

"KSA zero-six-zero, standby. Please maintain current heading and altitude for visual inspection."

"KSA zero-six-zero copies." The pilot toggled her microphone. "For Kerm's sake. Do they *really* think we're stupid enough to paint the wrong number on the tail. And they'd better be coming in low and slow - the last thing I want is some Wakiran wannabe shaking up my passenger!"

Her copilot shrugged. "Reckon it'll take more than a fighter to rattle this passenger. Soon find out anyway - that'll be them on their way now."

A glinting arrowhead arced up through the sky towards them, contrail suddenly bursting out behind it. The Wakiran plane swept past them at a discreet distance, before banking sharply onto their heading and taking up a position off their left wing. The copilot craned his neck, trying to catch a glimpse of it out of the cockpit window. "Looks like a Skysprite - they're obviously not *too* worried about us. Nothing under the wings that I can see, can't spot anything under the nose either from this angle but I'm betting they're rigged with some kind of cannon."

"Probably," she grunted, resetting her microphone and scanning her instruments; resisting the instinctive urge to pull away to a safer distance from the unnaturally close aircraft.

"KSA zero-six-zero, Wakira ATC. You are cleared for Wakiran airspace, confirm you inbound for KSA Site D. Thank you for your cooperation."

"Wakira ATC, KSA zero-six-zero copies. Thank you."

The Skysprite peeled away from them, diving out of sight. The little Skyway passenger jet flew on towards the desert, its pilot wiping the sweat from her forehead.

Wernher stacked his notes together and tucked them neatly back into his briefcase on the seat next to him. Seeing the movement, the steward padded quietly over and refilled his coffee cup. He smiled a quick thanks, rubbed the bridge of his nose thoughtfully and checked his watch. Outside his window the gently scalloped cliffs of the Kolan Western Peninsula were just giving way to turquoise coastal waters. To the northwest, hidden by haze and distance, the narrow Jhazi Straits marked the closest point between Kolan and Wakiran territorial waters.

Myriad wakes criss-crossed the sea, as the Skyway flew out over deeper waters. Squadrons of smaller boats trailed white v-shaped threads behind them, contrasting with the ropy, forked comet tails of froth churned up by the bigger container ships. Wernher watched a larger formation of vessels steam past underneath him, parallel wakes precisely scored across the azure waves. He sighed. *So much for a Wakiran spaceport. They'd never be able to clear a launch corridor through all of that. And given the payloads we'd be launching...* He shuddered. *Which means we'll need to transport the LV-N cores overland to Barkton which'll just be a different headache.* Wernher rubbed his eyes. *Fortunately not one that I'll need to deal with directly.* He swallowed a mouthful of coffee and pulled the next stack of notes out of his briefcase.

Buried in his work, Wernher failed to notice the light go on above his head or the soft chime that accompanied it. The steward cleared his throat more loudly, eyes deliberately fixed on the opposite cabin wall. "I'm sorry sir but we're starting our descent. Please could you refasten your seatbelt and return your table to its stowed position."

Wernher gathered up his papers, flipping them face down as he slid them into a buff folder, prominently marked with the Seal of Twelve Pillars and the letters KNSA arranged in a square. "Of course," he answered. "and thank you for letting me know."

The steward smiled and went back to his seat. Wernher stared around the little twelve-seater cabin, working the cricks out of his neck before turning to the window again. The Wakiran east coast was just coming into view, a meagre strip of dusty green that rapidly petered out into duns and ochres. From the opposite window, the distant Diamondback mountains stretched across the horizon. The plane banked, revealing a glimpse of habitation strung out along the banks of a convoluted river delta. A labyrinth of jetties and pontoon bridges, decked out in gaudy fabric awnings added to the confusion. Away from the banks, the settlement became a recognisably kerman town, although rather more haphazardly organised than most and with a noticeable lack of greenery.

The Skyway rolled wings level and lowered its undercarriage with a rumbling thump. It flew over a main road, dipped over a chain link fence and then, with a dainty flare, touched down neatly on the smaller runway of Balcabar International Airport. Wernher waited patiently until the plane had come to a standstill before gathering his luggage and making his way to the exit. The cabin door opened and the heat hit him like a wall.

A prickle of sweat broke out on Wernher's forehead and, just as quickly, was sucked away by the thirsty sun. The parched air smelled of aviation fuel, flint dust and over-baked stone. Bracing himself, he thanked the steward, hurried down the aircraft steps and made his way to the terminal building. A lone kerbal, dressed in a loose but heavy hooded poncho, waited for him just outside the door.

"Wernher? Good to meet you - glad you made it on time. I'm Hading." Hading pushed back his hood and thrust a bottle of water at Wernher. "Here, let me take the bags - you'd better get some of this into you." He whisked Wernher through the airport, past a pair of security stations and into a small but thoroughly air-conditioned off-roader parked in a private car park. "It's a couple of hours to Site D I'm afraid. Feel free to nap on the way - I won't be offended by the lack of conversation and Kerm knows the scenery isn't worth staying up for."

Wernher placed his briefcase carefully on the floor between his feet. "I'm fine thank you," he said. "Besides, the flight steward was very...attentive with the coffee - I'm not sure I could sleep yet if I tried."

"Fair enough," said Hading, starting the car, "In that case, hail and farewell to Balcabar - city of a thousand mosquitoes - and welcome to the beginning of the middle of nowhere." He drove past the airport gates and pulled out onto the main road, accelerating briskly.

Wernher stared at the ribbon of shimmering black asphalt receding into the distance. "A thousand dessicated mosquitoes perhaps," he said.

"It gets a lot more muggy down-town," said Hading. "Somebody once told me that Balcabar is a shortening of Bal-cabara in old Kerba. Translates to 'homes on the sand' apparently, which seems a daft name for a town built on a river delta but there you go. Anyway, enough of the local history - did you manage to get through the briefing notes I sent you?"

A little more local history might have been nice, Wernher thought. "I finished the last of them on the plane," he answered. "By my reading, your materials test program is going well, you have a shortlist of fuel element designs and reactor configurations drawn up but the fabrication work hasn't started yet?"

Hading nodded. "Preliminary materials testing has been done off-site - no sense building a new lab for that in the middle of a desert. So far we've been optimising for reducing propellants, as per your recommendations, but we have started looking at coatings capable of handling water."

"Good," said Wernher. "We won't get much of a specific impulse advantage from water but there's plenty of it out there for refuelling. Assuming we can persuade the KNSA that an LV-N is still required if we're only running it on water."

"What else would we use?" asked Hading. "Hypergolics are no good - I'm no rocket engineer but I've been doing some reading too and even I could tell you that the mass fraction would be lousy. Kerosene and liquid oxygen still wouldn't be as good as a water propelled nuke

and boil-off on the oxygen would be horrible. I don't even want to think about using liquid hydrogen."

"We could use water as a portable hydrogen supply and electrolyse it as required," said Wernher.

Hading glanced at him incredulously before turning his attention back to the road. "You can't be serious," he said. "Unless you actual rocket engineers are comfortable with far more points of failure than I would be."

"I didn't say it was a good solution," said Wernher mildly, "but it would be a non-nuclear one."

"Provided you can hang several net-ball courts worth of photovoltaics off the ship," muttered Hading.

"Agreed," said Wernher, "And that's one factor that the design team are looking at very closely. We won't have a final answer until the latest set of Hope probes reach Duna space next year, so in the meantime the KSA are running parallel design programmes for the colony ships and demonstrator programmes for key technologies."

"That figures," said Hading. "So far we've only been resourced for a single test stand and one prototype. So you and I will be picking the most likely reactor design and deciding how to turn it into a working nuclear rocket. That's our turn-off up ahead - give me a minute."

Wernher caught sight of a signpost just before Hading pulled off onto a side road. Fresh black asphalt abruptly gave way to a broad swathe of hard packed pavement, innumerable heavy gauge tyre tracks just visible against the densely compacted surface. Hading reached for the water bottle wedged into his door tray and downed half of it in a single gulp. "Get some more down you," he advised. "Don't let the cold fool you - it's still drier than an a mallek's temper in here so you need to keep drinking."

Wernher nodded and took a swallow from his own bottle. For a while he watched the desert roll past. "I've been thinking about the reactors," he said at last. "Configuration C seems like the best option, especially if we can run a heat exchanger off the secondary coolant channels and use it to drive a generator. The extra electrical power would be helpful."

"We can do that with any of the configurations," said Hading glumly. "Figured you'd pick the toughest option though."

"It just looked like the highest propellant flow option," said Wernher, "Granted, we'll never be launching anything on an LV-N but a semi-reasonable thrust to weight ratio will make the trajectories a lot easier to work with."

"Yeah but higher propellant flow means more cooling and bigger thermal gradients across the core to design around," said Hading. "Not to mention that all that lovely propellant is also going to make a lovely neutron moderator, giving us an interestingly non-linear feedback loop during startup."

Wernher grimaced. "What about normal operation."

"Shouldn't be too bad once we're at steady state flow," said Hading. "Unless you wanted it to be throttleable too. The control drums will need to be fail-safe of course and we'll build in a thermal cutout. Worst case scenario is that the reactor shuts down before going runaway. Not ideal during a critical manoeuvre but a sight better than having to cope with a nuclear meltdown on the back of your spacecraft. Anyway, these are the sort of trifling small details that we're here to work out."

"At least the engine design won't be too complicated said Wernher, "No igniters required, single pump..." His voice trailed away thoughtfully.

"I'll take your word for it," said Hading. "Good to hear we get *some* breaks with this thing." Both engineers took another swig of water and lapsed into companionable silence.

Kerbol was dipping low in the sky when Hading pulled up outside a heavy steel security gate. Chain link fence stretched out in either direction from the gate, fronted by a double row of large concrete blocks, spaced far enough apart to let a kerbal through but nothing larger. Armed guards patrolled behind the fence. In the distance Wernher saw a handful of blocky, white-painted outbuildings, their roofs glinting in the setting sun. Behind them, an enormous barn-like structure and a gantry crane stood out against the skyline. To his surprise, a ring of floodlight poles surrounded both crane and barn.

Hading saw his expression. "Not much to the place at the moment," he said. "The business end of the test stand is all underground - you can see the loading crane on the horizon there. That architectural masterpiece next to it is where all the construction gear is parked out of the way of any passing sandstorms. Building work tends to happen at night when it's cooler, hence the floodlights. As for the rest of it, well that's home sweet home. Welcome to Site D."

Chapter 66

For Kerm and Kerbal

The sound of the door opening failed to disturb either of the kerbals at the table, both with heads bent over their tasks and, Gerselle was amused to see, both with tongues protruding from the corner of their mouths. She watched the younger kerbal carefully cut a drinking straw into small pieces and the older, no less carefully, wind a strip of wet paper around a wire frame. Smiling to herself, she waited for Joenie to finish before closing the door behind her and putting down her bags. The clank of bottles managed to do what an opening door could not, and Joenie looked up inquisitively. "Mummy! Did you get juice?" She bounded to her feet and rushed over for a hug.

"Look out for the bags, sweet... *careful*, Joenie! You'll break all the bottles and then you won't have any juice! No, let me carry them - you can carry the vegetables for me. Oh, thank you, Enely."

"Not a problem," Enely replied easily, picking up two shopping bags and lifting them onto the kitchen bench. "Do you need any help chopping or slicing?"

"I'll be fine," said Gerselle. "There's not much to do. And besides," she added, raising an eyebrow, "I'll need my washing bowl back before we eat."

Enely looked slightly abashed. "Yes, yes, of course. Come on, Joenie, I've finished the first layer - do you want to do the next one?"

"Can I have some juice first, Mummy?"

Gerselle sighed. "You can have a little glass - I don't want you filling yourself up before supper." She pulled a bottle of fruit juice out of the grocery bags and poured some out for Joenie, who promptly gulped it down before clambering back onto her chair. Resignedly, Gerselle watched her dig her hand into the washing bowl and retrieve a fistful of dripping paper.

"Not as much as that, Joenie. Look." Enely demonstrated with his own, smaller handful. Joenie dropped her wad of paper back in the bowl, giggling at the soggy, splattering noise it made, before picking up a clump of strips between finger and thumb and moulding them onto the growing model. Gradually, with the occasional patient suggestion, the wire framework acquired a more-or-less even shell of papier-mâché.

"Why don't you put the last bit there, Joenie? There you go - perfect!" Enely surveyed the finished model, feeling obscurely pleased with himself. "I'll just go and wash out the bowl and then we can make the grooves. Gerselle looked up from stirring her saucepan to see a bulbous, grey...something standing on a square of cardboard. Enely caught her eye with an embarrassed little smile. "It'll look better once it's marked, spined and painted." he said.

"Do you like my kerbahusk, Mummy?" said Joenie.

"It's very good, sweetheart," said Gerselle, "but what is it?"

"It's a cactus, Mummy - we're learning about deserts at school, remember!"

"Oh, yes - of course you are." Gerselle smiled. "And I think I know who's going to take in the best homework on Munday." She cast an amused half-smile at Enely, who shrugged.

"I'm Hazachim. If there's one thing I do know about, it's cactuses." He picked up a paintbrush and turned to face Joenie. "A real kerbahusk has big grooves running down it - like this." He gouged a channel in the still-pliant papier-mâché with the brush handle. "And the bits between the grooves are covered in spikes. Why don't I do the grooves and you can make all the spikes with bits of straw?"

Gerselle turned the heat down under her pan. "And then you can *both* clear and set the table."

The supper dishes were cleared away, the finished model cactus put on top of Joenie's toy box to dry, and Enely was busying himself with the coffee pot. He could just hear Jonton's voice from next door, punctuated by indistinct questions from Joenie. He took two mugs out of the cupboard and arranged them on a tray, the coffee burbling away behind him.

"Night night, Enely!"

He turned to see Joenie in her nightdress, clutching a book with one hand and Gerselle's hand with the other. "Peaceful night, Joenie. Painting tomorrow, yes?"

Joenie nodded enthusiastically, unsuccessfully stifling a yawn.

"Come on, you," said Gerselle, "otherwise you'll be asleep before we can finish your story." She led Joenie away. Jonton picked up the coffee tray and went through to the sleep room.

"Good evening, Jonton."

Jonton shook himself, leaves rustling around his head. "Evening, Enely." He sniffed the air. "Coffee smells good." He paused. "Hmmm, smells tempting in fact. You couldn't bring me a mug too could you please?"

Enely hid his surprise behind a show of fussing with the tray. "Of course. I'll be right back." He hurried through to the kitchen, returning with the first mug that came to hand. Jonton raised his eyebrows at the *Twelve Riders* logo printed on the side but decided not to say anything. He took the full mug from Enely and sipped it cautiously.

"Ahhhhh, that hits the spot, as Fredlorf would say. Funny - it's been forever since I wanted anything but plain water but that coffee just smelt right tonight." He grinned. "Got a kick to it too after so long without. Shall we see what's going on in the world?"

Enely nodded and switched on the television before settling into one of Gerselle's new sack chairs with his own mug of coffee.

"...so, plenty left to do in Kerbin orbit, Bob?"

"Very much so - and then the real work begins."

"I think that probably counts as one of the biggest understatements we've ever heard in this studio, Bob. Moving further afield though, do you have any updates for us on the Mün or Minmus programmes?"

Bob leaned forward in his chair. "Absolutely," he said. "Preparations for Pioneer 6 are going well and we expect to be launching as planned. Then we'll be taking a break from the Mün to focus on Minmus. We're planning at least two crewed flights, maybe three if all goes well. After that, we've got some big plans for Pioneers 7 and 8! We'll be using a much bigger lander, so the crews will be able to take a lot more supplies with them to the Mün and stay on the surface for longer. Incidentally, building a bigger Mün lander will also give us some valuable experience in building a Duna lander when the time comes. We're also thinking about sending a rover to the Mün for long range surface EVAs."

"You mean a car, Bob?"

Bob laughed. "Nothing so grand I'm afraid. More like a small buggy, probably not much bigger than a tik-tik, although it will be battery powered. We won't be making the crews pedal in their spacesuits."

The presenter chuckled. "I'm sure that wouldn't work too well. Now, I know this is a sensitive topic, Bob but I'm afraid I do have to ask. Is it true that Commander Ribory has started practicing in the landing trainer despite all the safety concerns?"

"The new landing trainer," Bob corrected him. "She has, and I watched her first training session myself. The Mark 2 trainer doesn't look a lot different on the outside but the fly-by-wire system - the computer and sensors that control it - have been completely overhauled and re-qualified. We've been working extensively with the Kerbin Air Accident Board to make sure that none of our previous mistakes were repeated."

"So are you saying that the KSA accepts responsibility for the accident?"

"The KAAB report is on the public record," said Bob calmly. "The KSA fully accepts its conclusions and is working around the clock to fulfil it's recommendations. We're completely reorganising our crewed spaceflight operations and rescheduling our major crewed programmes to make sure that we can dedicate all our resources to them. Right now of course, we're expanding those resources to cope with the demands of Project Starseed but until then, as I mentioned earlier, we'll be running a single munar programme at a time..."

"Mün buggies." Jonton shook his head. "I'll bet young Gildas can't wait to see those!"

"I'd like to see them too," said Enely, "I wonder how they'll get them to the Mün?"

"Get what to the Mün?" said Gerselle, closing the door behind her. She blinked at the steam rising from Jonton's mug. "A hot drink, dear?"

Jonton grinned. "Yep. Like I said to Enely, that coffee just smelt right tonight."

Gerselle traded a worried look with Enely. "I suppose it has been a long time," she said uncertainly, picking up her own mug. "but if it keeps you awake all night..."

"No danger of that," said Jonton, "after a day rebalancing the breadfruit fields. Feels like I've spent the day with Fred's old hoe, pulling out the knotweed by hand. Did you still want to watch me working on the nematodes tomorrow, Enely?"

"Very much, if it wouldn't be a trouble," said Enely. A change of picture on the television screen caught his eye and he turned his head to watch. "The Council chamber?" His eyebrows shot up and he raised a hand for quiet.

"...depredations wrought by these so-called Children of Kerbin. No more excuses. If Wakira cannot or will not control these incursions, then Firesvar must take steps to protect its borders." President Enemone strode coldly back to her seat, pointedly ignoring President Lanrick and Chief Ambassador Burvis opposite her.

The broadcast cut back to a group of kerbals sitting in the KBS studio. Enely walked over to the television and muted the volume. "So the... *seffleks* have finally managed it," he said, throwing himself into his sack chair. "The one Regionality that hasn't been fighting - probably because nobody in their right mind picks a fight with Firesvar - and now these," Enely's jaw worked "*bjedla* idiots stuff a cactus straight..." He broke off. "Sorry."

"You need to teach me some Hazachim," Gerselle observed, "It sounds like the perfect language for moments like these."

Jonton sighed. "I have some sympathy for their goals," he said, "but planting new Groves without care or thought to the *other* ones around them? I can't imagine a worse thing to do for their own Kerm, let alone the others."

"I can," said Enely bleakly.

Jonton looked at him. "Of course you can," he said softly. "I'm sorry, Enely."

"I wouldn't care," said Gerselle, "but nobody is planning to lock their seeds away in a freezer and just forget about them. And if we do end up taking them to Duna, they'll need to travel

in cold storage anyway - I can't see anyone building a spaceship big enough to plant Kerm in."

"No," said Enely. "Not if those Mün ships are anything to go by." He stifled a yawn. "Anyway, I think I'll go to bed. Thank you for the company."

"I think I will too," said Gerselle, gathering up the coffee mugs and following him out of the door "and hope for better news tomorrow." Once Jonton was out of earshot she beckoned to Enely. "Coffee?" she whispered, "When did he start drinking coffee again?"

Enely looked at her silently. *Does she know? She must know.* "Forgive me," he whispered back, "I've been trying to find the right time but it's difficult to talk about. The first time I communed with him, the whole experience was so strange that I didn't think anything of it. I thought it would just go away but..."

Gerselle stared at him. "A barrier. A soft patch?"

Enely nodded frantically. "Yes, exactly that. A soft patch - and it's getting bigger."

"You think it has something to do with the coffee?"

"I don't know. I can't think what else it would be."

Gerselle gripped his shoulders. "You're communing again tomorrow..." It wasn't a question.

"Yes - yes I will."

The next morning, Enely lay down on his usual bunk feeling as though he'd swallowed a handful of especially restless caterpillars for breakfast. Jonton hummed to himself, leaves rustling in the morning sunlight, as he finished his morning exercise routine, stretching his arms over his head and cracked his knuckles. "Right then - nematodes! Ready to get started?"

Enely wedged another pillow under his head in reply and let his forehead brush against the waiting leaf cluster. White light unfolded in his mind, brighter than usual and somehow faster and sharper. *Probably the caffeine*, he thought. *I should tell him - too much caffeine could make this difficult.* Then the white light faded into a muddy brown mindscape.

"The first thing to know about nematodes," Jonton began, "is that I have to ignore most of them. When you can get up to a couple of million microscopic worms in a square metre of soil and Kerm knows..." He broke off with a rueful cough. "Actually, the Kerm doesn't know how many species. Anyway, there are too many to keep track of, let alone control. The good news is that most of them will just get on with it."

The muddy brown faded into a blotchy sandy colour. "Bacterivores..." Dark green patches spilled over the blotches. "Fungivores." Dark grey strands zig-zagged over the green and sand, sprouting ever denser tangles of filaments and turning the mindscape back to its original mud-brown colour. "And the tangled webs of predators that feed on them and on each other. That part I can control to an extent, or rather I can poke at the webs to nudge

them into the right shape. If I think too hard about what I'm doing it all starts to go wrong - that was the big mistake I kept making to begin with."

A regular array of ragged, lighter green dots appeared. "Now *these*," Jonton said enthusiastically, "are the rhizospheres and this is where things get really interesting!"

Enely listened to Jonton's increasingly detailed explanation of plant root environments and nematode balances with half an ear, whilst surreptitiously searching for the soft patch in Jonton's mind.

"...and this is a beautiful example! Normally, these would be a serious pest but when they start chewing up the gingergrass roots, the damaged roots exude a group of pheromones which attract the right predatory nematodes to feed on the parasites. With a bit of encouragement, a bit of gingergrass can keep the whole field clean of the little swines!"

Actually, that does sound interesting. The Berelgan researchers will be all over this kind of data. Maybe they'll even be taking gingergrass to Duna. Enely stopped short. *Oh my...*

The soft patch yawned open, revealing an iridescent membrane underneath. Oily swirls of colour rippled under the surface and as Enely leaned closer he made out snatches of sounds and scents and even the occasional word. The swirls seemed to sense his presence, darting towards him, growing thicker and richer, stretching the membrane to a translucent shimmer. Words became mumbled fragments of sentences, their meaning lurking just out of reach. Then, quietly, as if heard from the next room, two words echoed through Enely's head.

<Help me>

"And then a voice asked me to help it," said Enely. "Didn't you hear it too, Jonton?"

Jonton shook his head. "Not a thing. I haven't heard any voices for a long time," he added wryly, "and even then, they weren't really talking to me so much as over me." His eyes widened. "The shards..."

Gerselle's eyes met his. "The shards," she whispered. "That might..." She gnawed on a fingernail. "I think there's only one thing I can do, love," she said aloud. "Stop trying to keep the shards intact and just let them melt. Put all the pieces back together, give the Kerm its voice and let it concentrate on mending the Grove." She saw Enely's confused expression. "Something Jonton said to me before...before he went an-Kerm. I've never forgotten it."

Enely gaped at them. "The shards happened when your Kerm shattered, yes?" He saw Jonton wince. "You let them go, let them become *you*..." He closed his eyes. "But what..."

"But what if they didn't?" finished Jonton. "Or not completely. Like oil and water maybe. Even if you shake them together really hard, they don't stay mixed forever." He bowed his head. "I remember what it was like after the shattering. Never being quite sure who or what I was, trying to hold onto the kerbal parts of me and being too terrified to sleep because that's when the voices were strongest."

"We were both terrified," said Gerselle quietly, "I was terrified that your mind would melt with the shards and that I'd never get you back again."

"Looking back, I think it did," said Jonton slowly. "but the kerbal part of me had had more practice at being 'me' - if that makes any sense - and held together somehow." He swallowed hard. "The Kerm part of me had no idea, no practice at all. When I let go of the shards they must have fallen apart completely."

Enely's eyes snapped open. "Only now they're pulling back together again and crying out for help!" He rocked back on his heels. "That's what the voice reminded me of! Older - how could it not be older after all it had been through - but still like my Kerm!"

Thunderstruck silence greeted him.

Gerselle opened her mouth and then closed it again. "What did Gusemy say about going an-Kerm?" she said faintly. "That nobody could condone the destruction of Kerm minds on a global scale? So what happens if the Kerm mind survives?"

Jonton's eyes met hers "It could be the answer we've been looking for. Break the Law of Thirty Seven in every Grove and have the Keepers volunteer to go an-Kerm. The new an-Kerm pull back their borders, make room for a newly planted Kerm and then, when the time comes, separate again, leaving an intact Kerm behind." He shivered. "Although put like that it sounds beyond crazy."

"And instead we might start a second Age of Madness," said Gerselle "Maybe we were just lucky, Jonton - and being lucky once is too slender a peg to hang the whole of Kerbin on."

"Twice," said Enely quietly. He looked at Jonton. "Your Kerm already survived one shattering back in the Age of Madness. It must have or it wouldn't be here."

Jonton's leaves twitched. "If it was communing at the time...what happened to my kerbals?" He swallowed. "If the Kerm survived did their minds break into shards instead?"

"They might have pulled together again," said Enely lamely.

"This doesn't sound right," Gerselle said slowly. "I felt your *scars*, love, the first time we Communed - and I felt the *older* scars underneath." She pinched the bridge of her nose. "Before...before us, I think your Kerm was just a Kerm. You'd *remember* if it had ever been an an-Kerm before. So the only way that the scars make sense is if they're healed wounds from *both* shatterings. You let go of the shards and they knitted back together. Which explains how you learned to look after the Grove - your Kerm mind was still there somewhere." She threw up her hands. "Don't ask me what happened after that."

Jonton's leaves rustled around his head and a sudden gust of cinnamon blew through the room. "Joenie," he said quietly. "You remember when I was retreating from Patbro's daughter's..." He snapped his fingers. "From Tivie's new Grove?"

Gerselle nodded.

"I never told you at the time but I nearly gave in. Not because of the pain, although help me that was bad enough, but because in the end I just couldn't fight thousands of years of Kerm instinct howling at me to stop. It was Joenie who got me through. I remembered her pummelling my trunk with her little fists, telling the 'bad tree' off for hurting me. She was the anchor I needed and she helped me to remember the promise I made to everyone, that this an-Kerm would rather retreat than fight." Jonton's voice trembled. "It was barely enough and I felt it tear something inside me. There were times after that where I'd be checking the fields, find that everything was fine, and have absolutely no recollection of doing the work myself. I put it down to muscle memory - a sign that looking after the Grove was becoming automatic. Of course I took this to be a good sign." Jonton gave Gerselle and Enely a twisted smile. "A sign that I was becoming a proper Kerm."

"Which you were in a way," said Gerselle softly. "And that gives me an idea for helping the Kerm *and* getting you back, Jonton Kermol. She looked at Enely. "It would need both of us though and your part could be painful."

"What do I need to do?" said Enely. "I've already lost one Kerm - if I can do anything to help another, I will."

"Two anchors," said Gerselle. "We both commune with Jonton. I help him remember what being kerbal is all about - give his kerbal self something to hang onto and rally around. You do the same for his Kerm self." A hard lump of self-loathing settled in the pit of her stomach. "By showing it your Kerm. Young, newborn almost and untouched by kerbal thought. Trying to share it's world with you." She saw Enely's expression. "I'm sorry, Enely - truly I am. But I don't know who else to ask."

Another gust of cinnamon filled the room.

For a long minute Enely stared at his feet unable to meet her, or Jonton's gaze. *When she said painful...* Then he lifted his head, a haunted look in his eyes. "I will do this," he said. "I will keep my word and do this."

Jonton bowed his head in silent acknowledgement. "We should speak to Erlin," he said. "The Berelgan will need to know about this anyway and they'll be able to help us with the other arrangements." He looked at Gerselle. "We do things properly this time, love. Proper medical supervision, controlled conditions, someone there from the Berelgan to record everything. I had no idea what I was doing when I planted that thirty-eighth tree and look where that nearly got us. I can't - I won't take that kind of risk again. Not with either of you."

Chapter 67

A Time for Love

*Now baby call;
And see the sunlight shining in the sky.
Let the sunlight open up your eyes.
Now, is the time for love.*

Bad Company - See the Sunlight.

<https://youtu.be/JaZJQqsPwr8>

Joenie put on her coat and sat down to tie up her shoes. "I don't want to go to Adbas's house," she said. "I want to help Daddy with the Kerm tree."

"I know you do, sweetheart," said Gerselle, "but we're all going to be busy talking to the Kerm ourselves and the doctors are going to be busy looking after us while we're talking. There won't be any room in the sleep room for you too."

"Why are the doctors coming? Why will you need doctors to talk to the Kerm?"

"Because we're going to be talking to it for a long time, popkin," said Jonton. He tapped the vines coiled around his waist. "And asking it nicely to let go of me so I can go outside again."

Joenie scowled. "Don't call me popkin, Daddy. I hate being called popkin!"

Jonton hid a smile. "I'm sorry Joenie. I keep forgetting you're too old to be a..."

"Daddy!"

Gerselle checked the clock. "Adbas will be here any minute, sweetheart. Do I get a hug before you go?"

Joenie wrapped her arms around her mother's waist, burying her face in her poncho. "Be careful Mummy." Deliberately she pitched her voice in the squeaky tones of a younger kerblet. "Up, 'ummy? Hug Daddy?" Gerselle laughed despite herself and, swinging Joenie up into her arms, turned her around to face Jonton. Joenie leaned forward and kissed her father on the nose. "Be careful too, Daddy."

Jonton kissed her back. "I will, sweetheart. We all will."

Joenie wriggled out of Gerselle's arms and, to Enely's astonishment, ran over and flung her arms around his waist. "And you be careful, Enely!"

Awkwardly, Enely patted her on the head. "I will," he said. "I promise. We still need to make a mallek to go with your cactus, yes?"

The doorbell rang. Joenie let go of Enely, waved at everyone and ran for the door. Gerselle picked up Joenie's backpack and followed her.

There was a long silence.

"Are you sure you want to do this, Jonton?" said Enely at last.

Jonton nodded. "I'm sure," he answered. "It's been...something else, but I do want to go outside again and see the world with my own eyes." He sighed. "Besides, from what you and Gerselle were saying, I think it's going to happen anyway - and just for once, I'd like to decide something for myself rather than waiting until it's too late."

Enely walked over and gripped him by both shoulders. "Bravely said, Keeper. We'll be there for you."

The harsh, aseptic smell of rubbing alcohol drowned out the sweeter aroma of surgical adhesive as one of the medics swabbed down Enely's forehead and wrapped a not-quite-skin coloured elasticated band just under his hairline, leaving the top of his head clear. Gerselle lay on her bed, already wearing her band, a thick skein of multicoloured wires emerging at the nape of her neck and snaking across the floor to an equipment trolley. Enely settled himself on a nearby bunk and watched the other medic at work on Jonton's forehead, beads of perspiration trickling down his neck as he threaded an electrode pad through the gap between two Kerm leaves and delicately pressed it into place against the an-Kerm's skin. Clumps of grey-flecked hair lay scattered on the floor around them.

The first medic walked over to the equipment trolley and plugged in Enely's band. He pressed a button, waited a moment and then leaned forward to peer at a dense array of lines beginning to scribble their way across one of his monitors. He glanced at Gerselle's monitor then looked up at the two kermol. "Your bands are working nicely. How do they feel?"

Like somebody's knuckling the sides of my head, thought Enely. "No worse than you'd expect," he said. Gerselle grunted in agreement.

"They do feel a bit tight at first but most people get used to them in a few minutes," the medic said soothingly. "And they're a lot better than hooking all three of you up the the old-fashioned way." He gestured at Jonton, who was canting his neck to one side to allow yet another electrode to be glued to the side of his head, the coloured wires threaded between his leaves in an uneasy sculpture of biology and technology. His medic carefully inspected his work before joining his colleague at the monitors, an obvious look of relief crossing his face. He blinked at the third screen.

"Ohhh-kay. I think this is working." He tapped the side of the monitor and checked the plug connecting it to Jonton. "Definitely got brainwave activity you'll be happy to know but it's not like anything I've ever seen before. According to this you could be asleep, communing, having a fit... Kerm I don't know."

"That bedside manner needs a little more work," his colleague noted, apparently to himself. He smiled reassuringly at Enely and Gerselle. "Everything looks just fine from here so please just relax and start whenever you're ready."

Gerselle lifted her head up to the waiting leaf cluster, Enely following just behind her. Their EEG traces shivered and then went abruptly berserk.

Familiar white light filled her mind, washing away the sleep room ceiling. She sensed Enely joining her, his nervousness mirrored by her own, churning up the lambent mists around her. Mists that flowed over and around long gone scars before swirling away into darkness and fear. Instantly her own unease spiked into fright which rebounded off Enely's already heightened nerves and magnified, lashed back at her.

Practice and experience overcame instinct. Gerselle clamped down on her own roiling emotions, absorbing the fear and burying it beneath the surface. Cautiously, she extended her awareness through their slender, fragile link, reaching out to her partner, recalling the intensity and the joy of their first communion and letting it wash over them both.

It's all right my love. We're going to be fine - we're all going to be fine.

We've got you, Jonton, Enely said. As the Hazachim say, our water is yours and we'll keep the speargrass from your fields.

Erlin watched the monitors anxiously, willing order on the chaotic patterns sprawling across all three screens. One of the medics got up, moving quickly from patient to patient, checking pulses and noting eye movements before moving on.

Two of the three monitors settled into a set of steadier rhythms, punctuated by irregular bursts of activity. Erlin stared at the complex rhythms on third screen in fascination. Each cycle of the underlying waveforms perturbed into a smaller and smaller copies of themselves, turning to fuzz as the detail passed beyond the ability of the screen to display. Gradually two of the glowing traces strengthened, shimmered and shifted, each mirroring a trace on one of the other screens.

The second medic blew out his cheeks in relief. "They're in! Longest rapport time I've ever seen but they're in."

With an effort, Enely put Gerselle's voice to the back of his mind, letting their link dwindle to a filament of emotions and half-formed images and words. He sent a last wave of reassurance to Jonton, before closing their link down to a bare trickle of sensation. For a moment he floated in the darkness, breathing deeply, gathering himself for the task to come. Then he re-opened the link, letting his thoughts skip lightly over the surface of Jonton's awareness. Probing for the flaw in the the other's memories, softly calling out to it, careful not to disturb the an-Kerm's link with Gerselle.

The flaw found him.

Larger than ever before, the membrane ballooned out towards him like a shimmering, iridescent soap bubble, thought patterns flickering beneath it's surface. Slowly, Enely let his own thoughts brush against it, opening himself to it, letting himself sink into receptivity. The bubble puckered and swirled in response, ripples racing across it, reflecting off hidden lodes of deeper thought. The puckers deepened into folds and rilles, lodes became tendrils, probing at the bubble, stretching it to bursting but unable to break through. Memories of scents and fragmented images billowed from the surface, both edged with frustration and pleading. Enely saw Joenie hurtle past, saw images of faces and a flag, saw himself and Gerselle sitting on cushions, placing pieces on a game board.

<help me>

Gritting his teeth, Enely plunged into his past, tearing through half-healed scabs, ripping through times of sorrow and loss, reliving moments of pain and grieving. Reaching for happier days; for a mental picture of a smiling kerbal used to greet a new Kerm. Reaching for a barrage of scents and a medley of coloured blotches and swirls; the chatter from an infant Kerm sharing it's world for the first time, untouched by contact with kerbals. Enely imagined himself cupping his hands protectively around those few precious memories, shielding them from the raging bubble, holding them up to its helplessly writhing surface.

Gradually the lashing tendrils slowed, the fragmented images sucked back beneath the surface, retreating into quiescence. The bubble quivered, folds and rilles slipping into new patterns, frustration giving way to curiosity, pleading to expectation.

Enely smiled and opened his hands.

With relief, Gerselle sensed Enely drifting away. She paused for a moment, checking that their link was still there if needed, then turned all her attention to Jonton. *My Jonton. Kerman not an-Kerm.*

How do we do this, love?

Do you remember what you told me when you were learning to tend the Grove? Feel, taste or smell only, you told me. Seeing was a crutch - too slow and clumsy for what you needed. It was kerbal thinking you said.

Comprehension lit up Jonton's mind.

Exactly. Remember the sights of your Grove, my love. Walking the fields, seeing the crops, the colours of the flowers, the earth beneath your feet and the blue skies above you. Remember clouds and sunlight on water. Remember the sounds of the river - birdsong and the splashing of water on rock. I'll help you. Gerselle dipped into her own memories; herself standing by a gate, watching Joenie scampering down a lane towards a grey robed kerbal, who dropped to his knees and swept her into his arms.

Slowly, tentatively, a mirror image of the same scene trickled down the link. In the distance a kerbal by a gate, a kerblet sprinting down the road as fast as her little legs could carry her. A lurching drop, the pavement suddenly a lot closer; then an explosion of green and an armful of squirming toddler and excited babble.

The same scene washed over her again. Fainter this time and blurred, like a picture of a picture. The link wavered and Jonton's tentative image fell apart, blowing away like dust. *Sorry, love.* Jonton's mental voice sounded abashed. *I remember that day - of course I do - but I shared it with my trees... with my Kerm I mean.*

I could see you remembering, Gerselle replied. Understanding and encouragement flowed through the link. *We'll try another one. Focus on your memories, not the pale reflections.*

Some time later, the understanding and encouragement was beginning to wear thin. Every memory that Gerselle chose echoed between herself and Jonton, leaving mere after-images and fading reflections behind. The first sight of Joenie curled up in the bottom of her pouch had triggered the strongest reaction yet and for a moment, she thought the tiny, wrinkled figure, so newly born as to be barely recognisable as a kerblet, would be the anchor they sought. Then it too fell apart; a memory caught between two mirrors, reflections of reflections receding into a sparkling mote of dust.

Is there anything you didn't share with that Kerm, Jonton Kermol?

Silence answered her question. Behind it she sensed Jonton's growing desperation and behind that, a storm of frustration and pleading directed at Enely.

One more memory to try then. And if you've shared this one oh partner of mine, then we are going to have words. I'm sorry, Enely, she thought aloud. *If it makes you feel any better, I didn't want to do this either...*

Lambent mists swirled through the darkness and became sunlight.

Gerselle stood in the centre of the clearing, surrounded by a half circle of her friends and closest family, chosen to be her Witnesses. Music played in the background as a scrubbed and very much younger Jonton, accompanied by his own chosen companions, stepped into the clearing. He joined her in the centre, the ring of Witnesses closing behind them. All the

right words in all the right places. A golden torc placed gently around her neck and then Jonton in her arms.

The rest of the afternoon passed by in a blur of music, dancing and well-wishers; a beaming Jonton by her side the whole time. Finally, as the sun set over the Grove, they made their way up the hill towards the Keeper hut, the path before them strewn with flower petals. She had a vague recollection of a door closing behind them and then Jonton's hands quivering as he undid the clasp on her torc...

Two faces suddenly blushed a furious dark green.

Erlin blinked at Gerselle and Enely, still supine on their beds, and then stared in outright astonishment as Jonton's face turned an equally striking colour.

"Great Kerm above..." said one of the medics quietly.

"I'm not sure I want to know," Erlin murmured.

"What?" The medic glanced up. "Never mind that - would you look at this!"

Erlin froze. The baroque, nested waveforms had disappeared. Three perfectly normal sets of EEG traces whisked quietly across the screens in front of him.

The sunlight shrank to a pinprick; a brightness at the end of a tunnel. Jonton stifled a cry as the world closed in around him, trapping him, numbing his roots and cutting off his connection to the earth. Leaves, twigs and branches followed. Frantically he threw himself at the communion link trying to submerge himself in its comforting familiarity.

<open your eyes>

The voice was kindly but firm. The link shrank to a hair-fine thread, a vast presence gently turning Jonton away.

<put down the burden dear friend. It is no longer yours to carry>

Gerselle and Enely floated awestruck in the back of his mind. The presence wrapped around them like a blanket, holding them warmly in the blackness.

Who are you? Jonton managed at last.

<I am Kerm> Puzzled. <You know this>

I know what you are, said Jonton carefully, *but who are you? Do you have a name?*

<I have never needed such before. We speak, I know you, we are friends. That is all that matters>

Gerselle came forward. *It is, she agreed, but it would be easier for us - for us kerbals I mean - if we had a name to call you by. My name is Gerselle - and the one who carried your burden is Jonton.*

<Gerselle... Jonton... > The Kerm paused. <Very well my friends, I too will have a name>

<My name is Elton>

Chapter 68

Shaking the Pillars

Elton uncoiled his leaves from Gerselle's and Enely's heads.

Enely dumped his pillows on the floor and lay flat on his back, staring at the underside of the bunk above him. Gerselle peeled the damp electrode band off her head, the tacky, elasticated fabric tugging at her hair and sticking unpleasantly to her skin. She threw it to one side, rolled off her bed and helped herself to a mug of water from Jonton's pedestal before pressing a second mug into Enely's out-flung hand. Jonton stood motionless against Elton's trunk, a thicket of leaves and skeins of electrode leads still cradling his head.

<we have been as one a long time... Jonton> Elton stumbled over the unfamiliar word *<I cannot quickly draw my leaves from you, though perhaps that is for the best>*

Perhaps it is, replied Jonton. *Not being Kerm any longer - laying the burden aside - will be difficult enough.*

<I will help, and you will always be welcome to join me in working the tapestry> Elton paused *<if I could use your word for it?>*

Of course, Jonton replied, *I'm flattered that you'd want to - and that you think I'd be able to help now that I'm...*

<kerbal again? But a kerbal who knows what it is to be Kerm. For that you will always be welcome as the first amongst my Keepers>

Jonton squeezed his eyes shut, blocking out the outside world whilst he composed himself. *What about the vines?* he said at last.

<vines?>

Jonton tugged at the crooked vines still wrapped around his lower torso. *These. Healing vines or just vines.*

<ahhh. Those too will take time to withdraw. Maybe longer than the leaf hairs. I am sorry, Jonton>

No need to be sorry, Jonton replied. It's no more than I expected...Elton. He looked up at the two medics and Erlin, still sitting dumbfounded behind their monitors. I'd better speak to the others but don't suppose we could...commune again before I do? Only if you want to, he added quickly. This is beyond strange for me - I can't even imagine what it must be like for you.

<I can't either> said Elton gently <I remember things of course but they're like something shown by a kerbal. They happened but not to me. But we can talk of this another day. The other kerbals will wish to commune too - it is only proper that my first of Keepers should go first>

The link yawned open and sunlight sparkled from the sudden tears that ran unchecked down Jonton's cheeks.

A soul reborn.

A soul unleashed.

No longer a shattered maelstrom of panic and fractured dreams. Not even the placid lake of a thirty-seven tree Kerm; wide but shallow, untroubled by wind or rain. Instead curtains of numinous fire ran from horizon to horizon, bathing the mindscape around him in the pure, unsullied joy of a being finally made whole and set at peace with itself. The sparks gambolled before him, familiar tools now, still to be respected but no longer to be feared or used as weapons of war. Centuries of stored memories stretched out before him, reaching back into prehistory; buttressed with the deep and comforting knowledge that they were there to be absorbed, studied and to bestow wisdom in that studying. Already flickers of lightning danced around him, illuminating and reshaping whatever they touched.

Not a vessel to be filled but a fire to be lit, murmured Jonton in awe.

<yes> said Elton. <strange words but I...> A fresh wave of joy lit up the mindscape. <I think I understand them!>

"Is everything alright, Keeper?" With an effort, Jonton dragged his attention back to the blurry figure tugging at his hand. He blinked and the anxious face of the younger medic swam into view. "Keeper?"

Jonton smiled beatifically at him. "Everything's just fine," he answered.

The medic swallowed hard. "And... the Kerm?"

At that, Jonton laughed out loud. "He," he declared, "is much, much more than alright!"

Three bewildered faces looked back at him. Then Erlin's jaw dropped open. "Oh sweet... Are you saying...?" He stared wide-eyed at the great trunk behind Jonton's head. "Gusemy needs to know about this I think," he said faintly. "Preserve me, the Council... everyone

needs to know about this!" He blinked. "But 'he', Jonton? Kerm are self-seeding plants for goodness sake. They don't even..."

"Kerm do have male or female Keepers though," said Gerselle. She smiled at Jonton. "I thought I recognised his voice, love."

"A Kerm identifying with it's Keeper," said Erlin slowly. "Excuse me - his or her Keeper, I suppose I should say now. That makes sense...I think."

"I wish I could say the same," said the older medic with asperity. "Would somebody mind telling me just what on Kerbin is going on here?"

"As I said to somebody else a long time ago," said Jonton, "It would be easier to show than tell." Hastily he cast his mind back to his communion with Gusemy, Obrett and Erlin and offered the memory of Erlin's mental voice to Elton. *This one has communed before but I'm not sure if the other two have.* "Take a bunk, good kerbals," he said aloud. "It doesn't matter which one - they're all much the same."

The medic glanced sidelong at Erlin and raised his eyebrows. Erlin nodded, doing his best to look reassuring. "I know," he said, "That's what I thought too the first time but it'll be fine, trust me." He studied the Kerm trunk again, the corners of his mouth turning up in an involuntary grin as his curiosity began to get the better of him. Confidently, he led the way over to the bunks and picked one nearest to Jonton. "In fact, I think *everything's* going to be fine."

Elton's leaves uncoiled from the the scalps of three stunned kerbals. Erlin's eyes shone with unshed tears as he stared wordlessly at Jonton. The older medic rolled over on his bunk, opened his mouth to speak only to close it again. He reached above his head, brushing his fingertips over leaves that, until moments ago, had been lodged in his brain. *Dry*, he thought. *So impossibly dry.* Reverently, he pressed his fingers against the whorled bark around the base of the leaf cluster. "Can we do this for all of them?" he said plaintively

"We have to," his colleague said softly. "We can't just leave them... deny them their chance at that."

"I don't think so either," said Erlin. "How could we?" He buried his face in his hands for a second before smoothing his hair back and lacing his fingers together behind his head. "We'll need to find a better way though." He flicked a glance at Jonton then shook his head. "Going an-Kerm nearly killed you and if you'd died, then who knows what would happened to Elton's mind."

"That's because Jonton went through it alone." Four heads snapped round to face Enely, now sitting upright on his bed. "But nobody else needs to." He looked Erlin in the eye. "Gerselle and I separated Jonton - the kermal Jonton - from Elton by providing anchors for them to form around. What if we do that from the beginning?"

"Go on," said Erlin intently.

Enely held out his hands. "Plant the thirty-eighth tree in a Grove," he said. "Keep watch over it, make sure that when the black spots come, the Keeper and two Anchors are all communing. One Anchor supports the Keeper whilst he - or she - helps the Kerm. The other Anchor supports the Kerm. Perhaps that way there will be no shattering at all. But if there is, then we can learn from Jonton." Enely looked at the former an-Kerm apologetically. "You fought to keep the shards of Elton's mind intact," he said. "and to keep yourself apart from them. I am thinking that was a mistake. Perhaps if the shards had been allowed to melt faster, then they might have healed faster too."

The two medics gaped at him.

Gerselle frowned, scratching the bridge of her nose as she thought it through. "The two Anchors would need to practice communing first," said Jonton slowly. "and let the Kerm get used to them as well as its Keeper."

"They'd also need to be carefully chosen," said Gerselle. "One of them would need to know the Keeper very well and the other..." Her voice trailed away.

Enely offered her a small half-smile. "Yes," he said, "But I would be glad to. Perhaps a third Anchor to help me and to show others in turn? I do not think I could help every Kerm on Kerbin."

Erlin looked at them. "I think I need to make a call," he said at last. "Could I borrow your phone, Gerselle?"

"Of course," said Gerselle. "It's in the kitchen."

Head whirling, Erlin walked out of the sleep room, shutting the door behind him. He retrieved his jacket from its peg, reached into a small buttoned-down, pocket inside and took out a plain embossed card. Mentally he ran through the procedure that Donman had taught him, took a deep breath, picked up the phone and dialled the number on the card.

"Good afternoon, Chief Ambassador Donman's office. How may I help you?"

"Good afternoon. My name is Professor Erlin Kerman, from the Berelgan Institute. I'd like to request an advisory call with the Chief Ambassador please."

"I'm afraid the Ambassador is in a Council meeting, Professor but I shall arrange an emergency conference call at his earliest convenience. Do you have a number he can reach you on?"

"I do," said Erlin politely, "but I did request an *advisory* rather than an emergency call. Please could you inform the Chief Ambassador that this is a Bar-Katon matter, priority zero."

The voice in his ear sounded oddly strained. "I understand, Professor but please be advised that the Ambassador is in a closed Council session and cannot be disturbed."

A cold lump dropped into the pit of Erlin's stomach. "Then I await the Ambassador's pleasure," he replied. "Please could you let him know that I'm with a pair of mutual friends."

I believe he has their number but just in case.” Erlin read off the number taped to the base of the phone.

“Thank you, Professor. I shall see that the Ambassador gets your message. Good afternoon.”

“And a good afternoon to you also.” Erlin put the phone down and stared unseeingly at the wall, the cold lump twisting his insides into a savage knot.

Donman hurried into the Council chamber, eyes flicking around the table as he nodded to Obrick and took his seat next to him. Behind a carefully impassive face, his heart sank at the sight of the two empty seats opposite Lanrick and Burvis. Then the great chamber doors thudded shut and any last flickering hope of good news was extinguished by the stony Firesvarn faces in front of him. President Enemone stalked up to the podium, stabbed a finger at the microphone button and, with no further preamble, began to speak.

“Good kerbals.” Enemone’s utterly flat delivery spoke more eloquently of her opinion of that greeting than any further words could. “Firesvar has convened this closed session of the Council of Twelve Pillars to bring you a report...”

The Lapwing long range search and reconnaissance plane jettisoned its drop tanks and turned north for Firesvar. Descending to visual altitude it began a methodical search pattern, looping back and forth over it’s allocated section of coast, its pilot scanning for any seagoing vessels.

Halfway through his sweep he found one.

A small ship tucked into a remote bay, a lack of wake marking it as riding at anchor. The Lapwing banked low, skimming over the waves, relying on speed and the low sun to protect it from any anti-aircraft fire. The pilot caught a glimpse of two dinghies pulled up on the beach, then he was past them, past the cliffs, over the nearby forest and banking sharply for a second pass. A flick of a switch and the centreline camera pod whirled into life, film clacking rapidly past the shutters.

On the ground, a squad of kerbals broke cover, sprinting for the treeline, slowed by the heavy packs on their backs. The aircraft roared overhead, turned and came back for a third pass, the long coastal grass snapping back and forth in the turbulence of its passing.

“Patrol craft two-zero-six reporting contact in designated sector delta-five. One vessel, two dinghies, crew sighted and confirmed making for treeline. Two-zero-six remaining on-sector till minimum safe fuel, recommend deploying pickup team asap.” The pilot paused. “Contact looks fresh, Control, if they don’t run first, pickup team may be able to repatriate.”

Enemone’s gaze swept the Council chamber before settling on Lanrick and Burvis. “Firesvar therefore regretfully informs Wakira of its decision to invoke Article 24 of the Bill of Land,

effective immediately." Her voice hardened. "Firesvar also reserves the right to invoke Article 24 against any other Regionality found to be aiding or abetting the organisation calling itself the Children of Kerbin. Good day to you all."

The two Firesvarn marched stiffly out of the Council chamber, leaving a stunned silence in their wake. Burvis turned a furious shade of mottled green and opened her mouth to speak before a minute gesture from a flinty-eyed Lanrick made her snap it shut again in a thin-lipped, humourless smile. Chadwick and Aldwell exchanged glances, impassive faces not quite hiding the sudden shadows behind their eyes. *And no wonder*, thought Donman, *given their decidedly pro-Kerm stance*. Aldwell mumbled a perfunctory farewell before leaving the chamber behind his President. Burvis and Lanrick followed closely behind.

The Doreni leaders departed without saying a word. The openly worried Veidan leaders nodded politely and left, leaving Donman and Obrick at an empty Council table staring at each other in disbelief.

"Do you think we can stay out of it?" said Donman at last.

Obrick pinched the bridge of his nose. "I think so," he replied, "If anything, this should keep Wakira off our backs along the Northwest Border. I'll order Commander Valentina to step up the patrols but pull back to our side of the border and stay neutral. Then I'll need to call an emergency session of the Ruling Council - I trust you'll summon the Enclave?"

Donman nodded. "I will. In fact I think we should declare a joint session." He paused. "What about Starseed?"

"Fortunately," said Obrick, "Rockomax and the KIS are still shouldering most of the heavy lifting there. I think we have to assume that the Wakiran contributions are going on hold for the interim but I'll have to speak to Lanrick as soon as possible about securing Site D. The Skyhawk program is coming along well according to Lodan but still very much in the experimental phase..."

"I hate to say it," said Donman, "but what about Doren?"

Obrick sighed. "Probably what they always do - stay neutral and extract as much political capital as they can for doing nothing. We need them to hold up their end of Starseed but Kerm knows what they'll demand for it after Humilisia. He rubbed his forehead tiredly. "I need a drink."

"My office is closer if you'll settle for a coffee," replied Donman.

"May as well start as we mean to go on," said Obrick. "Lead on, Ambassador."

Corsen looked up from his monitor as Donman and Obrick strode into the office. "A short meeting, sir," he noted.

"Short and to the point," said Donman heavily. "Any messages?"

"Just one, sir." Corsen walked over to the coffee percolator on its table and began scooping ground beans into the filter basket. "A priority zero call from Professor Erlin at the Berelgan

regarding the Bar-Katon matter." He looked at Donman apologetically. "I would have sent word immediately, sir, but under the circumstances..."

Donman waved it away. "Indeed. Did Erlin leave a number?"

"On your desk sir." Corsen saw the expression on Obrick's face and added an extra scoopful to the basket. "I'll bring the coffee through once it's done."

Donman nodded his thanks and held his office door open for Obrick. It closed behind the two kerbals with a quiet but definite sounding click. Swiftly, he crossed the room and picked up the phone. "Good afternoon. Could I speak to Professor Erlin." A pause. "Yes, he said. With respect, Professor, this had better be good. Yes, I thought it would be." Donman sat bolt upright. "He did what? A medical team first? Well we can thank the Kerm for small mercies I suppose. So was the procedure successful?"

Obrick's eyes widened at the sudden expression on Donman's face.

"Very much so, Professor and more than you can imagine. Very well - please inform the Keepers that we'll be there as quickly as possible." A tone of wonder crept into his voice. "And I'd be obliged if you could convey my respects to... Elton and request an audience for myself and President Obrick. Thank you, Professor."

Donman put the telephone down and hurried through to the anteroom. Eyebrows raised, Obrick followed him.

"...airport and have them prepare the Spirit of Kolus for immediate departure to Barkton. We'll also need priority transportation from Barkton airport to the Grove."

"We'll *both* need transport?" said Obrick from the doorway. "Only, I seem to recall a large number of phone calls in my immediate future."

Donman began pulling files out of his cabinet. "You can do all that once we're airborne. We'll both need to witness this - only way to be sure."

"Witness what?" said Obrick impatiently. He was completely unprepared for the sudden fire in Donman's eyes.

"Something that we couldn't have dared hope for, Obrick! I'll brief you on the way, Mr President - we've got a war to stop."

Chapter 69

Crossroads

The *Spirit of Kolus* touched down on the main runway at Barkton airport. It had barely pulled onto the nearest taxiway before the whup-whup-whup of descending rotor blades sounded loudly overhead. The helicopter set down just long enough to pick up its two passengers before taking off into the pre-dawn sky, the first tinges of colour appearing on the horizon behind it...

Pioneer 6 stood on its launchpad, cradled within its gantries, caught in the light of Kerbol's first rays. At the appointed hour, six rocket engines roared into life, carrying three kerbonauts skywards on the first stage of their Munar voyage. Behind them the jubilant crowds watched them through the rapidly dissipating early morning mists...

The orders came through. Diesel engines rumbled into life as the convoy began to move. They crossed the border under the noonday sun, heading south through the mountains. By the time the trucks stopped again, the setting sun was throwing long, irregular shadows from their armoured flanks and in the distance, casting a deep pool of shade from the fortifications straddling the narrow pass...

Frantic radio messages criss-crossed the globe from the *Spirit of Kolus*, their pleas to speak to the other ten Pillars of Kerbin falling on the professionally deaf ears of aides and adjutants. Then, at the close of day, a single, short message flashed eastward.

The rockets tore through the evening sky, streaks of fire blooming into thunderous detonations that hurled broken blocks and broken bodies effortlessly aside.

"...rocket attack on Wakiran border positions. Numbers of dead and injured unknown at this time but feared to be high with survivors reporting that Ambassador Jerfun was amongst the casualties. Jerfun - the kerbal responsible for bringing the Kerm crisis into the public eye - now amongst the first victims of its latest, and most severe, escalation..."

The luminescent dials of a bedside radio set lit the musty room with a feeble glow. The room's occupant rolled over, buried its face against the wall and pulled the bedcovers over its head. A hand reached out, snapped a switch, and a little more light went out of the world.

"Flight, Bob. How do you read, Bob?"

"Scratchy but audible, Flight. Not bad, all things considered." Bob took another bite of ration cube. "You're working late, Gene. I thought Jeb was taking the night shifts?"

"Lucan found a message on the console this afternoon. Jeb's not feeling too good - asked to be excused from his shift. Not a problem - I wanted to do an operational assessment on the relay sats anyway."

"Makes sense, Flight. I've got time before bed - you want to start by checking the command loop?"

"Copy that, Bob." Geneney flipped a switch, jotted down a note in his flight log and then pressed a recessed button, held it down and pressed the button next to it. A light winked out on his console. "Flight recorder off, private channel opened - please confirm."

"Confirmed, Flight." Bob waited for a moment. "Okay, Gene, what's happening down there? If Jeb had two busted legs he'd get someone to wheel him in behind that console."

Geneney's reply was muted. "Wish I knew, Bob and it's the note that worries me most..."

Bob completed his thought. "Yep - definitely not Jeb's style."

"No. I think I'll go and find him tomorrow morning, see if anything's up."

Bob fell silent for a moment. "That'd make me feel better too, Gene - thanks. Tell him the crew were asking after him."

"Yeah... yeah I will do." Geneney pressed a button and waited for the console light to come back on before adjusting his headset. "Command loop checks out, Bob. Telemetry links look good - Lucan can run you through the formal tests on his next shift."

"Sure thing, Flight. If Luco could wait till after breakfast that'd be nominal. How're things over on your side of the Mün anyway?"

Geneney chuckled softly. "Ribory's sound asleep. Chad was too excited to get his head down so the science teams at Alpha and Foxham set up an extra session for him to run through the day's results. They're just finishing up now. A good day all in all, even if most of it's geology to me."

"I know that feeling, Flight - on both counts. Not quite what I meant though."

"No," Geneney said resignedly, "I thought it wasn't." He fidgeted with the lead on his headset. "No news on that front, Bob, probably because any news team with a gram of sense is getting out of the war zone as fast as they can. Lodan's been in meetings with the

President and Chief Ambassador all day, so at least Starseed still seems to be on the priority list."

"War zone," Bob repeated. "We should send the Firesvarn Pillars out here, Gene - give them the view from four hundred thousand kilometres and let them see what they're really fighting over."

"It's a tempting thought," Geneney agreed. "Anyhow, that's Chad finished and according to my flight schedule, it's time you were heading under the couches yourself. We've got the ship, Bob - sleep tight and don't let the kraken bite."

"See you in the morning, Dad." Bob said dryly. "Six, signing off for the night."

The warehouse stairs creaked underfoot, the aroma of old take-out food hanging in the air as Geneney climbed the stairs to Jeb's room. He put his ear against the closed door, listening hard for a moment before reluctantly knocking.

"Are you in there, Jeb?"

For a long minute there was silence and then, much to his relief, he heard a muffled grunt from inside.

"Okay if I come in?"

A second grunt percolated through the door, which Geneney chose to interpret as a yes. He turned the handle and gingerly opened the door, only for the smell of stale food to hit him in the face, mingled with a changing room miasma of rancid sweat and old socks. Hastily he closed the door, the click of the latch eliciting a third grunt from the shapeless heap stirring on the bed. Geneney surveyed the unwashed dishes stacked up in the sink and the pile of discarded clothes in one corner of the room.

"Long night, Jeb? " he said conversationally, "I don't reckon I've seen your room like this since the good old Institute days."

Jeb's head emerged from under the bedcovers. Geneney kept his expression carefully neutral at the sight of his friend's unkempt, greasy hair and the dark green bags under his eyes. "Do you want to talk about it?" he added gently, sitting down on the edge of the bed.

Jeb shook his head. "Nothing to talk about," he said. "Just another long week at the office, that's all. Haven't had time for much else."

Geneney nodded. "Gloomy in here," he said. "Mind if I open the drapes?"

Jeb shrugged. "Sure."

Geneney crossed the room, pulled back the blinds and opened the window a notch. The warm air from outside wafted in, cutting cleanly through the fog and stirring up ripples on the fetid grey water lurking around the dishes in the sink. He eyed the collection of beer bottles leaning against the draining board. *Okay, forget about going to Jorfurts.* "Well that

settles it," he said briskly, "I need a coffee, you look like you could use one too and I'd hate to disrupt whatever experiment you've got growing in here. No point heading over to the VAB, Dorny'll be run off his feet." Geneney turned to look at Jeb. "My place will be a bit quieter and I've even got some anise in the back of the cupboard somewhere."

Despite himself, Jeb smiled. "It's good of you Genie but there's no need. I'm fine - it's been a long week is all." He gestured around at the cluttered room. "I should get up, clear some of this junk away, get back to work. Prospector 1 isn't gonna launch itself."

"And all of that," said Geneney firmly, "will look a whole lot easier after a walk to clear your head, lunch that doesn't come in a kebab box, and a hot coffee to wash the last of the cobwebs out of that skull of yours."

Jeb held up his hands in mock surrender. "Okay, okay. But you'd better be right about that anise." He climbed out of bed, revealing a pair of creased and travel worn undershorts and went through to his moss room, closing the door behind him. Geneney waited for a second then retrieved a bin bag from under the sink and began gathering up the worst of the detritus. He rinsed out the empty bottles, dumped them into a recycling bag and was about to start on the washing up when he heard the moss room door opening behind him.

"I'm *fine*, Gene. I told you I'd clear this up myself."

Geneney turned around to face a damp and considerably fresher Jeb. "I know you did," he said equably. "Just thought I'd make myself useful whilst I was waiting."

Jeb eyed him suspiciously for a moment, then began rummaging around in his wardrobe. "Well in that case, if you could leave them outside the door. I'll dump them when I get back." He emerged, pulling a clean shirt over his head. "You know?" he said in a muffled voice, "I think you're right about that coffee."

Chapter 70

A Grove for a Grove

The wind howled against the cliff face, catching against the craggy overhangs and swirling over jutting edges of rock with a sepulchral moan. On the cliff top, a snow griv dropped onto all fours and raised its muzzle to the sky, adding its own shivering howl to the mournful chorus, as if to welcome the ghosts of history home to roost.

The squad leader suppressed a shiver as he studied the four mountaineers in front of him. Three tough, weatherbeaten kerbals, any one of whom looked like they could, and probably had, faced down a charging scallan. Their sergeant, Lukin, wore a band of dirty grey gronnek fur around the edge of his snow hood. Deep set eyes watched the squad leader from a nest of wrinkles and more than a kerbals's fair share of scars. *Gronneks don't shoot back though. And scallans don't have families. None that you'd care about anyway.* A gust of wind rattled the hut windows, shaking the heavy black drapes stapled over them and keening through a chink in the slatted walls. Safe behind its screen of sooty glass, the flame from the hanging kerosene lamp barely flickered. One the mountaineers flicked a sideways glance at the drapes, before turning her attention back to the squad leader.

"Did you find them?"

Lukin snorted. "Truly. Kerm knows why they're holed up there but they are."

The squad leader shrugged. "The main passes were too obvious and they needed to resupply before breaking clear of the mountains. For sure they won't be refuelling anywhere in Wakira without a fight."

"Figured that part for myself, sir." Lukin kept his face straight with an effort. "Could point them at three, maybe four better places within an hour's drive though."

"I'm sure you could, sergeant. But now you've found them, what did you figure to do about them."

"Draw 'em out and burn 'em down, sir. Open the taps, toss in a special flare or two rigged with sawdust and sparkles - should make a full enough job of them." Lukin hooked a gloved hand over his shoulder. "Let the guards catch a look at this collection of ugly mugs first, all accidental like, to pull 'em away from the camp. Then we knock them on the head, drag 'em behind a rock, and light off the trucks." He scowled at the squad leader's approving look. "Truly. We're Wakirans, not murderers. We'll even leave the seffleks a nice fire to keep warm by. Meantime, I'll be heading off quick and quiet to the first of those safe places."

"Volunteering for bonfire duty, sergeant?"

"Wouldn't trust that lot to keep their eyebrows in one piece, sir."

The squad leader contented himself with a nod. "And afterwards."

"Box gully just south of Hookeye Ridge, sir."

"I know it. Shoes on, people - time to go."

Each of the mountaineers unhooked a pair of four-toed snowshoes from his or her harness and strapped them on. Lukin snuffed out the kerosene lamp and cautiously poked his head out of the door, before gesturing for the squad to follow. They left in single file, rocking slightly on their unevenly soled footwear, snowflakes gusting into the hut behind them. At a murmured command they headed out into the night at a loping trot, leaving fresh trails of griv paw prints in the snow behind them. The squad leader clapped his sergeant on the shoulder and set off after them.

Doubt the shoes'll fool 'em for long but it might make the difference. And with any luck one of the seffleks'll fetch up against a real griv. Lukin checked the gear on his own harness, tied back the ear flaps on his snow hood and set off down the slope into the wind, drifting noiselessly from one rocky outcrop to the next.

An oily stench of diesel fuel was the first warning that he was getting close, the falling snow muffling sound and sight with equal facility. Cautiously he backed up against the cliff edge, trusting to the weather and his nondescript clothing for concealment. Gradually, his eyes adapted, picking out the expected edges of shadow against the night sky. Four logging trucks formed a perimeter at the edges of the camp, big bowsers of fuel strapped to their trailers. A darker, square bulk occupied the centre, a flicker of yellow light suddenly revealing an open door to a well lit interior and dim figures within.

Convenient. Six in there looks like, so another six on patrol by my last count. He unhooked a chunky radio handset from his belt and tapped the transmit key twice, then held it for a longer burst. Then he waited.

The sharp clatter of falling stones cut through the snow-swaddled night. There was a long pause and then another, fainter clatter. Lukin crept forward, ears straining for the sound of voices. eyes swivelling from side to side. He glanced up just in time to see a figure silhouetted against the skyline. Another, more distant, clatter reached his ears but still there was no response from the supply camp. Lukin waited patiently.

Kerm. Too dumb to notice or they know exactly what we're about. Either way it seems we're doing this the hard way. He tapped out a second coded transmission, two long bursts followed by three short, then dropped to the ground, edging towards the nearest truck on his belly, reaching for the weighted baton in his belt. One of the shadows by the cab resolved itself into the figure of a guard peering alertly around. Lukin backed away on fingers and toes; circling around, gathering himself.

Like taking down a gronnek.

He sprang to his feet, loping across the snow, weapon held across his chest. The guard spun around, reaching for his belt, just as the baton snapped out and caught him neatly behind the ear with a meaty thud. He dropped to the ground without a whimper.

Lukin flipped open the bowser hood, studied its innards for a second, then opened the main valve. Diesel gushed onto the snow, the sudden reek making his eyes water. Hastily he pulled out a rag, tied it round the valve to deaden the noise and struck it sharply with his baton. Satisfied that the - now badly bent - handle wasn't going to close again, he heaved the unconscious guard over his shoulder and took off in a crouching run. He laid the guard down behind the first convenient rock and pulled out his radio, thumb reaching for the transmit key.

Two answering rattles of static told him that two of the remaining bowzers had been disabled. He clenched his fists, willing the last of the saboteurs to report in. The radio hissed in his hand in one long then two short bursts. *Retreating. Cannot engage without compromising position.* Lukin swore under his breath then sent his final message of the night.

Three balls of brilliant white light lit up the sky in quick succession, throwing jagged shadows over the encampment before dropping into the rapidly spreading, glistening slicks of fuel. The cabin door burst open, armed kerbals spilling out, just as the flares burst open with a loud crack scattering sawdust and burning magnesium shavings over the snow. With a deceptively soft whump, the diesel ignited, sending tongues of orange flame racing across the ground. Before the horrified Firesvarn guards could react, the flames reached the trucks, charring paintwork and igniting tyres in blazing clouds of choking black smoke. Metal warped and twisted in the heat, rivets popped, joints flexed open pouring out yet more fuel.

The guards ran.

Amidst the chaos, three kerbals slipped quietly away into the night, leaving nothing but three trails of boot prints in the snow. A single trail of four toed paw prints, scuffed and dragged out as if made by a wounded animal, petered out amongst a rocky slope leading up to a narrow cave entrance.

"Vanguard is outbound. Bearing two-two-five for waypoint alpha."

"Copy that, Vanguard."

Val checked her instruments and, satisfied, leaned back in her ejection seat. "Any news from Zephyr, Control?"

"Just scheduled civilian flights, Vanguard. No Firesvarn movement on the ground, nothing heading for Nordham Bay."

"Good," said Val briefly. She glanced out of her cockpit canopy, searching for the rest of her patrol. "Last thing we need is disrupted shipping on top of everything else." The glint of sunlight on steel revealed two other aircraft flying alongside her in a shallow V formation. She clicked a button. "Ferl - you with us?"

"Right above you," came the laconic reply.

"How's that radar holding up?"

"Doing fine. Too bad there's nowhere to wedge one into a Clouddrunner."

"Yeah. We're dropping to eyeball height. Shout if you see anything up there."

"Will do."

Val clicked her radio back to the air-to-ground channel. "Coming up on alpha, Control. Descending to reconnaissance altitude."

"Copy, Vanguard. They should be expecting you but make sure you stay on the right side of the border anyway."

"Not a problem, Control. That easterly wind is holding steady - should carry the packages right where they're needed."

The four aircraft flew on, the Kolan tundra unrolling relentlessly under them broken only by the thin and, Val was surprised to see, mostly deserted thread of the Northern Highway. Ferl reported a steady stream of radar contacts from the west but after Val's terse warning to one patrol which came perilously close to crossing the border, the Wakiran forces kept a respectful distance. The tundra began to give way to scrubland and patches of conifer forest, and then to the first signs of cultivated land and kerbal habitation. A light flashed on Val's instrument panel accompanied by a chime from the waypoint indicator.

"I'll take the first delivery. Watch my back and for Kerm's sake make sure you hit the next waypoint!" Val checked her transponder settings and pushed her control stick forward, easing the Clouddrunner into a shallow dive. "We're here to offer our help - and make a point - we're not here to get involved!"

The outskirts of a small kerman town appeared on the horizon, surrounded by a scattering of Groves. Val banked to the right, carefully adjusting her heading, then rolled level and uncaged a button on her control stick. "Vanguard, payload armed." Her eyes darted from canopy to waypoint indicator and back, judging distances, waiting for the exact moment. "Deploying payload!" She tipped her aircraft onto a wingtip, banking hard left, fingers clenching around the weapon release button. The torpedo pylon under the Clouddrunner's belly sprang open and a rounded tubular capsule tumbled away towards the ground.

Explosive bolts fired, fragmenting the capsule and scattering hundreds of brightly coloured streamers across the sky, each tied to a small cardboard message tube. The wind caught the streamers, carrying them across the border and depositing them across swathes of Wakiran farmland.

One by one the other Vanguard pilots followed Val's lead: diving for the border then pulling away leaving nothing behind but a cloud of colourful streamers to flutter down over towns and villages, fields and Kerm trees.

Gunfire hammered down the road, almost drowning out the roar of heavy diesel engines.

Designed to stop a charging snow griv at a safe distance - and if that failed, to put another half-dozen rounds into it before it closed to an *unsafe* distance - each shot from the heavy, semi-automatic hunting rifles was deafening by itself. Together, they melted into a brutal, nerve-shredding din that bypassed mere eardrums and pounded the brain to an insensate mass. The Wakiran troops lay flat on the floors of their vehicles, cowering under seats, curling up in footwells, arms wrapped protectively around their heads. Bullets ripped through the air, smashing safety glass, ripping into upholstery, whining off door pillars, ricocheting around passenger compartments.

The platoon leader flung open his door. Under no illusion that a few millimetres of steel would offer any real protection, he peered through the chink between door and hinge, trying to catch a glimpse of the approaching enemy forces. Seeing nothing, he steeled himself to lean out a little further.

The rebounding door slammed into its frame. The truck lurched on its suspension, throwing the commander hard against one arm. He felt, rather than heard, a dull snap. Sheets of jagged fire strobed before his eyes and he clenched his jaw in a futile attempt to not scream. The truck lurched again, steel shrieking against steel as it rocked wildly. The commander tumbled over the handbrake, the blow knocking the wind out of him. He fell against the opposite door and this time the fire was engulfed in black.

He awoke to an ominous silence. One-handed he struggled to haul himself into his seat, not daring to inspect the throbbing weight hanging from his other shoulder. *Strange - I thought it would hurt more than this.* His hand trailed over the edge of the seat cushion, the momentary friction enough to scrape bone against bone.

Ahh.

Blinking exploding stars out of his eyes, the platoon leader looked around. The truck was ruined; buckled door wedged into its equally buckled frame, side panels bowing inwards and what remained of the roof riddled with bullet holes. Pellets of broken safety glass crunched unnervingly as he shifted in his seat. The other trucks in his platoon hadn't fared any better. Knocked sideways, or in most cases, off the road altogether, one of them perilously close to fetching up against a tree trunk, their makeshift roadblock had been comprehensively

demolished. The commander screwed his eyes shut against more than the agony in his arm.

"Squads - report in by truck."

He waited, ignoring the shaken but heartfelt swearing from the back of his own truck. *Besides - I couldn't have put it better myself.*

"Alpha-one. Two kerbals down, sir! No fatalities."

"Alpha-two is all-in. No damage here but bruised egos, sir."

"Bravo-one - all-in, shaken but not stirred!"

"Bravo-two - three kerbals down... and we'll be sending Calley back to her Grove, sir."

The radio went very quiet.

"Understood, Bravo-two. Charlie-one?"

"All-in, sir. No shortage of bruises but nothing that'll stop anyone holding a spade for Calley."

"Copy." He clicked the radio off and carefully turned round in his seat. "Sure wasn't hearing any bruised mouths back there. What about the rest of you?"

"Count us in for spade duty too, sir."

The radio clicked on again. "Charlie-two reporting all-in. Anyone that can move, move. Barrim, Sidgan, please render medical assistance to Alpha-one and Bravo-two. Barrim - a word with you once you're done please. Everyone else - gear check on your transport and equipment. I don't care how much sky you can see through the roof - I want a scouting force after those Firesvarn seffleks before they do any more damage. Start at the two Groves up the road and for Kerm's sake keep your heads down."

Two of the six trucks were wrecked beyond repair and all of the remaining four were windowless, dented and badly shot up. Fortunately, one of them still had an intact set of tyres and, after a brief inspection, four kerbals from Bravo squad piled in with their equipment and weapons and drove off. After a brief conference with his sergeant, the platoon leader sent out two patrols drawn from trucks Alpha-two and Charlie-one. Whilst Barrim and Sidgan tended to the injured, the rest of the platoon set to work pushing their vehicles into the middle of the road and overturning them.

By the time the scouting party returned, the roadblock was back in place and a crackling fire built behind it. Bandaged kerbals stood by the warmth, sipping from tin mugs, their comrades busily stripping and cleaning weapons and repacking rucksacks. The side of the road was marked by a shallow mound of fresh earth.

"Report."

"They didn't go anywhere near either village, sir. Far as we could tell from talking to the villagers, they went out of their way to skirt around both Groves."

A raised eyebrow. "And you took their word for it?"

"No, sir. We reced the area. Checked the rest of the Groves in the group too - nothing doing. The last anybody saw of them, they were heading southeast. Too much territory that way for a quick look, sir and since they don't seem to be looking to take any nearby Groves, we came back to report."

The platoon leader adjusted his sling, scratching absently at the thick roll of bandage around his arm. "If they're not capturing old Groves, they must be trying to claim ground for new ones. Not good but it beats the alternative. Break out the maps."

"Yes, sir." The scout ran back to his truck and retrieved a bundle of acetate rolls, which he quickly spread over the ground. The platoon gathered round, alternately studying the map or their commander.

"Southeast?"

"Yes, sir."

"They're going cross-country then." He jabbed a finger at a line of hills sheltering an expanse of forest. "Probably heading for the Bouldertops - they're the nearest clear territory to here. We've got them marked for Groves ourselves but they don't have any defending forces to speak of. Command didn't reckon we'd need them this far over the border." The platoon leader grimaced. "Give them enough time to bed in and knotweed would be easier to shift." He jumped to his feet and made for his truck, followed by his platoon sergeant. "Command'll need to know about this. For sure we're not going to be digging them out ourselves."

Lemke stole through the forest, creeping through the undergrowth, alert for Firesvarn pickets - or for a loose twig underfoot that would give away his position. Up ahead he spotted a tree liberally festooned with balls of twigs and moss, white feathers visible inside some of them. Automatically, he shifted course, working his way around a clump of thorn bushes, staying downwind of the woodjar rookery.

A twig snapped. Lemke froze against a tree trunk, eyes darting left and right. A dip in the ground, fringed by more bushes offered better shelter, the hard ground and drifts of dried thorns underfoot sufficient to hide his passage. He dashed forward, lifting his feet high to avoid scuff marks and dropped to his belly. Silently, his hand dropped to the knife sheathed at his waist.

He spotted a pair of boots through the bushes and held his breath. They stopped and Lemke heard a muffled clink of equipment as the Firesvarn soldier dropped to one knee, fumbling with his laces. Lemke measured the distance between them by eye, mouth suddenly dry. *Up, across, head back and slice. One less picket to warn the rest.* He set his jaw. I can do this. The Firesvarn straightened up, waited for a nerve-jangling minute then set off again, Lemke's head swivelling to track him.

I can do this. I have to do this.

Lemke launched himself from the dip and threw himself across the forest floor, drawing his knife as he went. He flung his other arm out in preparation, ready to lock it round his enemy's throat. A mottled olive-and-brown jacket filled his vision, short neck and close-cropped black hair above it. Hair not so very different from his own. Hair that snapped round revealing wide open, terrified eyes.

I can't do this.

The blade swung up and back. Lemke lashed out, slamming the hilt of his knife awkwardly into the side of the other's head. The Firesvarn dropped bonelessly to the forest floor, eyes rolling back into their sockets. Lemke dropped the knife and fell to one knee, catching him, fingers feeling for a pulse. When he found the beat, weak but steady, he almost collapsed too, limbs suddenly shaking uncontrollably.

Can't leave. Must leave. Must hide. Crush berry.

He dragged the unconscious soldier into the dip he'd just vacated and heaved him onto his side. He broke off a spray of berries from the nearest thornbush and crushed them between his fingers, gagging at the sudden rotting stench. He wiped the brownish juice over the Firesvarn's face and hands then scrubbed his fingers vigorously on the other's jacket.

Not dead but smells dead. Smells bad. Need to find. Make trail.

Hastily, Lemke scooped out a trench in the leaf litter. Removing the Firesvarn's belt, he tied the soldier's wrists together behind his back, rolled him into the trench and piled the litter back over him. Breaking off branches from the nearby bushes, he arranged them on top of the limp form until it was mostly hidden under a blanket of thorns. He climbed to his feet and cut a shallow blaze in the nearest tree trunk, not enough to damage it but clear enough for all that knew to see. He set off into the forest again, marking a trail as he went.

The first skirmish had been relatively short. Deprived of their scouts, the Firesvarn at the valley entrance were caught by surprise and then overpowered by superior Wakiran numbers. Although the fighting had been fierce, casualties were mercifully low, the Firesvarn commander unwilling to waste the lives of his troops once the true size of the Wakiran forces became apparent. After a brief foray into the forest to retrieve Lemke's and, he had been relieved to see, a number of other scouts, the prisoners were now on their way to the nearest town.

The second skirmish had not been short.

Lemke skidded behind a boulder, leaned out, fired, ducked back. Incoming rounds tore chips of stone off his meagre cover in reply. Rifle fire echoed from the surrounding hills in a savage counterpoint to the screams and shouted orders coming from his radio. He heard a rapid burst of fire somewhere to his right and the bullets whining over his head abruptly ceased.

"To me!" Another Wakiran soldier waved at him frantically from behind a larger outcrop of rock. "Go, go, go!"

Lemke grabbed his own weapon and sprinted across the uneven ground, throwing himself to the ground amidst another deafening exchange. The blue band on his companion's sleeve marked him as being from a different platoon. "Lemke - twenty-first," he shouted over the gunfire. "You?"

"Nedrim. Fifteenth under Lenory!"

"Thought your lot were taking the next hill over!"

"Yep! Got split up by those seffleks," Nedrim aimed a rude gesture downhill, "down there!"

"Right!"

Lemke caught a glimpse of movement to his left, turned and fired. His shots went high forcing the approaching soldier to the ground. Nedrim's rifle roared and the soldier rolled over once and lay still. He scanned the hillside, searching for cover, fingers busy reloading his own rifle. Nedrim grabbed his arm and pointed. "That way I reckon."

Lemke nodded in reply, eyes darting from tussock to tussock, searching for more Firesvarn. "You go first - I'll cover you." He saw Nedrim sprint away in a crouching run, zig-zagging up the hill, head flicking back and forth. His rifle barrel twitched back and forth in sympathy as he tried to watch in all directions at once. Nedrim threw himself into a shallow dip, looked round, then gestured for Lemke to follow him.

A single shot rang out, startlingly close amidst the background chaos. Lemke slid feet-first into the hollow, just in time to see Nedrim topple forward. Time seemed to slow down as he stared at the other kerbal in sudden disbelief, barely registering the blood and tissues spattering his own uniform or fluids seeping into the grass from what remained of Nedrim's skull. From the back it seemed strangely undamaged.

The part of Lemke's mind that wasn't yammering in shock flung him sideways and round, desperately trying to bring his rifle to bear on the attacker behind him. Something flared in the corner of his eye and he felt a sudden dull pain in his chest. Hitting the ground awkwardly, he rolled onto his back, both hands patting the front of his jacket curiously.

The sky seemed to turn pale and grey, clouds gathering around the tops of the Bouldertop hills. Lemke touched his damp sleeve with a finger. *Must be raining. I should get to shelter.* He tried to sit up but nothing seemed to work any more. His joints felt as if they were packed with sand; gritty, slow, unwilling to move. His eyes felt suddenly heavy, the leathery rasp as they rolled back against his eyelids almost soothing. *Like a... like a...*

Lemke's rifle slipped out of his hands. One leg twitched briefly and then fell still.

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Bleakly, the Firesvar commander surveyed the aftermath of the second skirmish, the remains of his personal platoon gathered silently around him. Bodies littered the battlefield, Firesvarn and Wakiran alike. Each of them a mother's son or daughter lying dead on a hillside far from home.

Chapter 71

No Borders

The gangplank shifted under Gusden's feet. He leaned forward, balancing on the balls of his feet as he addressed the older kerbal on the quayside. "And remember your air cover. The forward operating base on Humilisia is provisioned for the next four months; fuelled and munitioned for two, assuming worst case projections. So use them." He smiled humourlessly. "I'm pulling rank on you, Commander. Apart from your flagship, the rest of the new corvettes are coming to the Jhazi Straits with me." Gusden jerked a thumb over his shoulder. "With that old barge in tow too, hopefully they'll be a big enough stick to keep the Firesvarn away from the west coast. You'll get the next lot of corvettes but they won't be ready for a couple of weeks yet. For now, I'm relying on you to hold off our Doreni friends if they poke their bows over the horizon."

The other kerbal stared at him impassively. "By your orders, Fleet Commander."

Gusden looked at her thoughtfully then dipped his head in a brief salute. "Good luck, Commander."

His second-in-command watched him stride up the gangplank and step through a gap in the rail around the sharply raked bow. Gusden walked briskly aft, past the stepped gun turrets on the forward deck, and through the door to the bridge. Further aft, behind the main superstructure, a third sternward-facing turret guarded the lifeboat stations. Smaller gun barrels jutted out from recessed bays along the superstructure flanks.

A whistle blew and two flags unfurled over the radar mast. One sported the ancient green-on-blue diagonal bars of the Regionality of Kolus. The second was a much newer addition to the Kerbin Maritime Code; it's quartered black-on-white denoting an armed combat vessel.

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The mid-morning sun burned in a cloudless, azure desert sky, raising shimmering pools from the sandy ground and glaring brightly enough from the white-painted blockhouses to dazzle

the unprotected eye. The cranes and floodlight poles surrounding the entrances to the Site D underground test stands shone like webs of liquid fire. Wernher sat under an awning on the western side of the main test bunker, an outsized sunhat perched atop his head and a tepid and rapidly drying towel draped around his neck. A large bottle of water and a small portable radio sat on the ground beside his camp chair.

"...that was the KBS one o'clock news. The headlines again; the death toll continues to rise as Firesvarn and Wakiran forces struggle for control of the Bouldertop hills and other key positions along the border. Meanwhile..."

Wernher reached down and clicked off the radio. Behind him the bunker door scraped open, pushing a drift of sand out of its way. Hading emerged, carrying his own dripping bottle and took one look at Wernher's face. "That good is it?" he asked.

"And getting worse," said Wernher. "At least around the Bouldertops and it sounds like the fighting is spreading along the border." He sighed. "No details to speak of - just a note that, and I quote, "the death toll continues to rise". I'm not sure if numbers would make that better or worse."

Hading sat down heavily. "S'pose we can count ourselves lucky," he said at last. "If they're looking for places to plant Kerm, we're about as far from there as you could get. Doesn't help the poor slasherns up there on the sharp end though." He took a long drink from his bottle. "Looks like the KNSA were right - trucking fissiles around in the current climate is just asking for trouble."

Wernher nodded soberly. "At the enrichment levels we're using for the LV-N reactors, it wouldn't take too much material for a..." He paused, hunting for the right words. "A deliberate prompt-critical excursion. Thankfully, I suspect that anyone trying to engineer such a thing are more likely to kill themselves in a variety of unpleasant ways than build a working article."

"Not that likely," said Hading grimly. "The Kerbin Nuclear Standards Agency commissioned any number of safety studies back when nuclear fission became a practical technology. The idea was to figure out what configurations and conditions would make a reactor go pop and then avoid them. Long story short, it would take some care during manufacture but any half-competent nuclear engineer with access to the right neutron transport codes could design something capable of going catastrophically prompt-critical."

"If they were also completely insane," said Wernher. "Settling a dispute over Kerm planting territory by turning it into a radioactive cinder?" He shook his head. "Utter madness."

"Especially when they could just pack a lot of low-enriched fuel around a normal explosive charge and irradiate the place without destroying it," said Hading.

"Blight take it, that's even worse." Wernher looked sickened by the thought. "There's insanity and there's nasty, petty "if we can't have it nobody can" insanity. If we ever descend to *that* level I'll be on the first ship out to Duna because Kerbin won't be a place I'll want to live anymore!"

"I'd be right behind you," said Hading. "And speaking of trips to Duna, that last test run was no better than the rest. Control drum synching is still off, so we don't have enough safety margin with the neutron reflectors to operate at full flow and I'm starting to think we wouldn't get the power density even if we could."

"Wider coolant channels?" asked Wernher.

"Looks like we'll need them," said Hading. "And a better cooling system for the core support. Radial power distribution still isn't right either - we need to look at the fuel loading in the outer elements again."

"So, a complete rebuild then," said Wernher. "Which means we're stuck until the KNSA release the next shipment."

Hading nodded glumly. "At least we'll have plenty of time to work up the new design. Whatever we do though, we're still going to be thermally constrained. There's only so hot we can run the thing before it melts. No way around that..." his voice trailed off. Wernher looked at him curiously. "Unless we don't bother containing the reaction."

"What?"

Hading raised a hand. "Hear me out. What if we build a small prompt-critical device, embed it in a block of propellant and set the whole thing off behind the spacecraft? Should give us very respectable thrust at a ridiculous specific impulse."

"And a vaporised spacecraft," said Wernher. To his astonishment Hading just grinned.

"Didn't you ever put a firecracker under a tin can when you were a kerblet?" He ignored Wernher's indignant look. "Works best if you prop the can up on something to create an air gap around the base." Hading's expression turned reminiscent. "You can really get some height if you use a decent sized 'cracker."

"I'm not sure how to tell you this," said Wernher carefully. "But a firecracker doesn't really compare very well to a nuclear explosive."

"Oh I don't know," said Hading. "Get the opacities right and set the thing off at the right distance from the spacecraft and it might work." He waved a hand in the general direction of the desert. "Launch from somewhere out of harm's way of course."

"And sell pieces of the glass as souvenirs?" said Wernher politely.

Hading looked puzzled for a moment then caught sight of Wernher's face. "Souvenir glow-in-the-dark night-lights," he agreed. "Ahh, it was just a thought. The KNSA would never go for it anyway."

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"...that was the KBS one o'clock news. The headlines again; the death toll continues to rise as Firesvarn and Wakiran forces struggle for control of the Bouldertop hills and other key positions along the border. Meanwhile..."

Gerselle switched off the radio and slumped into her sack chair. Across the room, Jonton lifted his head and caught her gaze briefly before returning his attention to the elastic cords tethering his feet to the wall behind him. Clenching his teeth he lowered his legs, hands pressed firmly over the waist straps holding him to the bed, squeezing them against the bandages wrapped around his middle.

Down...and hold...and slowly up...and...ow...relax. And down again. And repeat...

Gerselle saw the flicker of tension in his eyes. "Is it getting any better?" she asked.

Jonton grimaced. "Not quickly enough. Elton did his best but the scars are still tender." He gestured disgustedly at the walking sticks propped within easy reach of the bedside. "And Kerm knows how long it'll be before I can put those away. I don't think we can afford to wait any longer though - as soon as I can climb into a car without tearing myself in half, we need to go."

Gerselle nodded. "I spoke to Meleny," she said softly. "She and Thombal will take Joenie in if anything happens."

"And we're still leaving the hut to her and Elton?"

"If we can," said Gerselle. "I had Jerdin go through the Archives but he couldn't find anything about leaving property to 'non-legal persons' as he put it."

"I didn't think he would," said Jonton. "All the more reason to force the issue." He saw Gerselle's doubtful look. "We don't have any choice love. If Enely's plan works, then it doesn't matter anyway - Awakened Kerm will *have* to be recognised before Grove law. On the other hand, if Enely's plan doesn't work then we have to make sure that Elton isn't forgotten - and a big high-profile court case will be perfect for that."

"If we can find anyone to file it," said Gerselle.

"We will," said Jonton confidently. "Jerdin knows plenty of legalists - we'll just introduce them to Elton and they'll be queuing up to be involved in a piece of legal history!"

Gerselle raised her eyebrows. "You should probably see if Elton wants the hut first," she said dryly. She glanced at the radio and a worried look passed across her face. "Has he... asked yet?"

Jonton's face froze. "Not yet," he said. "He hasn't mentioned it and to be honest, I've been happy to leave him in peace for the moment."

Gerselle heard the front door opening, accompanied by a clatter of footsteps and Joenie's high speed chatter. "We haven't got time for that either, Jonton Kermol," she said. "We need to talk to him tonight, as soon as Joenie's settled. All of us - you, me and Enely."

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"So the LV-N programme is on hold?"

"It is," said Lodan. "By order of the KNSA and confirmed by the Council of Twelve Pillars. Security at all open uranium mines is on high alert, supply depots are locked down for the duration, and any and all movement of nuclear materials is prohibited until such time as a cessation of hostilities between Wakira and Firesvar is declared. Fortunately, the KNSA also had the foresight to advance the reactor resupply schedule shortly after the Kerm crisis broke, so power generation and research reactors will not be affected, although security is being stepped up there as well."

Ademone made a note on her pad and flipped over the next page of the agenda. "Next item. In-situ resource utilisation. Otherwise known as the dirt-to-fuel programme. Dunney?"

Dunney cleared his throat. "As you'll all be aware, Probodyne currently have a fleet of Hope probes en-route to the Duna system, tasked with pinning down the availability of raw materials for propellant manufacture. In the meantime, as a starting point, we commissioned Reaction Systems Ltd to build proof-of-concept reactors for synthesising methane and ammonia from carbon dioxide and nitrogen respectively, both of which we already know are present in the Dunan atmosphere. Preliminary experiments have gone well, demonstrating operational feasibility in a simulated Dunan atmosphere. A source of hydrogen will also be required for both reactions, which we hope to obtain that from sub-surface water. Alternatively we could transport hydrogen from Kerbin either as a gas or as water."

Dunney sipped his coffee. "Methane and ammonia are both useful raw materials in their own right but, more importantly, we believe they provide us with a tentative mission architecture for Starseed." He nodded politely at Geneney.

"The Site D team," said Geneney, "have been evaluating various propulsion options for the colony ships. The currently favoured option is a nuclear-thermal engine using ammonia as the propellant. In terms of raw performance, ammonia is substantially worse than pure hydrogen but still offers a significant improvement over conventional engines burning hydrogen and oxygen - hydrolox in engineering parlance. However, the logistics of using ammonia propellant are vastly more straightforward than using hydrogen and we also have some hope of extracting ammonia from Minmus which would ease the Starseed launch schedule significantly. Ideally, we'd also be able to harvest ammonia from Ike to refuel the colony ships for the return journey to Kerbin. However, manufacturing ammonia at Duna would be an acceptable backup plan."

"The KNSA are not going to be happy about launching large numbers of nuclear engines to orbit," said Lodan thoughtfully. "Is hydrolox the best alternative we've got?"

"Yes," said Ademone. "The propellants team at Rockomax have investigated a number of...more exotic options but they're quite frankly terrifying. And if anything, their large scale manufacture, storage and combustion pose a greater environmental and personnel risk than using nuclear engines." She removed a stack of reports from her case and slid them across the table. "We do intend to publish our results in case anyone can build on them but for now, I think you'll agree that these don't solve any of our immediate problems."

Dunney skimmed the summary page and blanched. "No indeed, he murmured. "I remember reading about some of these once and I'm fairly sure that some of them set fire to sand, let alone maintenance crews."

Geneney's eyebrows shot up. "I'm not sure whether to be impressed or horrified," he said. "Either way, I'd burn a Kerm tree before putting a pilot on top of these. What about you, Jeb?"

"Hmmm?"

"These propellant combinations. Too risky for crewed flights?"

Jeb glanced at his copy of Ademone's report. "Probably. They look nasty."

Geneney caught Lodan's expression and shook his head minutely. "I'd say so too. Anyway, moving on. We can use ammonia in a nuclear engine and it makes a reasonable fuel for a lox engine too although we never got it to work particularly well. Methane makes a good fuel too - we used it quite a lot in the early days for our smaller rockets. To cut a long story short, we passed our designs over to Periapsis Ltd over in Doren and set them to work developing scaled up versions of both engines."

Geneney steepled his fingers over the bridge of his nose before resting them on the arms of his chair. "Our tentative Starseed crewed mission architecture therefore involves three stages. Standard launch to low Kerbin orbit and rendezvous with the colony ship, transfer to Duna orbit, and then transfer to the surface by reusable shuttle. Colony ships to be powered by ammonia-fuelled nuclear engines, shuttles to be powered by either ammonia or methane-fuelled conventional lox engines. Ammonia for the colony ships to be harvested at Minmus for the outbound journey and either harvested at Ike or manufactured on Duna for the return journey. All propellants for the shuttles to be manufactured on Duna."

"Periapsis aren't much more than a start-up at the moment," Ademone added, "but they're competent and they're expanding." She looked at Lodan. "Assigning the Duna shuttle project to Doren would give them some useful political capital and it's not as if Rockomax have the resources to start up another major project."

Lodan favoured her with a half smile. "Noted. Although I always thought that periapsis was the lowest point on an orbit. A strange choice of name for a rapidly growing company."

Geneney coughed. "Without wishing to burden everyone with mathematics, various orbital manoeuvres are best performed at the lowest possible altitude. Hence their 'rockets work better at Periapsis' slogan and other assorted in-jokes."

Ademone rolled her eyes. "That," she noted, with a sideways glance at Jeb, "is what happens when you let engineers do marketing." Jeb looked up and then, much to her surprise, shrugged and turned back to his copy of the propellant report.

Lodan shot Geneney a concerned look. "Last item for today," he said. "The Prospector programme. Status please."

"Prospector 1 is on orbit," said Geneney. "The Rockomax Stretch booster performed flawlessly, placing the empty command, habitation, and service modules into the intended orbit. The crew are on the pad as we speak, launching in a Pioneer command and service module aboard an Eve booster. Primary flight objectives: testing the new autonomous rendezvous and docking systems for future automated logistics flights, full duration test of the habitation module, crew EVA transfer testing between the command and habitation modules, full systems test and manoeuvrability test of the Prospector stack, excluding the Minmus lander. Ademone?"

"Stretch booster construction for Prospector 2 is complete," said Ademone. "Habitation module, lander and CSM are undergoing post-assembly checkout but at the moment we're on schedule. We're using a Pioneer lander for expediency which gives us a considerable fuel margin for a Minmus landing. Crew training is proceeding smoothly with the first integrated sims beginning this week. Primary flight objectives: orbit Minmus and return to Kerbin. Secondary flight objectives, validate lander systems and seismograph network, landing attempt to proceed if all systems nominal."

For a moment Dunney's eyes sparkled. Then they clouded over again. "And after Prospector 2?" he asked.

"That," said Lodan flatly, "depends on the political circumstances at the time. Our next priorities are the Endurance 2 centrifuge station, the on-orbit refuelling programme and ground test evaluations of the ice mining equipment. All three projects are underway. Whether our priorities will still align with Council priorities after Prospector 2 remains to be seen.

Geneney's eyes flicked towards the wall-mounted speaker box suspended over Lodan's head. He unclipped his pager from his belt and set it down on the conference table. "The crew should be on their way to orbit by now," he said quietly. "Shall we?"

Lodan nodded and flipped a switch on the wall.

"...understood, Prospector. Decoupler D armed. Go for staging."

"Flight, Prospector. Second stage ignition confirmed. Launch escape jettison confirmed. Getting some real bright light through the windows, Flight."

"It keeps getting better from here, Prospector. Copy your LES is gone."

Lodan studied the four kerbals sitting around the table. Geneney's and Ademone's eyes were locked on the speaker box. Dunney stared unseeingly at his notes, frowning occasionally then nodding in satisfaction. Jeb cocked his head, lips moving soundlessly along with the reports from the capsule crew.

"We have a horizon, Flight. Guidance mode orbital."

"Confirmed, Prospector. We're tracking your projected apoapsis at one-eighty-five on the nose."

"Thank you, Flight. Feels like that pogo is damping now."

"Booster concurs, Prospector. FD calculates T plus twenty-five on second stage shutdown."

A second voice came over the air. *"Taking it slow and steady, Flight. Works for me."*

Lodan raised an eyebrow at Dunney who tapped Geneney on the shoulder and mouthed 'who?' at him. Geneney frowned at him, trying to understand the question. Then his face cleared and he scribbled 'Seelan' on his note pad. Quietly, Dunney passed the pad across to Lodan.

"We've got a periapsis, Flight. Standing by for shutdown."

"Flight copies, Prospector."

"And three...two...one...engine stop..."

"Booster separation confirmed, orbit is one-eighty-five by one-seven-nine. Orienting for sightseeing orbit!"

Dunney grinned at Geneney and Ademone and even Jeb managed a smile.

"Ohhh. Kerm is that pretty!"

"Oh wow. Got all sorts of mountains here, Flight. West coast of Doren, Humilisia if you squint real hard, but Veiid... northern Veiid js just spectacular!"

"No lines though, Flight."

"Say again, Prospector?"

"No lines," Seelan repeated. "No borders, no lines on the map. Veiid, Doren - it all looks the same."

And with apologies to Bruce Dickinson:

*When I stand before you; shining in the early morning sun
When I feel the engines roar and I think of what we've done
Oh the bittersweet reflection as we kiss the earth goodbye
As the waves and echoes of the towns become the ghosts of time*

*Over borders that divide the Kerm-bound tribes
No creed and no religion; we the hundred willing souls
Who will ride these thunderbirds, silver shadows on the earth
A thousand leagues away, our lands of birth*

Chapter 72

Hot and Cold

Elton's leaves closed over Jonton's head. Linking with the Kerm was effortless, although Jonton was unsure whether that was due to Communing with a sapient Kerm or to the lingering after-effects of his time spent an-Kerm. The familiar white light seemed deeper, more richly textured than ever before, and coloured in all the whites imaginable, from fresh paper to the soft fluff of an old kerbal's hair. Then it faded into the background and Jonton felt himself surrounded by Elton's presence.

<good evening, Jonton>

Good evening, Elton. Umm - Gerselle and Enely would like to join us if that's alright?

<of course. They are always welcome> A hint of reproach. *<you know this>*

Jonton came *forward*, letting his link with Elton slip to the back of his mind. Across the room he saw Enely and Gerselle watching him anxiously from their bunks and flashed them a quick thumbs up. He waited just long enough to see the leaves descending towards their heads before giving himself wholly over to the link again. Moments later he sensed Enely and Gerselle joining the Communion and sharing an awkward greeting with Elton.

<I am glad you are here, my friends. I have been waiting to speak to you all>

We...we've been waiting to speak to you too, Elton, Jonton said diffidently.

<perhaps we wish to speak of the same thing. I have been thinking about the Seeding>

The sense of relief from Gerselle and Enely flared brightly, both kerbals hastily damping down their emotions. Jonton felt the tension drain out of his own body, leaving him light-headed and faintly giddy.

<I sense that you too wanted to speak of this>

Very much, Elton. Very much indeed. If we could ask - what have you been thinking about?

<soil. From our memories I know that the world does not have enough soil for this Seeding. I know that kerbals fly to other worlds to find more. They do not think they will find it soon enough. I agree>

The three kerbals nodded.

<so now kerbals fight over soil. This has happened before. This always happens. But when Jonton and I were one, we shared our soil that another Kerm may live>

Yes, said Gerselle cautiously, *We thought about asking more Keepers to become one with their Kerm so that they could share their soil too but we thought that becoming one would kill the Kerm. The original Kerm that is, the unawakened Kerm.* Gerselle broke off helplessly. *How can I explain this?*

<I feel your confusion. Thinking about the I before I was difficult but now I understand>

But thanks to you we know better, Enely broke in. *Becoming one with their Keepers could help all Kerm awaken from that I before I!*

And that's what we wanted to talk to you about, said Jonton. *We think we can awaken all the Kerm - and then ask them to share their soil with the Kerm yet to seed. But we wanted to hear your thoughts first.*

<there will be much danger. I remember your pain, first of my Keepers, and fear for the other Keepers. But to not do this will be worse>

That's what we thought, said Jonton. *Myself, Gerselle, Enely and the other kerbals you have spoken to. He took a deep breath. But we will need more time. Some kerbals think the only way to buy enough time is to freeze the new Kerm seeds until we have enough soil to plant them.*

<other kerbals think this is wrong. I know of this. Tell me, Jonton - has any kernal planted a frozen seed>

Jonton blinked. *I don't know,* he admitted.

We should speak to Erlin, said Gerselle. *If anybody has, it'll be somebody at the Berelgan.*

I don't know, said Jonton, *I thought the Berelgan was mostly Kerm free for their experiments?*

Enely laughed. *Their experiments were outdated from the moment Elton awoke. He could tell them more about - what did Erlin call it, Kerm micro-ecology - than they'd learn from a hundred years of study!*

<Erlin is a good kernal - I would be pleased to help him. But first he must perform a last experiment for me> Elton paused. *<I do not like this my friends but we must know if a Kerm can grow from a frozen seed. On that, all else depends>*

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The convoy drove southwest, across the plains and abandoned fields of northern Wakira, towards the Northern Highway. Truck after bright yellow truck rumbled past on heavy winter tyres, doors and roofs emblazoned with a Kerm leaf cluster in a circle of woven vines - the international symbol of disaster relief assistance used by all the Regionalities of Kerbin. Four aircraft circled high overhead, dark shapes against a crisp blue sky, flying a slowly shifting racetrack pattern, that kept them within spotting distance of the convoy. Three of the aircraft kept a loose wedge formation, their lone companion watching them from above.

"Recommend we come round another five degrees, boss and pull in the northbound leg of the loop. We'll still have eyes on the convoy but I'd be happier keeping a little extra airspace between us and Firesvar."

Val glanced at the map clipped to her kneeboard and automatically checked her instruments. "Good call, Ferl. Cal, Gil, on me." She tipped her Cloudburner into a lazy bank. "How's everyone doing ground-side, Gil?"

"Nervous," said Gil briefly. "Don't blame them either, drivin' through a war zone and all lit up in yellow. I'd feel a little hard to be missed, myself."

"Guess that's the point," put in Cal. "When somethin's that big of a target there's no excuse for not missing it."

The rest of the squad could almost hear Gil rolling her eyes. "Just you worry about not hitting the ground, Cal. Leave the thinking to those that can do it."

"Hey - I was just saying!"

"I got an inbound here, boss," Ferl announced, "Maybe a couple - hard to tell at this range."

Val snapped to attention. "Direction?"

"Bearing eighty-five relative. Coming in dead straight."

"Firesvarn then. Gil - get a sitrep to the convoy, then join us on IF1 in case the inbounds have anything to say. Keep it together, Vanguard - we're on the right side of the border and we're here with a medical aid convoy. No need to get rattled."

Cal swallowed hard. "Copy, boss. No need to get rattled."

Suddenly a new voice crackled out from all four Vanguard radio receivers. *"Hostile aircraft, this is Firesvarn Airborne Defence Force. You are in violation of Firesvar regionality airspace. Acknowledge message and return to your nearest airfield."*

Val keyed her microphone. "Firesvarn Airborne Defence Force, this is Commander Valentina Kerman, Vanguard patrol, Kolan border security. We are in clear Wakiran airspace on medical escort duty, flight plan Wakira One Five Bravo, repeat Wakira One Five Bravo. Requesting acknowledgement and clearance."

"Denied, Vanguard. You are on illegal overflight of Firesvarn territory. Return to your nearest airfield now or we are authorised to remove you by force."

Val's mouth went very dry. "Firesvarn Airborne Defence Force, our instruments and maps put us fifty - five zero - kilometres south of the border. Vanguard patrol respectfully requests clearance to proceed."

"Negative, Commander. Maps have changed."

One Firesvarn pilot waggled his wings, then abruptly peeled away from his commander, swinging wide then rolling level, lining up on the Kolan planes. Both pilots flipped back a cover on their control sticks, gloved thumbs reaching for the buttons underneath. Four under-wing pylons sprang open, releasing four slim tubular shapes studded with stabilising fins.

Three solid rocket motors ignited with a roar. A jammed steering vane sent one missile corkscrewing wildly through the sky. Seconds later, onboard sensors tripped a switch and the out-of-control rocket tore itself apart in mid-air. A fourth missile failed to start and tumbled away harmlessly towards the ground whilst high overhead two smoke trails lanced through the sky.

Ferl's threat warning systems shrieked in his ear. His eyes snapped to his radar screen, widening at the two clear returns still several kilometres distant. "Inbound! Break, break, break!"

Instinctively, Val rolled inverted, hauling back on her control stick and throttle and sending her Clouddrunner into a screaming dive. The g-forces crushed her into her seat, canopy and cockpit instruments blurring at the edges of her vision. The pursuing missile wavered for instant, its target's sudden change in direction momentarily confusing it's sensors. Then it steadied, target reacquired, nose pulling round and down to intercept.

"Speak to me Ferl! What we got?"

"I got nothing! Got a heat return then nothing! Inbounds are still way out of range!"

Val pulled out of her dive, jinking hard left then right, head twisting in all directions. "Cal, Gil - you see anything?" A roar of static and an abruptly cut-off scream drowned out Cal's reply.

"...oh Kerm-oh-Kerm-oh-Kerm! Gil's down - no chute! No chute!"

Val's stomach turned to ice. *Keep moving, keep moving...* She slammed her aircraft into another turn, a quicksilver bright something in the distance flashing past the corner of her canopy and out of sight. "Something on my tail! You reading anything, Ferl?"

"Negative, boss! No emissions, no returns, no visuals!"

"Copy. Both of you - hard moves. Whatever it is - keep it off your back!" *No emissions...no emissions.* Behind her oxygen mask, Val's eyes widened in sudden understanding.

Instinctively she wrenched her throttle back to idle power and pulled her aircraft's nose up into a zoom climb. The Clouddrunner reared skywards, rapidly shedding speed, teetering on the brink of a stall. Val's grip tightened on the throttle lever...

The missile wagged from side to side, seeker head trying to reacquire the heat source so abruptly whisked away from it. Milliseconds later, its guidance system concluded that the target was lost.

The detonation flared in Val's rear view mirrors. Fragments of white-hot steel whickered through the sky, shredding tailplanes and engine cowling alike. The Cloudbunner bucked wildly, tipping onto one wing and tumbling into a flat spin. Val took one look at the constellation of warning lights across her instrument panel, braced herself against her seat and pulled the ejection handle.

The cockpit canopy blasted clear and was promptly whipped away by the slipstream. A fraction of a second later the ejector seat fired, hurling Val free from her plummeting aircraft. The howling wind battered at her flight helmet, pinning her against the seat backrest, harness straps digging painfully into her flight suit. Automatic retractors whipped in the straps around her calves, tight enough to nearly cut off the circulation to her legs.

The next handful of seconds hurtled by in a blur of sharp, popping explosions, deafening wind, and gut-wrenching changes in direction and speed. Val clenched her teeth, not even daring to scream in case the next tooth-rattling jolt removed her tongue. Then it was all over. The seat fell away from under her, leaving her bruised, battered but alive; hanging against the sky, survival pack dangling from her waist.

The impact drove the wind from her body. Jaw set against the pain flaring across her ribs, Val shrugged out of her harness and began to gather up her parachute.

Geneney closed the door to the Mission Control Centre and stood for a moment, letting his eyes adjust to the darkness. Light streamed from the windows of VAB 1, illuminating the lines of kerbals filing quietly into and out of the main doors. Across the Space Centre grounds the dark bulk of VAB 2 and its machine shops blotted out the night sky, all construction work for *Pioneer 7* on hold although not, Geneney hoped, for long. He rubbed his eyes, yawned hugely and set off in search of a mug of *djeng*.

Letting himself in through the side door, Geneney blinked at the closed canteen door and the light spilling out of the windows. The television was on, casting flickering shadows over the far wall. Curiously he peered through the nearest window, heart suddenly sinking at the sight of the lone figure staring at the screen, a drift of abandoned and, Geneney suspected, largely ignored papers scattered over the table in front of him. He closed his eyes for a moment then, squaring his shoulders, quietly pushed open the door.

...shot down whilst escorting a medical convoy. The surviving pilots report being fired on by guided rocket weapons although Wakiran and Kolan officials have not yet commented on the truth of those allegations. Statements from the ruling Councils of both Regionalities are condemning the attacks in the strongest possible terms...

"Evening, Jeb."

Jeb turned his head, staring listlessly back at him. "Genie. You're up late."

Geneney walked over to the kitchen cupboard and retrieved a mug and a sachet of *djeng*. "Just off the late shift for Prospector 1," he replied, pouring boiling water into his mug. "Habitation module's holding up well. You want a coffee?"

Jeb shook his head. "Not for me. Not getting much sleep as it is."

Geneney sat down opposite him and took a cautious sip. "I know that feeling," he said. "I always need something to dilute the console coffee before bed too." He made a face at his mug. "Even if it's just a *djeng*. The powdered stuff that Derny came up with seems to be keeping the crew happy though." He watched Jeb's face but his friend's expression didn't even flicker. "Anyway - you're not exactly having an early night yourself?" The question hung in mid-air.

"Early or late - makes no difference," said Jeb. "Doesn't help the sleeping."

Geneney saw his eyes flick towards the television screen. "Do you want to talk about it?" he said gently.

For a second, a spark of defiance flared in Jeb's eyes but was quickly snuffed out. The veteran kerbonaut slumped in his chair, seeming to fold in on himself. Eventually he lifted his head, staring helplessly at his friend through hollowed-out eyes.

"Don't worry about it," Geneney said quietly. "I just thought it might help is all."

"I think it might," said Jeb finally. He twisted his fingers together, leaning back in his chair. "Wish I knew how to start though."

"The beginning is always a good place," said Geneney.

Jeb shot him a miserable look. "This is going to sound stupid but I think that would be Pioneer 4. At the time I told myself I was just being an idiot - I was finally off to the Mün for Kerm's sake, something I'd been dreaming of since the Institute. The thing is, Genie, even back then I knew Lodan had plans for us - and sitting out there on the pad just felt like we were waiting for the end."

Geneney nodded. "And then seven days later..."

"It was all over," finished Jeb. "Years of junkyard rocketry, shoestring budgets, deals, planning, building, flying and dreaming - done. Finished." The old Jeb danced briefly behind the hollowed-out eyes. "We sure went out in style though."

"In peace for Kerm and kerbal," murmured Geneney. Jeb's expression turned bitter.

"Yeah. In peace for Kerm and kerbal. Except we didn't quite manage that little detail did we. The landing, Obrick's big speech. None of it made any difference." Jeb gestured at the television. "We got a war anyway - and every day it just keeps on getting worse. We built rockets to explore the universe, Genie. We never meant them to be used for shooting down planes or murdering each other." Jeb's eyes blazed. "But we did *that* just fine! We built a stupid, lashed together, *scrapheap* of a rocket trainer - and we let Ornie fly it."

Oh Kerm. "That wasn't your..."

Jeb rounded on him. "Wasn't my fault? It was *all* my fault! I was there first, Gene - I got to him first. And what did I do?" Tears spilled from the corners of Jeb's eyes and he swiped them angrily away. "Nothing! That's what. Some kerbonaut. Some 'beacon of the kerbal spirit'. A fraud who fell apart when he was needed most!"

"No," said Geneney firmly. "A friend who did the right thing. You didn't know how badly he was injured; moving him could have made things worse. There was nothing else you could have done, Jeb."

The fire went out of Jeb's eyes. "And that's the worst part," he said dully. "Doesn't matter how often I tell myself exactly that - it doesn't help."

"Of course it doesn't," said Geneney, "Wouldn't expect it to." He looked at Jeb sympathetically. "It sounds like a dreadful cliché, old friend but I think you need a holiday. Have a break, maybe go for those sailing lessons you always meant to take. Or we can set you up a workshop next to Roncott's. Somewhere you can just build stuff like in the old days. If you want something more constructive, there's no shortage of Pioneer parts you could start on. Take it easy - if a day doesn't feel like a working day then don't worry about it." He squeezed Jeb's shoulders. "Most of all, if you ever need to talk, we're always here. Me, Bob, Bill, any of the gang."

Jeb stood up, walked over to the television and switched it off. "Thanks, Genie, that's... good of you. He looked at Geneney hopefully. "Think I'll have a *djeng* myself, stay up a while longer then try and get some sleep. Are you good for staying up a bit longer?"

Geneney forced a smile. "Of course. Like I said, Jeb - we're always here."

Halsy punched a code into the combination lock and opened the laboratory door. He flicked the lights on and stepped aside for the others to file in behind him. Gerselle looked around curiously, taking in the the rows of bottles on their shelves and the workbenches full of glassware, mysterious boxes and other, more complicated looking pieces of equipment. A pair of tall refrigerated cabinets stood against one wall, next to a rack of gas cylinders. A forest of tubing connected the cylinders to a long glass fronted cabinet that occupied most of another wall.

Obrett pointed at the refrigerators. "You keep them in there?"

Erlin nodded. "Yes. We've been collecting them for some time, mostly from Spierka and Forseti I believe although I wouldn't be surprised if we have some from elsewhere. Discreetly of course - we don't advertise the facility for obvious reasons. Personally, I suspect the Veidan diplomatic bag has carried more than one or two but naturally, we don't ask."

Halsy walked over to one of the refrigerators and opened it. Gerselle caught a glimpse of shelves and what looked like thick glass spheres. Halsy lifted one of them onto a nearby bench before quickly closing the refrigerator door again. Close to, Gerselle saw that the

sphere was actually two flattened half spheres clipped together along a thickened rim and topped with a glass tap. Inside, a Kerm seed rested on a metal grille.

"Vacuum desiccators," Erlin explained. "We use them for drying out samples in the lab but with a couple of modifications they work well for storing Kerm seeds. The seeds themselves are pretty robust - the hard part was working out the right combination of temperature, humidity and atmosphere to preserve their fibrous coating. We can't keep them under vacuum of course - which is why the desiccators are clipped shut instead."

Obrett squatted down and peered at the seed. "Nitrogen?" she asked.

"Mostly," Halsy answered. "With some carbon dioxide and just a trace of hydrogen sulphide. We found that the fibres got too badly damaged if we cooled them down to normal seed storage temperatures, so we use a higher storage temperature along with hydrogen sulphide to lower their metabolism."

Gerselle frowned. "That must have taken a lot of experimenting to work out," she said. "How did you..."

Halsy smiled. "Don't worry," he said. "Even in these desperate times we wouldn't experiment on live Kerm seeds. He led Gerselle over to the long cabinet. Inside Gerselle saw rack after rack of sealed flasks holding fragments of matted fibre in various states of decomposition. At the back of the cabinet, clusters of syringes hung from clamps, each of them connected to one or more taps by a thin rubber tube. Another bundle of tubes connected the flasks to a larger, insulated pipe protruding from the cabinet wall.

"This is just a mockup of course," said Halsy, "but we thought you - and Elton - would be interested in seeing how we ran the experiments. All the flasks are nitrogen cooled with a water jacket to stop them getting too cold. That bunch of syringes all connect through to these gas cylinders here, letting us inject whichever mix of gases we like into a flask. As for the tissue samples..." Halsy bowed his head. "We recovered them from the Blight, or rather our colleagues at the Accident Investigation Department did."

Gerselle looked at Gusemy who gave her a grim look in reply. "We did," he said quietly. "Just after the first villages were Blighted, I had Erlin do some research in the Berelgan archives. It quickly became clear to both of us that long term storage of Kerm seeds would be needed before the end of the Seeding, to give us enough time to find a solution to the crisis. The Department began an urgent search of any new Blighted areas for seed fragments. At the same time we began construction of a storage facility on the Spierkan coast. As soon as Erlin's team had a reliable storage protocol we began saving seeds. We thought they would be safe there." Gusemy's expression darkened. "We were wrong."

Erlin sighed. "We were." He shook his head. "But hopefully this planting will begin to change that."

"If the Kerm survives," said Gerselle.

Erlin bowed his head in acknowledgement. "Indeed." He picked up the desiccator with both hands, holding it carefully level. "Shall we?"

Everyone nodded. Halsy picked up a large, round-bottomed flask and filled it with water. He followed the others out of the laboratory, switching off the lights and locking the door behind him.

The drive out to the planting site was sombre, each kerbal lost in his or her thoughts, not even commenting on the newly completed Dunan agronomy complex. Erlin stared at the Kerm seed in his hands, Halsy cradled the flask of water in his. Sitting in the front with the driver, Gerselle was surprised to see a sizeable crowd of Berelgan staff waiting for them by the side of the road.

As soon as the van stopped, two kerbals stepped forward to open the doors. Obrett and Gusemy climbed out first, then helped Erlin and Halsy out. By the time Gerselle joined them, the crowd were forming up into two lines to let them through, Erlin and Halsy in the lead. As they set out across the field, the two lines merged into a solemn procession behind them.

The planting site was marked by a single spade thrust into the earth. Gerselle pulled it out with a grunt of effort and set to work digging a shallow trench, measuring its depth against the spade handle. Satisfied, she stepped back and watched Erlin step forward. He knelt, placing the desiccator on the ground beside him. The crowd held its breath as he opened it and lifted out the fibre-swathed Kerm seed. Working quickly, he placed it in the trench, packing earth around and over it before tamping it down with his spade. He stood, accepting the flask of water from Halsy.

Erlin paused, gazing round at the crowd, one hand hidden behind his back. Then he solemnly up-ended the flask over the patch of fresh earth. Silently, Gerselle watched him uncross his fingers.

Chapter 73

Politics

Donman clasped his hands behind his back and stared across the central plaza to the Capital building. His gaze travelled slowly over the great Arches, each symbolising one of the six Regionalities of Kerbin, each anchored by two of the smaller, but still impressive, out-buildings given over to the administration of that Regionality. Four of the Arches were grounded in the light spilling from every ornately carved doorway and every arched window. The Wakiran and Firesvarn Arches were grounded in darkness, staff recalled to other administration centres on another continent. The evening sun threw oddly angular shadows from the statues decorating the nearest out-buildings and the flag of all Kerbin drooped listlessly against its pole, as if cowed by the flaming evening sky. Across the great central Dome, a gap-toothed chequerboard pattern of brightly lit office windows stood out against the twilit stonework.

Donman sighed and went back inside, nodding briefly to the guards as he walked past. Head down, deep in thought, he strode along the corridor and up the stairs to his chambers. Retrieving the coffee jar from where he'd abandoned it on Corsen's desk, he busied himself setting a fresh pot on to brew. For a long minute he stared at his red-eyed, haggard reflection in the mirror by the door. Then he shook his head and walked through to his office in search of eyedrops, casting a weary glance at the stack of old books on their cart as he went.

Some time later, moistened eye and fortified by hot caffeine, Donman carefully set his empty mug down on the edge of his desk before pulling on a pair of white archivist gloves and opening the leather-bound book in front of him. Delicately, he turned the yellowing pages until he found his bookmark, placed the square of silver filigree on its stand, and began to read. For the next couple of hours, he worked his way steadily through the book, pausing occasionally to jot down a note or look up a cross-reference in another, equally old book. Eventually he pushed his chair back, rubbed his eyes with the heels of his hands, and swore feelingly under his breath.

Can't invoke Article 24 without declaring for one side or the other or declaring against another Regionality altogether. The Emergencies and Global Unity Act looks like it'll be useless unless we can broker a ceasefire. I don't have a Right of Conclave because I am Conclave. Donman set his jaw, reached into his desk drawer and found a sheet of headed notepaper and a fountain pen. He paused then, reluctantly took out a small hand press, a sheet of thin wax discs and his seal of office. Setting them to one side, he uncapped his pen and began to write.

He hadn't got any further than a perfunctory 'Dear Mr President,' when his phone rang. Groaning at the blinking red light under its keypad, Donman pushed his letter away and picked up the receiver. "Mr President?" He frowned, nodding impatiently at what he was hearing. Then his eyes snapped open. "They did what? Commander Valentina survived? Thank Kerm for small mercies. But where in the seven smoking *hells* were those planes? I thought they were under orders to keep to Wakiran airspace at all costs?!" Anger rapidly turned to consternation. "Fifty kilometres south of the border? We can prove that?"

Donman sat bolt upright in his chair. "That's ridiculous! The second Fleet are under strict orders to remain within the Jhazi Straits and surrounding coastline! Chadwick and Aldwell know the trouble we had getting permission to sail through Veidan waters - what in all the Blighted Groves do they think Wakira and the Confederacy would do if we sent Gusden any *further* west? That fleet is there to secure our medical relief operations - end of story!" A bleak expression settled on his face as he listened to Obrick's reply.

"I don't think we have a lot of choice. We promised medical aid to any kerbal involved in the fighting. If our relief workers need to go armed in order to protect themselves, then so be it." He listened intently for several long minutes then fell silent.

"Wakira, Mr President," he said at last, propping his forehead on one sweating palm. "We offer succour to all but we stand with Wakira."

He laughed shortly at Obrick's reply. "One of the few ways we could, although I doubt anyone will be any more receptive to tales of sapient Kerm than they were last time, especially after an Article 24 declaration. What's that? No - apart from Article 24, it seems the only guaranteed way to force a session of the Twelve Pillars is for one Pillar to be impeached... or to resign."

There was a long pause. Donman glanced at his seal of office lying on his desk. "I hadn't got much further than the usual pleasantries before you so kindly interrupted."

Shred that damn letter, Don. We can talk about that once we get out of this mess and even then you'd better hope you can write faster than I can.

Enely led the two legalists up the hill towards Jonton's hut. One of them raised her eyebrows at the three stacked rings braced against the Kerm trunk and the ropeways winding between them. The second just nodded and murmured something to his taller colleague. Enely caught the words 'Sage of Barkton' and smiled to himself. The front door

opened and Jonton stepped outside to greet them, leaning heavily on his walking stick. Both legalists did a swift double-take before recovering with an obvious look of embarrassment. "Forgive my surprise, Keeper," the shorter one said diffidently, "but I was led to believe that you were... indisposed."

Jonton nodded. "I was until very recently." He gestured at his stick. "And I'm looking forward to the day I can leave this behind. But please - come on in." He hobbled through to the kitchen where Meleny and Thombal were waiting with Gerselle around the table. Once everyone was seated, a cup of fresh coffee or *djeng* in front of them, he found a convenient spot against the wall and leaned back with a sigh of relief. "I hope nobody minds if I stand here - I still find sitting for any length of time uncomfortable." He looked at the two legalists, gathering his thoughts. "How much did Erlin tell you?" he asked at last.

"Almost everything I believe," replied the senior legalist. "Including a digression into some significant breaches of established Grove law, although there I am informed that you have special dispensation from Chief Ambassador Donman." The tone of her voice stopped politely short of outright disbelief. She ticked the main points off on her fingers. "You are about to engage in an...undertaking at Gerselle Kermol's Grove. Yourself and Gerselle have a daughter, Joenie. You believe this undertaking may be hazardous to the adult kerbals involved and therefore wish to register Meleny and Thombal Kermol - and the Kerm of this Grove - as Joenie's guardians." Meleny and Thombal nodded solemnly. "Finally you wish to give both Meleny and Thombal power of attorney to speak on behalf of the aforementioned Kerm." She coughed. "I must be honest, Keeper - I'm not sure I completely understand your last request."

"It's straightforward enough," replied Jonton, "but neither Gerselle, Elton or myself were sure about the legal technicalities."

"Elton?" asked the second legalist. "Pardon me, Keeper but I don't think we've met an Elton Kermol. Or should that be Elton Kerman?"

"Neither name suits him very well," said Jonton calmly. "Elton is the Kerm of this Grove and he's looking forward to meeting you both. If everyone has finished their drinks, we can go through."

He led the skeptical looking legalists through to the sleep room and waved at the rows of bunks. "Please make yourself at home. All the bunks are much the same so pick any one you like. We can bring extra pillows through if need be. Once you're comfortable just rest your head against the leaf clusters and Elton will take it from there."

Both legalists looked startled at that. "You want us to Commune with the Kerm?" one of them said doubtfully.

"I do," said Jonton, "Once you've both had a chance to talk to him, I'm hoping you can find some legally binding way for him to grant Thombal and Meleny power of attorney to speak for him in mine or Gerselle's absence. We'd also very much appreciate some advice on writing him into our wills."

The senior legalist raised her hands. "As you wish, Keeper." She nodded at her colleague. "We shall see what we can do for Guardian Elton." She smiled faintly at Jonton's surprised expression. "It's been many decades since I was kermol, Keeper but I was always taught that the Kerm were guardians of the Groves." She walked over to the nearest bunk, lay down and, propping a pillow under her neck, tipped her head back into the waiting leaves.

By the time Jonton joined them, Gerselle, Thombal and Meleny had already paid their respects to Elton and had moved quietly back, to let him speak to the legalists without distraction. The Communion crackled with intense curiosity, awe and a barely suppressed excitement. Elton stopped in the middle of a sentence and Jonton sensed his sudden regard.

<good afternoon, Jonton>

Good afternoon, Elton. I brought the legal advisors whom Erlin recommended.

<yes, I have been speaking to them. They think very clearly and do not fear new things - we will need more kerbals like these>

A brief sense of sorrow washed over Jonton but was swiftly replaced by fresh excitement from the senior legalist. *This is incredible, Keeper - we apologise for ever doubting you!*

No apologies necessary, answered Jonton. *If anything, I should apologise for being quite so cryptic but Elton can speak for himself far better than I can speak for him.*

And I would speak with him for much, much longer if he has the time. For now, I can assure you that it will be a straightforward matter for him to grant power of attorney to Thombal and Meleny. A simple declaration in front of everyone here and then we can sign the agreement bel-oncordaan, that is, outwith one contracting party, witnessed by myself and my colleague for Thombal and Meleny and yourself and Gerselle for Elton.

Thank you, said Jonton gratefully. For a long minute he turned inward, sensing the ebb and flow of emotions through the Communion link. *Our undertaking at Gerselle's Grove, he said at last. How much did Erlin tell you about it?*

Very little, came the answer. *He didn't think he was the best person to talk about it although he did assure us that it was of the utmost importance.*

It is, said Jonton simply. *To cut a very long story short we think we can awaken Gerselle's Kerm in the same way that Elton awoke from mine. And if we can do that for one Kerm, we can do it for all Kerm.*

There was a stunned silence. *That would be... wonderful,* said the legalist at last. *I don't... I don't think I have the proper words for what it would imply.*

To be honest, I'm not sure I do either, said Jonton. *But from personal experience I do know that awakened Kerm could mean an end to the Law of Territory.* He waited expectantly.

But that would mean... Wild hope flared across the link. *Please tell me that means what I think it does?*

It does, said Jonton quietly. I know that Kerm do not need to fight amongst themselves. If we can awaken them and speak to them, we can explain the danger that the Seeding puts all of us in. And if we can do that, then... then we may be able persuade them to draw in their territories - and so create enough room on Kerbin for all the Kerm yet unplanted.

A sudden maelstrom of emotions churned the Communion link to near insensibility. Instinctively, Jonton tried to damp them down, Enely and Gerselle hastily following his lead. Then Elton came forward, a vast, calming presence helping everyone regain control.

<we can speak of this later. For now, tell me what words I must speak to guard my Joenie>

The two legalists conferred for a moment and then, hesitantly, spoke to Elton.

<very well> Elton paused, absorbing the unfamiliar language. <then I Elton, Guardian and Kerm of this Grove, do hereby grant Thombal Kermol and Meleny Kermol, jointly and severably, the rights and responsibilities to speak for me in all matters pertaining to the guardianship of Joenie Kermol and the estates and worldly properties of Jonton and Gerselle Kermol. Let any of those present, state their disagreement with no fear of coercion nor fear of censure nor fear of reproach>

All seven kerbals remained silent.

<Then by the laws of Grove, Enclave and Council, as we have spoken, let it be done>

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“...Nordham Bay. Firesvarn air support was severely impeded by defences around the town itself and by anti-aircraft fire from the Kolan 2nd Fleet commanded by Admiral Gusden. We don’t have accurate casualty numbers but losses are thought to be moderate to heavy depending on who you ask; pilot losses significantly less so.” The Chief of Fleets cleared his throat. “Firesvar, predictably, are pointing to this as evidence of Kolan aggressive intentions. Kolus - equally predictably - point out that the Firesvarn aircraft were defeated by defensive facilities, installation of which has now been shown to be fully justified.”

The grim silence around the table was broken by the clink of glass on lacquered wood. President Chadwick blotted his lips before tucking his handkerchief back into his pocket. “What of the Firesvarn fleets?”

“The Northern Ocean situation remains unchanged, Mr President. Forces in the Wakiran Ocean are on high alert but so far as we can tell, Firesvarn efforts there remain focused on increased coastal and near-coastal patrols in an attempt to intercept any Children of Kerbin vessels.”

“Do we have any indication that they’re operating any further afield?”

The Chief of Intelligence glanced at her colleague who dipped his head in reply. “Scouting operations only, Mr President,” she said. “Purely systematic at present with nothing to indicate that they’re specifically watching ourselves, Doren or Wakira. Formally, I have several reports of violations of our territorial waters - to which we’ve turned a carefully blind eye.”

Worried faces and angry murmurs rippled around the table. Chadwick contented himself with a nod. "Very good. And what of the Children of Kerbin? Do we have any new information there?"

Under the table, the Chief of Fleets' knuckles turned white but his voice remained unruffled. "No, Mr President. We watch for them of course but we deem Doren, Kolus and latterly, Firesvar to be of greater concern at present."

"Naturally, " Chadwick replied. "And likely to remain so."

Across the table Chief Ambassador Aldwell pinched the bridge of his nose. "For how long, Mr President? Our sympathies to the Children's goals, if not their methods, are well known. What happens when a Firesvar scouting patrol finds something that we cannot conveniently ignore?"

President Chadwick raised his eyebrows. "Then we will of course lend any assistance we can, although Firesvar will understand that our resources are stretched very thinly. However, I believe we have made our opposition to unsanctioned Kerm planting perfectly clear and I trust that Firesvar will remember that."

"Erbabar-beldaonerba ebda berot pilla," somebody muttered. Chadwick's head turned.

"Excuse me?"

The deputy Chief Ambassador for Forseti looked up from her briefing papers. "An Old Kerba proverb, Mr President. The literal translation is 'words possessed by those they rely on for words are half-truths'. Or in plain Kerba - the words of diplomats are but half-truths."

"I fear I do not see your point," said Chadwick politely.

Aldwell sighed. "My esteemed colleague is correct, Chadwick," he said reluctantly. "We aren't overtly supporting the Children but neither are we overtly opposing them." His voice turned grim. "Wakira's inability to prevent the Children's incursions was sufficient pretext for Firesvar to invoke Article 24 against them, triggering a war which Kolus has now been dragged into. How long before our inaction provides a similar pretext?"

Thank you. The Chief of Fleets' hands relaxed for the first time that meeting. Carefully, he brought them above the tabletop, poured himself a drink of water and took a sip. "That would be my concern also, Mr President."

The Chief of Intelligence nodded. "We would also run the risk of providing a common enemy for both Firesvar and Wakira combined, possibly supported by Kolus."

At that, a clamour broke out around the table. Chadwick watched impassively, weighing his options. He let the clamour subside before tapping his glass on the table for attention. Gradually the room quietened as all eyes turned towards him. "So what would you suggest?" he asked.

“Veiid,” said the Chief of Intelligence bluntly. “We reach out to Veiid and, through them, to Doren proposing an alliance against the Children. With Doren on our side, we can persuade Firesvar that there is no further need for them to trespass on Confederacy territory.”

Chadwick’s eyes bored into hers. “Whilst betraying our people’s most deeply-held principles?” he said quietly.

The Chief of Intelligence didn’t flinch. “No, Mr President. Whilst *upholding* those principles and upholding *your* publicly stated policy. However well intentioned, the Children’s misguided Kerm planting betrays the right to life of many Kerm for the sake of one.” Around her, the room fell deathly silent and she saw Chadwick’s expression harden. “Naturally, each member of the Alliance will be responsible for searching their own territory. If we find any Children operating from the Confederacy we deal with them sympathetically whilst reaping the diplomatic benefits of preventing further unsanctioned Kerm planting.” She locked eyes with her President. “With respect, Mr President, the alternative is running a growing risk that Firesvar will find us to be harbouring the Children. I believe the consequences of that discovery are obvious.”

Aldwell held his breath. Chadwick’s expression remained stony. “Why Veiid?” he said conversationally.

A murmur of agreement rippled around the table. “*Veiidol ebda balsathona*,” muttered the Forseti deputy Chief Ambassador under her breath.

Chadwick sighed. “If you insist on demonstrating your erudition in Council, Madame Ambassador, might I suggest you read an Old Kerba grammar first? I have many excellent examples in my personal library which you would be welcome to borrow.” He flicked a glance at Aldwell’s deputy, now blushing dark green. “I believe the expression you were searching for is ‘*Veiidol ebda beldasathona*.’ Whilst the Veidan Council are indeed bureaucratic to a fault, I would hesitate to describe them as useless items.” He turned back to the Chief of Intelligence. “Now, as I was saying before we were interrupted - why Veiid?”

“Because alone, neither we nor Veiid have the political capital to persuade Doren of the benefits of an alliance,” said the other bluntly. “Together we might, particularly if we can also demonstrate the effectiveness of Confederacy-Veidan cooperation first.”

Chadwick absorbed her words unblinkingly. “Indeed,” he said. “Particularly as I suspect that Veidd will also be rather happy with the diplomatic benefits.” He looked at his Chief of Intelligence thoughtfully. “Very well. I want to see a position paper and heads of terms for a declaration of alliance by the end of the week. In the meantime, myself and Chief Ambassador Aldwell will speak to our Veidan colleagues and propose a summit meeting.”

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Silently, Enely watched Gerselle at work, his thoughts a roiling mix of trepidation, happy memories, and sorrow, mingled with an undercurrent of guilty excitement. Jonton stood by her side, leaning heavily on his walking stick with one hand, holding Gerselle’s tools with the other. Enely watched him bend forward and take the fresh Kerm cutting out of her hand,

completely absorbed in the sight of Gerselle painting leaf paste over the exposed branch stump.

Gerselle peered at her work critically then, satisfied, handed the bowl of left over paste to Jonton. She took a pruning bag out of her poncho pocket and shook out the loose charcoal dust before slipping it over the stump and pulling the drawstring tight. She looked up to see Jonton staring at the cutting in his hand. "Here we go again, Jonton Kermol," she said softly.

Jonton dropped the rest of the pruning gear into his own poncho, hobbled over and put his arm around her in an awkward one-armed hug. "Here we go again," he repeated. "We'll do better this time though, love. You, me and Enely - we'll do it right. And your Kerm is just a sapling compared to Elton - that should help with the..." He stopped, fumbling for the right words. "It should help," he said at last. Gerselle didn't reply.

The two Keepers made their way to the planting site, Enely following them at a discreet distance. He wasn't surprised by the crowd of kerbals waiting for them, from both Jonton and Gerselle's Groves. Fredlorf and Ferry waiting solemnly at the front. Silently, everyone watched Gerselle plant and water the cutting, watched her unfold a wickerwork screen and arrange it carefully around its stem. Enely watched her and Jonton work their way through the crowd, offering a reassuring word here, a moment or two of explanation there. He saw one or two of the eldest kerbals inspecting the leaves of the nearest mature Kerm trees then, apparently satisfied, walk away. Others stood by the wickerwork screen, reaching over to touch the new cutting and even, Enely was bemused to see, caress it, running their fingers over its leaves.

Gradually, the crowd dispersed, leaving their thirty-eighth Kerm alone in the soil. It was, Enely thought, a sign of the respect that the villagers had for their Keepers that the whole event had passed quite so peacefully. *But why not? They've seen the Law of Thirty Seven broken, they've seen Jonton survive his time spent an-Kerm. Most importantly, they've all had a chance to Commune with Elton.* He shook his head. *Besides - we'll be watching the new sapling. For black leaf spots if nothing else.*

Chapter 74

Blue and Grey

Milden paced up and down the communal living room of the KSA quarantine suite, privately referred to as 'Jim's Jail' by the kerbonauts. After the last minute change to *Pioneer 5's* crew caused by James Kerman's illness, crew training schedules now included a mandatory two week quarantine before launch day. Despite their relative luxury, the isolation quarters used in the final week were regarded as something to be endured rather than enjoyed by the flight crews, particularly the first time kerbonauts.

Barrie looked up from her flight manual, speared another chunk of creva with her fork and turned back to her power up and prelaunch checklists. Wilford sliced a piece off his own breakfast steak and chewed on it thoughtfully as he watched Milden, mind drifting back to his flight aboard Moho 3 and his sleepless night before it. "Your steak's getting cold," he offered. "Last proper food for a couple of months - I'd make the most of it."

"I know," said Milden. "I'm just not hungry. You think they'll let me bag it up and take it onboard for a snack later on?"

Wilford smiled at the weak joke. "Gene probably would," he admitted. "but the medics might not be so amused. How much sleep did you manage to get last night?"

Milden looked at him oddly. "Enough," she said. "Why do you ask?"

"Because I remember what it's like," said Wilford quietly. "I didn't get much sleep at all before the Moho 3 launch. After the second nightmare, I was about this far," he held up his finger and thumb, "from bailing on the flight."

Barrie put down her manual. Milden stopped her pacing and turned to face him. "You had nightmares?" she asked in disbelief.

"Yep," said Wilford. He decided not to go into details. "Not a surprise looking back. Jeb's flight nearly ended in disaster because of a faulty synch trigger on the decouplers. We got

that fixed for Camrie's flight but..." He shrugged. "We were working with brand new technology. We tested it as best we could but another failure somewhere was always an option."

"But you climbed aboard anyway," said Barrie.

Wilford nodded. "I figured I wasn't going to get any more sleep that night, so I went down to the canteen to get a drink and think things over. I found Jeb already there with the flight plan and what looked like half of Wernher's schematics for the Moho booster. I got my drink - made Jeb a coffee - and we had a chat. I'll always remember the end of that chat."

Milden sat down opposite him. "Why - what happened?" she asked curiously.

"It was something that Jeb said," Wilford replied. He closed his eyes for a second. "I'm not going to lie to you - at the moment, it's still a risky business. But when the recovery team fish you out of that capsule tomorrow and haul you up onto the boat, I'm going to be there asking you just one question; *were the risks worth it?*"

Wilford looked at her solemnly. "Jeb thought he knew the answer already - and he was right. They were. " He smiled. "We used Minmus as a reference point for testing the attitude control system. Just seeing it with my own eyes, a tiny greenish-blue dot smack in the middle of the capsule window - I can't describe it. I think it was at that moment that I knew everything was going to be okay. The spacecraft I was flying, everyone on the ground watching over the systems, all the procedures and planning - they were working just as we'd hoped."

Wilford's eyes sparkled with a sudden fierce joy. "When I brought Moho 3 out of orbit, I promised myself I'd go back one day. I never dreamed that I'd be on the first flight out to that greenish-blue dot - that I'd be one of the first to see what it's *really* like!" He shook himself. "Sorry - getting carried away there. Seriously though, Milden, we've come an awful long way from the old Moho days. We're flying the most advanced spacecraft ever made, built by the best in the business. Our flight control teams have Kerm knows how many hundreds of hours experience between them." He looked Milden in the eye. "Like Jeb, I won't lie to you - we're still in a risky business but we've got the best kerbals in the world behind us - and the risks are *all* worth it."

Barrie nodded approvingly. Milden picked up her fork and began to eat, mechanically at first but then with greater enthusiasm. Just as she swallowed the final mouthful, there was a knock at the door followed by a cheerful voice.

"Everyone awake in there? Ten minute call for suiting up!"

"Okay, Milden - ready to take a short walk?"

"Ready." Milden glanced down at her suit readouts and checked her water and oxygen hoses, hands moving automatically from one lock to the next. "Water and oxygen locked." She gave her bubble helmet a sharp twist, nodding in satisfaction as it stayed exactly where

it was. Finally she uncoiled a length of tether, snapped one end onto her belt and looped the other through its D-ring on her chest. "Hat and gloves sealed, life support green, tether set."

"Copy."

Milden edged her way carefully through the hatch. Clumsily, she pulled the rest of her tether through after her muttering to herself as the stiff material flapped awkwardly around her. Sweating slightly in the confines of her suit, she found the safety buckle at its other end and clipped it onto the outside of the hatch. Barrie watched her pull herself clear of the capsule.

"You're doing fine. Left a bit. Great!"

Cool air blew across Milden's face. She tipped her head back, peering through the top of her helmet but all she could see was blackness. She took a deep breath, settled her boots firmly against the restraining bar holding them to *Prospector 2's* hull, and straightened up.

Like every other space-walking kerbonaut before her, she stared, enraptured by the blue-green sphere of her homeworld - seen for the first time as a planet in its own right, and a fragile sanctuary against the frozen dark. Barrie heard her suck in her breath.

"It's something isn't it?"

For a moment, Milden didn't reply. "No sign of the KDS," she said at last.

"We left that behind hours ago," Barrie agreed.

Milden tipped her head to one side, squinting at the glowing horizon along the edge of her visor. Awestruck she watched it crawl away from her rough and ready reference mark, Kerbin itself shrinking before her eyes as she sped away from it.

"Come on," said Barrie gently, "We'll point a window towards home once we're all aboard."

Milden shook herself, "Right." She reached up, unclipped her tether and secured it to the next attachment point before easing her feet free. Slowly, deliberately, she worked her way along the hull, pausing occasionally to sneak a look around her. The flanks of her spacecraft gleamed mirror bright under her feet, matched by the reflected sunlight from the photovoltaic arrays jutting out to either side. Peering down between her legs, she could just see the habitation module hatch with Barrie's head and shoulders poking out through it.

"I'm clear. Watch your feet on the edge. There you go - nicely done! You want to pass your tether down - get it out of the way? Okay, Wilford - we're ready for you. Don't lock the hatch behind you."

Wilford's answering laugh echoed inside her helmet. Milden watched his head emerge from the command module hatchway, helmet and life support backpack cutting an oddly blocky notch out of Kerbin's horizon.

An appetising smell emerged from the galley, followed by Barrie nonchalantly pushing a tray of steaming ration packs in front of her, already opened and clipped into their handles. Leaving the tray floating in midair, she unstowed the collapsible dining table from its recess in the habitation module hull. The tray fitted snugly into its own recess, held in place by the ubiquitous patches of hook-and-loop fabric. "Hey - you two want me to eat these for you as well?" Milden looked over her shoulder in surprise as Barrie continued in mock indignation. "I got one spare white bean stew with extra firewhisker and one grey mush - my apologies, one tuber and pepper cactus surprise - with tomato sauce."

Wilford tucked his book into its elasticated pouch on the wall. "Better hope that Sherf isn't on a console," he said, "She and Derny spent Kerm knows how long perfecting this." He swung his legs over the edge of his sleeping shelf and carefully pushed off towards the floor. Tucking his feet under a convenient pair of restraints, he buckled himself into his sack chair and reached for his ration pack. Ignoring Barrie's amused look he dug happily into his meal. "Mmm - I think Derny is still tinkering with this one. The extra onion sure makes a difference."

"And we can still patch the EVA suits with it in an emergency," said Barrie. "How's the stew, Milden?"

"It's very good," said Milden softly. Barrie followed her gaze and smiled.

"Never gets old does it?"

Milden shook her head. "There's so many of them. There's got to be somebody else out there, Commander. Somebody other than kerbals I mean. I sometimes wonder if some of them are flying to one of their muns right now and asking themselves the same thing."

"Maybe some of them are," said Barrie. "And I bet they're wishing *they* had a hot pouch of coffee to help them along the way. Can I get you two anything to wash these fine rations down with?"

"A green *djeng* please, Commander," said Milden.

"Coming right up," replied Barrie. "And I keep telling you - that's Barrie to you. Leave the ranks and titles for the simulator and the kerbonaut office." She waved at the window. "Out here, it's just us. What are you drinking, Wilford?"

"Just a water please," answered Wilford. "Thought I'd brew up a sapwood later for the TV broadcast." He glanced at the instrument panels above his head. "We're still set up for the finale?"

"Yep," said Barrie. "Should have quite a show for them tonight."

The *Prospector 2* crew finished their meal in companionable silence. Milden sat cross-legged by a window, her pouch of *djeng* floating within easy reach. Wilford gathered the empty ration packs and tidied them away before pulling out a Tiles set from its webbing by his sleeping bag. He raised his eyebrows at Barrie. "Spot you five?"

Barrie snorted. "I was going to ask you the same question. Set 'em up - honours even. I'd better check in with Mission Control." She pulled herself carefully over to the communication panel and flipped a switch. "Flight, Prospector 2 on high gain alpha. How do you read?"

Nelton's reply was tinny but clear. "Loud and clear, Prospector. Be advised, we've just run a poll down here and you're looking good across all boards. CapSys recommends you restart the thermal control roll after the broadcast though."

"Understood, Flight. Confirm we have the spin-up program loaded and checked."

"Copy. How are you all doing up there?"

"I've said it before, Flight but this habitation module was the best idea we ever had! Proper bunks, an honest to Kerm dining table and I don't get Kerke's elbow in my eye for the whole journey. Can't beat it. Milden's enjoying the view and I'm thinking we've got plenty of time before the broadcast for me to hand Wilford his box at Tiles."

"Not a hope," Wilford put in cheerfully. "Just so the flight controller pool knows, the good Commander has refused my generous offer of a five-spot."

Nelton chuckled. "I like to see confidence in my spacecraft commanders - but I think I'll sweep low on this stake."

"No faith," said Barrie sadly. "That's the problem with flight directors these days. No faith."

The first game of the set was long over and Barrie was frowning at the board, trying to stave off a second defeat, when the communication panel chimed overhead. "Pioneer 2, Flight. Twenty minutes to showtime."

"I'll get the cameras," said Milden. "You finish your game."

"Appreciate that," said Barrie wryly as she tapped a tile into place on the board. She ducked slightly as Milden drifted overhead. "At least this one should be over in time to spare the folks back home my blushes."

Milden checked the battery charge on the camera before unclipping it from its mounting bracket. She pushed off for her sleeping shelf, careful not to snag the trailing power and data cable on anything. Settling herself, she flipped up the viewfinder and switched the camera on. "Flight, Prospector. Camera on, are you receiving?"

"We're getting a good picture, Prospector. Recommend Barrie takes that five-spot next time."

"Everyone's a critic," grumbled Barrie. "Well played, Wilford."

"Thanks," said Wilford. "You too. Think I'll go through to the galley - get that sapwood ready."

Barrie nodded. "I'll get the window camera set up then start the comms check."

Milden took a set of note cards out of her pocket and flipped through them, half listening to Barrie's running conversation with Nelton and occasionally glancing up at the flight clock.

"Two minutes, Prospector."

"Copy, Flight." Barrie flipped a switch on the communications panel and suddenly the background chatter of technicians and television crew filled the habitation module alongside the more measured responses from the capsule systems team.

"Prospector, Flight. Audio test."

"Good pickup, Flight."

"That's affirmative. Going live in ten...nine...eight..."

Milden panned the camera around, tracking Barrie as she pushed away from the control panels.

"...Jonbo Kerman, going live to Prospector 2. Can you hear us Prospector?"

Barrie smiled into the camera. "We can hear you, Jon. Good to have you with us again."

"Thank you for taking time for us, Barrie. How's the flight going?"

"Very well thank you, Jon. We're a little under three days out from Minmus right now, so we're making the most of our last day in the habitation module. Tomorrow we'll be going back into the command module, where we'll be staying until we're on the way back to Kerbin in six days time."

"You won't be staying there for the whole six days though, I hope?"

Barrie laughed. "We hope not too, Jon, but we won't know for sure until we wake the lander up. That's a big part of what we'll be doing for the next two days - we have a third midcourse correction burn first thing tomorrow morning your time - and then we'll be running a complete systems check on the whole spacecraft to make sure we're ready for the landing attempt."

"And everyone at KBS News is wishing you the best of luck with that, Barrie. But for now, for the folks that couldn't join us for our last broadcast, we were all wondering if you could show them around a little?"

"Be happy to, Jon." Barrie cleared her throat. "Okay, Prospector is a lot like the Pioneer spacecraft that we use for going to the Mün. We've got a service module at the back which holds our main engine for getting into and out of Minmus orbit. We've got a lander on the front for getting down to the surface and back, and we've got the main command module. That's the only part of the ship with a heat shield and it's the part we'll be flying back down to Kerbin in." Barrie smiled again. "The thing is though - that command module is pretty compact. It's fine for flying to the Mün and back but it's too small for the round trip to Minmus. By the time we'd filled it with all the supplies and for the journey, there wouldn't be much room for us kerbonauts! So the KSA built us a habitation module to live in."

"Is it true that the habitation module was based on the Endurance space station, Barrie?"

"Absolutely, Jon. The original Endurance module was originally designed to support four kerbals in space for four weeks. We had to move the hatch around to the side and make some other changes too but the Endurance design turned out to be a good place to start. We've got Milden here with the camera, if you're ready for a guided tour?"

"That would be splendid, Barrie."

Recognising her cue, Milden tilted the camera until the hatch was framed neatly in her viewfinder. "Um. Like Commander Barrie said, the habitation module has a side mounted hatch. It's in the middle of the spacecraft, in between the service and command modules, so, um, a hatch in the end would be no good." The camera panned slowly left. "At the end there is the toilet compartment and then most of the module is divided into two by these shelves fitted to either side. They're, uh, a bit like bunk beds - we sleep two to a shelf." Milden zoomed in on her sleeping space. "We get our own sleeping bag and lots of elasticated webbing pockets to store personal belongings in like books and things. It's a bit like being in a tent."

"But with a better view outside, right?"

Milden's face lit up. "Oh yes! If I get any spare time during the flight, I like to sit by a window and watch the stars. You just never get tired of it."

"But when we do need to take a break from stargazing," Barrie put in, "there's room for other things too. Down here," the camera tracked her gesture, "we've got a table and sack chairs. It looks a little snug but it's actually pretty roomy in zero-g. Wilford is a bit of a traditionalist - he likes to use the table as an actual dining table." Barrie tore a tile off the abandoned board and held it up to the camera. "As you can see, we've got a Tiles set too. The hooks on the back here stick onto little bits of fluffy fabric on the game board which stops them from floating away."

"So where is Wilford?"

"He's in the galley making himself a drink. Could you pass me the camera please. Milden?"

"Um. Certainly, Commander." Milden turned the camera around and carefully pushed it over to Barrie, treating the watching KBS team and their viewers to the sight of the habitation module walls drifting slowly past. Deftly, Barrie snagged the camera from mid-air and carried on talking. "This compartment here is the galley, where we keep all our food supplies. What you got for us, Wilford?"

Wilford waved at the camera as it appeared around the doorway. "Just mixing up a sapwood from one of our new multi-bag packs." He held up a pouch of white powder with a nozzle attached to each end. "I prefer my sapwood with milk, so that's what I'm going to take care of first." Wilford unclipped the cold water hose and pushed the end over one of the nozzles. "We have to make sure this is on tight - if the hose pops off, we'll have water balls floating everywhere. Okay." He pressed a button and a jet of water shot into the bag,

breaking up into a myriad of shimmering spheres that slowly turned a pearlescent white as the milk powder stuck to them and began to dissolve.

Wilford disconnected the hose, catching the stray water droplets with a towel. "Next, we knead the bag, make sure all that powder is properly dissolved. Then we screw this nozzle on this bag onto this nozzle on this other bag here...and squeeze." The milk streamed through into the second bag, splashing off the toffee coloured coating inside. "Knead the bag again, give it a shake and there you have it - one zero-gravity sapwood!"

Barrie applauded from behind the camera. "And before you say it, Jon, we did try putting the milk and sap into a single bag but they just don't mix right. Unless you use hot water." Wilford made a face. "Which doesn't taste so good," Barrie finished.

Wilford screwed a spout onto his sapwood bag. "Last but not least - the drinking spout. Beloved by parents all across Kerbin, with a built in valve to stop spillages by clumsy kerblets - or kerbonauts!"

Gerselle laughed. "He's right - that looks just like something you'd give a kerblet to drink from. I wonder how well it would work for pastes - a bag of puree with a spout would be perfect for weaning."

"Oh Kerm, yes," agreed Jonton. "Anything to keep the food in one place instead of over the floor and into little eyes."

"And hair," said Gerselle. She shuddered. "I still have nightmares about washing Joenie's hair after the blueberry pudding shampoo game."

Enely rolled over on his makeshift bunk and smiled at the unforced banter between his two friends. The long watch over Gerselle's Kerm was beginning to take its toll on all three of them, none of them able to stray too far from the sleep room and at least one of them being constantly on the watch for the first sign of black spots. *Speaking of which.* He glanced up but, much to his relief, the glossy green leaves overhead remained resolutely blemish free. He yawned and picked up his book, flipping idly through the pages in search of his bookmark.

"...this is our main camera by the window here. We brought it for um, for photography of Minmus from orbit but when we saw this, we really hoped we could um, share it with everyone back on Kerbin."

"We're picking it up just fine, Mildew and what a...what a truly incredible sight that is."

Gerselle sucked her breath in sharply. "Enely - look!"

Enely looked up from his book. He blinked, peering at the television screen and then his eyes widened.

"On the left, Kerbin. From here I can hold up my smallest finger and eclipse that fragile blue dot behind my finger nail. And, if you can see it on the right, that tiny grey speck is the Mün."

Blue and grey, side by side, reminding all of us aboard Prospector 2 of how far we've come - and how far we still have to go."

Chapter 75

The Skies of Minmus

A blotchy black and white landscape rolled past outside *Prospector 2*'s windows, softened slightly by an ephemeral haze of dust, gases and tiny ice particles. *Not at all*, Barrie thought, *like the Mün*. She glanced around the cramped lander cabin, her eyes resting briefly on Wilford standing calmly at his station. *When they said Minmus had an atmosphere, I didn't expect it to be so damned visible. Didn't sign up to fly this tinfoil spacecraft through it either.* She stared out of the window. *Thank the Kerm we're not orbiting this dirty snowball at much of a speed. Too slow for dust to do any damage anyway.* She shuffled her feet in their restraints. "Any word on that Button, Flight?" Silently, she counted off the handful of seconds in her head, the delay a palpable reminder of quite how far from home she and Wilford were.

"Comsats have acquired a carrier wave, *Prospector*. Surface team are waiting for it to mesh with the network. Flight dynamics are prepping your DOI update."

"Ready when they are," replied Wilford. "How's Milden doing?"

"All set up for the wave-off rendezvous," said Nelton. The radio link fell silent and Barrie clenched her jaw in frustration. "Which won't be required. Button 3 is online and meshed. No above-background activity showing on any of the seismometers."

"Good to hear, Flight," said Wilford. "We're Go for DOI on the next pass?"

"That's affirmative, *Prospector*."

Barrie clicked her microphone over to the crew channel. "And thank the Kerm for that," she said, "The view was real nice and all, but none of us came all this way to be stopped by a busted sensor." She flipped over to the air to ground loop. "Thank you, Flight."

Prospector 2 flew onwards. Wilford's gaze flicked restlessly over his instrument panel, both Barrie's and Milden's breathing sounding loudly in his ears. A brief burst of colour filled the

cabin as Kerbol dipped below the horizon and then he was plunged into darkness. He blinked away the afterimages, pulse rate beginning to climb.

"Okay, spacecraft alignment is good," Barrie said quietly. "Throttle mode zero, SAS in auto. Go for DOI."

Wilford took a calming breath through his nose and blew it out through his mouth. The luminescent dials and switch guards on his instrument panels glowed softly in the Minmusian night. "Alignment confirmed," he replied. "Guidance is green, descent engine armed. Standing by for ullage burn." A blue light blinked on above the flight computer screen, familiar from long hours spent in the simulator. Wordlessly, Barrie leaned forward and pushed a button. The reaction control system fired a brief burst, settling propellants in their tanks and Wilford into his foot restraints. Then the descent engine lit, throttled briefly up to half thrust and closed down again. Wilford's fingers raced over his keyboard. The computer screen lit up in response and he nodded in satisfaction "Periapsis eight dot six kilometres. Residuals nulling."

Barrie grinned for the first time since their undocking from the command module. "Hardly had time to get started. How's the tracking, Milden?"

"It's fine, Comm...Barrie. I have a strong radar return on you and your delta-V matches Wilford's calculations. We're approaching reacquisition of signal too."

Barrie opened her mouth to reply when suddenly Kerbol swept over the horizon, banishing the glow from the lander instrument panels and casting sharp edged shadows from switches and button guards. Wilford's glanced at the flight clock, confirming Milden's reply for himself.

"...Prospector. Come in, Prospector."

"Prospector reading you loud and clear on high gain two, Flight!" Wilford replied. "Going three-way on omni beta."

"Copy, Prospector. Milden, do you read?"

"I read you, Flight but you're very noisy. I'm switching antennas."

"I think we're looking pretty good from up here," Barrie broke in. "What say you, Flight?"

"We concur, Prospector. Flight dynamics aren't seeing any trajectory deviations, Surface confirms landing zone status is green."

"Outstanding. Please advise Lander that if we're getting any buffeting, it's too small to notice. Our descent engine is armed, throttle mode zero, SAS in auto. Ready when you are, Flight."

Wilford scanned his side of the instrument panel. "Attitude confirmed, guidance is green, tank pressures nominal."

"Copy, Prospector. You're Go for Powered Descent. Ignition at two minutes on my mark. Mark."

Barrie grinned at Wilford and gave him a quick thumbs-up before turning her attention back to her instruments, her voice calm and studied. "Proceeding at sixty seconds, Flight." She scanned her navball and rate indicators, one hand gripping the attitude hand controller, the other hovering over the manual ignition button. Both kerbonauts felt the sudden kick from the manoeuvring thrusters. "Ullage burn...and ignition. Throttle in auto-one. Rendezvous radar to standby, landing radar to auto."

Wilford barely felt the descent engine rumble to life beneath his feet, although a quick check of his instruments told him that the braking burn was proceeding as expected. The reaction control system fired a brief burst, easing the lander over. The radar contact light flickered then steadied, data scrolling up his computer screen in response. Another burst from the thrusters and the horizon crept into view over the windowsill.

"Sighting angle check please, Wilford."

Wilford keyed in the request. "Fifty two degrees," he reported.

Barrie tilted her head, peering carefully through the graticule scribed on the lander window. "That's not bad," she said calmly. "Trajectory team caught the edge of that snowfield nicely. I'm going to bring us round a couple of degrees and land us closer to that frilly looking area. Flight?"

"Receiving you, Prospector."

"No debris on the snowfield, Flight, but there could be fifty metre rocks hiding in those dark regions for all I can tell. I'm re-designating the landing site by a degree or two. Barrie paused. "I'm telling you, Flight, this landscape is just plain weird. Looks like spilled milk on charcoal dust."

"Looking forward to the holiday snaps, Prospector. You're Go for landing. Sixty seconds to terminal guidance initiate."

The faint rumble from the descent engine fell silent. Both kerbonaut's eyes snapped to their instruments but a reassuring lack of warning lights confirmed that it was still lit. Wilford felt a brief flutter in the pit of his stomach as the lander fell away from underneath him. "Sighting fifty-six degrees. Eight hundred metres, down seven dot two. Horizontal velocity eighteen on the mark." His eyes were fixed on the computer display as *Prospector 2* fell towards the surface, engine throttled back to minimum thrust. "Four hundred metres, down eleven dot one, forward fourteen."

The even, white snowfield gave Barrie no sense of scale or speed as it rushed up to meet them, which, she thought was probably just as well. Even so, her hand twitched towards the manual controls, like a nervous passenger riding in a fast car. "Landing site clear at four hundred," she reported. "Go for Auto."

"Two hundred metres. Down twelve dot three, forward ten dot six."

The lander tipped back, shedding the last vestiges of its velocity over the surface, the descent engine throttling up with a welcome rumble through the cabin floor. Barrie blew

out her cheeks in relief and Wilford wiped his glove across the front of his visor. "Throttle up! One-twenty metres, down nine dot eight, horizontal velocity in the noise."

Barrie stared fixedly out of the window, both hands gripping the edge of the instrument panel resisting the urge to reach for the Abort Stage button. Punching out at this height, she knew, would be more dangerous than crashing. Beside her, Wilford counted off the last few seconds of their flight.

"Sixty metres. Down six dot five..."

"Thirty metres. Down two dot eight."

The final moments of the landing blurred past too quickly for Wilford to keep up. The altimeter spun down past fifteen metres, the contact light flared, the vibrations from the engine dipped and then cut out completely. He turned to face Barrie, both kerbonauts waiting tensely. Then a set of four indicator lamps lit up. Barrie flashed him a triumphant grin, hands already moving over the instrument panel. Wilford began working through the checklist with her, confirming essential switch settings, shutting down the descent engine and preparing the lander for emergency liftoff.

"...descent stage overpressure valves to auto. External cameras on." Barrie paused. "Flight, Prospector. Solid contact on all legs. We're down on the snow."

"We see you down, Prospector. Fine flying."

"Not much flying to do, Flight. We owe the guidance and control team one though, that's for sure."

"We'll pass that on for you, Prospector. Confirm you have a Stay from all controllers and you're clear for surface EVA. Incidentally, according to KBS News, you two are running almost neck and neck with Pioneer 4 for viewing figures."

Barrie blinked. "Good thing we got Milden to write some words for the flag then. Thanks, Flight – we'll try not to let them down."

"Well said, team," Nelton called. "You're looking great out there – just great!"

"Feels great too!" answered Barrie. "This gravity makes everything a breeze – way easier than training!"

Wilford's eyes sparkled behind his reflective visor, his face split by a huge ear-to-ear grin. He peered down through his helmet into the viewfinder mounted on top of his chest camera. "Hold it there, Barrie – that's perfect." He snapped off a shot of Barrie standing by the flag of all Kerbin, its bright greens and blues a bold splash of colour against the black and white landscape. "Have to get some of you by the lander later – they'll be perfect for Jeb's office wall!" He retrieved a sample bag from his belt and clipped it over the end of his scoop. "Okay, Flight, I'm heading over to clean ground for the snow sample. Don't want to pick up any contamination from the engine exhaust."

"I've got an exposed patch of dark material over here," Barrie reported. "Hard to see much but it feels pretty loose through the scoop, like a gravel maybe. It's not sticking to the sample bag either – must be pretty dry." She stuck the sealed sample bag to a fabric patch on her shoulder before retrieving a narrow-bladed shovel head from her belt and screwing it onto the free end of her scoop handle. She scraped out a shallow trench in the dirt, aimed her chest camera at it and clicked off a set of pictures. "Yep – definitely dry. Trench walls keep collapsing. Bottom of the trench is as dark as the surface material. I'm going back for a core tube."

"Copy that, Barrie. Surface team are requesting you take a deep core if possible."

"I'll do what I can, Flight – be good to find some ice down there. I'm sure burnt space gravel is real exciting for the geologists but I'm pretty sure you can't turn it into rocket fuel."

"Apparently that depends on the gravel," Nelton said dryly.

Barrie thrust her shovel into the dirt and bounded back to the lander. "Ohhhh – yeah! Hey Wilford – don't jump too hard else you'll be back upstairs with Milden!"

Wilford laughed. "You can really get some height can't you? I've got a good bagful of snow here – time to get started on the surface science package."

Barrie peeled back a section of insulating material from the lander descent stage, revealing a tool rack and a hand cart. She unclipped a core sample tube and mallet from the rack and bounced back over to her shovel. Working awkwardly, in her pressurised suit gloves, she wrestled the tube into the ground beside her trench, twisting it back and forth and pushing down on it as best she could. She stopped to catch her breath, sweat trickling into her eyes, then resumed her efforts. "Okay, that seems to be staying put. Commencing percussive geology." Stiffly, she raised her hammer and brought it down on the core tube, frowning as it hardly moved. "Getting...oof...quite a lot of...bah...resistance here, Flight."

"Take it easy, Barrie. We can scrub some of the other objectives if you need more time for this." Nelton paused and Barrie heard muffled voices in the background. "Ahh. Surface are saying it might get easier the further down you go. They're thinking any large gravels have probably been shaken up to the surface over time, leaving the finer stuff underneath."

"That would be real nice." Barrie took a swig of water from her helmet spigot then picked up her hammer again. "These suits weren't exactly built for this. Oh come *on*. Get in there you miserable snake-kissing...hunk...of...junk!"

"Snake kissing?" Even across the radio gulf to Kerbin, Barrie could hear Nelton's raised eyebrows.

"One of Jeb's expressions," she answered, breathing heavily. "Or so Sherf tells me. Useful for hot mike situations apparently."

Nelton sighed. "And soon to be a flight controller favourite too, I expect."

Barrie grinned. "Better that than...woah! Looks like Surface were right - this just got a lot easier all of a sudden." She hammered the last few centimetres of core tube into the ground and stepped back to photograph her work. "This be one crazy frozen munlet, Flight."

A frozen world – but not a dead one. Beneath a sooty, rocky shell, intricately folded layers of ices lay hidden. Constantly kneaded by the combined gravitational forces of Kerbin and the Mün, compressed by the weight of ice above them and warmed from below by the faint radioactivity of still deeper rocks, the lower strata of ice float on the dark, ammonia-rich seas of Minmus.

Tidal forces and convection currents driven by pockets of relative warmth, tug on the ice layers, calving them into vast, slowly moving plates. Where the plates grind together, the relentless pressure creates sufficient heat to melt the ice in localised 'hot spots' More often than not, the resulting trickles of liquid simply refreeze, bonding the plates together still more tightly. Occasionally, a particularly long-lived flow lubricates the labyrinthine interfaces between the plates, allowing them to scrape past one another in a brief, juddering burst. Over time such small movements act as a safety valve, releasing the tremendous pressure of the depths in a constant stream of micro tremors.

But sometimes the right trickle of liquid finds a channel to flow through. Rich enough in ammonia to remain liquid despite the freezing temperatures, it drains through one of the myriad fracture patterns cobwebbing their way through the ice, before finally re-freezing and forcing those fractures a little further apart. By itself a single such event is barely noticeable over the ceaseless grinding background, but over time, repeated cycles of freezing and thawing broaden - and deepen - the fracture network, splitting the ice around it and driving a channel down to the sunless seas below...

The duty controller from the Surface team looked up at the quiet beep from her console and frowned at the jagged bursts scribbling their way across several of the seismometer readout displays. She paused for a second, mentally converting ID codes to map coordinates, then sat up straight, giving the screens her full attention. The console beeped again, more insistently this time. The controller leaned forward, fingers racing across her keyboard, calling up a set of analysis programs. "Flight, Surface."

"Go ahead, Surface."

"Picking up above-background activity in sectors delta and echo, Flight."

"Patch me in," Nelton replied crisply. "Do we have enough signal to triangulate?"

"Working it, Flight, but I'd say..." A louder, two-tone beep sounded and amber warning lights flashed on across the Surface console. "Oh, Kerm. First pass error ellipse is too large to call it, Flight but that's way too close for comfort!"

The repeater traces on Nelton's console spiked upwards. Nelton took one look and cut in the all-controllers and ground-to-air loops. "EVA1, EVA2. Abort to orbit - landing zone Red, repeat Red!"

On the surface, Wilford looked up in surprise. He opened his mouth to reply then snapped it shut again as the ground shivered beneath his feet. Eyes widening in sudden alarm, he dropped his armful of spindly rods and gold foil and kicked off for the lander. "Copy that, Flight. Returning to base!" He skidded across the ground, boots churning up a double plume of frozen powder as he kicked off again. "Barrie – where are you?"

"Out by Danfen's Dip and heading home at speed. You?"

"Nearly there." Wilford bent his knees to absorb his landing and ran on towards the lander in an awkward lope. He sprang up the ladder, clearing half the distance to the cabin in a single bound, scrambled up the rest of the way and squeezed through the open hatchway. No sooner had he wedged his feet into their restraints when the lander shook beneath him, landing legs creaking alarmingly.

"Speak to me, Barrie!"

"Got a faceful of snow but nothing cracked or broken." Barrie fought to keep her voice level. "Which is more than I can say for the landscape out here." Wilford heard her panting as she she scrambled to her feet. "That checklist better be clear!"

"Working it."

"How bad is the cracking?" Nelton cut in.

"No idea, Flight," gasped Barrie, "Lander is clear which is...oof... all I really...ooof... care about right now."

"Hold onto that thought," said Nelton grimly. "Surface is tracking minor shocks in Charlie and Foxtrot sectors. Prospector – are you clear for launch?"

Wilford flipped the last of a series of switches and checked his computer display. "ATO is in, Flight." He made a mental note of the calculated launch azimuth and throttle settings before leaning forward and very deliberately pushing the 'Cancel' button. The flashing blue light on Barrie's instrument panel went out. Abort stage to manual. He flicked a glance at the throttle settings, one hand resting by the engine start button, the other clenched around the attitude controller. *Blight it, Barrie, where are you?*

The cabin lurched sideways. Wilford snatched his hands away from the controls, gritting his teeth as something thudded into the descent stage beneath him. Metallic scrapes, clinks and heartfelt swearing filled his ears.

"I'm clipped on! Go, go, go!"

Wilford's head snapped round. "On the ladder?! It's not designed for loading under thrust! Get up here – quick!"

"Yeah well I'm not designed for flash freezing! Get us out of here. Now!"

Wilford grabbed the attitude controller, pulled the throttle to minimum takeoff thrust and slapped the engine start button. Hypergols sprayed into the combustion chamber and exploded into flame, throwing the lander skywards in a cloud of rapidly freezing vapour. Attention riveted on his instruments, Wilford rolled his spacecraft onto its launch heading and cautiously fed power to the engine. "Hang on!" He twisted the controller, yawing the lander inverted, then pitched up onto a flatter trajectory, skimming over the icy plains. "Barrie?"

"Still with you. Thanks for the ladder-up manoeuvre."

Wilford's knees almost gave way. "How's the ladder holding up?" He shook his head angrily. "Blight it – how are you holding up?"

"Thanking the Kerm for a two-hop mission profile and an overpowered lander," said Barrie. "Not to mention ladders that you can wedge EVA boots into. Shoulders are going to be like a gronnek with toothache tomorrow but I'll worry about that once we *get* to tomorrow."

"Can they take more acceleration now? We're not going anywhere on this trajectory!"

"Yes they can and no we're not. Do it..."

Behind them, the sky flared brilliant white. Instantly, Wilford pushed both hand controller and throttle lever forward. The lander soared upwards, racing the storm of ice and vapour erupting from Minmus. The ragged edge of the shockwave buffeted them, tiny frozen particles sparkling in their exhaust plume and puffing into vapour as they struck the lander hull. Then they were through, horizon curving away beneath them, reflected sunlight washing out the stars.

"...I'll tell you if my arm falls off," Barrie finished.

Wilford set the autopilot to attitude hold then punched in a trajectory request. The computer flashed up a predicted apoapsis and he drew a deep shuddering breath. "Okay, Flight, we're on track for abort mode two-beta. Prepping for descent engine shutdown and requesting burn update for transfer orbit insertion."

"Flight dynamics are on it, Prospector," came the clipped reply. "Barrie – what's your status?"

"Ready to come aboard," said Barrie. "Suit pressure nominal, both arms intact. And whichever of Bob's team glued this ladder on..." her voice tailed away. "Well they went above and beyond – and thank the Kerm that they did."

The fuel quantity light glowed on the instrument panel and Wilford promptly eased the throttle back against its stops. Barrie sensed the deceleration in the pit of her stomach, her feet briefly lifting out of their boots. She braced herself, gritting her teeth as her bruised and aching arms took the strain. Exactly ninety seconds later the descent engine shut down. Swallowing blood from a bitten through lip, she squeezed her eyes shut and shook her head to dislodge the tears clinging to the corners of her eyes.

"Can you throw your tether up?"

Barrie tipped her head back. Wilford was leaning out of the lander hatch, gloved hand outstretched, EVA tether snaking back into the cabin. "I don't know about throwing it," she said. "But as long as you can catch it." She took a firm grip on the ladder rung, unclipped her own tether and propelled it clumsily towards him.

"Gotcha!" Wilford snagged a twisting loop of safety line over the crook of his arm and promptly hooked it in. Carefully he retreated into the cabin, unclipped his own tether and attached Barrie's in its place. "EVA 1 secure, Flight!"

"And on her way!" added Barrie. Moments later her head poked over the hatch sill and she began wriggling her way inside, guided by a perspiring Wilford. Both kerbonauts shuffled over to their places behind the instrument panel. "Flight, Prospector – all crew aboard!"

Nelton's voice was barely recognizable. "We...we all copy that, Prospector. Got a lot of kerbals down here breathing again. Thanks a lot."

"As well as one kerbal up here, Commander," said Milden in a choked voice.

There was a long, heartfelt pause then the flight director's brisk tones crackled across the radio. "Okay team, we've got that transfer burn for you as soon as you lose the descent stage."

"Copy, Flight." Wilford glanced at Barrie who nodded in reply. "Jettisoning descent stage... now." The decoupler fired with a sharp crack and the lander cabin lurched under them, RCS thrusters firing in a staccato rattle to compensate. Wilford nudged his hand controller, setting the ascent stage into a slow roll. "Hey, that's a bit sportier now... and we have a visual. Okay, Flight, separation confirmed. What's the plan?"

"Straight burn at the top with the ascent engine, into a phasing orbit. Telemetry review after insertion to evaluate restart options. Flight Dynamics and Lander are working the options for rendezvous - if need be, Milden will fly the final approach and docking."

"You can count on that, Commander," said Milden firmly.

"I know I can," said Barrie simply. "Ready to take down that burn update, Flight."

"...and shutdown. Ascent engine safed. How are we looking, Milden?"

"You're looking good, Barrie. Predicted apoapsis within acceptable margins." A worried tone crept into Milden's voice. "But according to the radar your inclination is off. Do you have tracking figures, Flight?"

"We do," said Nelton, "And Flight Dynamics concurs. Prospector – please confirm RCS propellant reserves."

"We're at eighty-two percent, Flight. Good thing we're not running a plane change out by the Mün."

"That's affirmative, Prospector. Okay, Lander is recommending you re-route propellant from the ascent propulsion system through the RCS tank and fly all manoeuvres on the thrusters. We've spoken to Bob's team and they concur. Primary APS valves are not rated for relight and the risk of a stick-on is too high."

Barrie swapped a concerned look with Wilford. "Understood, Flight. I take it we'll be changing plane at the descending node to buy us more time?"

"Correct. I'll pass up the burn updates as soon as the Flight Dynamics team have them. For now I'm putting Lander on-loop to run through your valve settings for the reroute.

"And Wilford is standing by for that," said Barrie. "I'm going to close the hatch and repressurise this cabin. Getting mighty tired of my own company inside this helmet."

Nelton gave a startled laugh. "Copy, Prospector."

Prospector 2's ascent module arced out into space. Incapable of returning home to Kerbin on its own, it was a spacecraft in the purest sense – a metal bubble, pared down to the barest essentials needed to keep its crew of two alive for two days on the surface of Minmus and return them to their crewmate in orbit. Slowing, it reached the highest point on its orbit and began to fall back to the distant munlet. Thrusters fired, tipping the spacecraft back until its cabin windows faced forward along the direction of flight, two glassy, triangular eyes watching the way ahead. The spacecraft waited, gathering itself then, at the appointed moment, the thrusters fired again in a sustained blast, four jets of fire bracketing the silent main engine. The fire winked out but the spacecraft flew on.

"...transfer valves closed, APS override in. Propellant reserves: seventy percent in the RCS tank, APS gauge bottomed out."

"Good burn, Prospector. Relative inclination zeroed out and Flight dynamics confirms your margin for rendezvous. You won't have a lot left in the tank but you'll get there."

Barrie ran her hands through her hair. "Best news I've had all day, Flight," she said sincerely. She peeled her squeeze bulb of water off the cabin wall and took a long drink. Letting the half-full bulb float freely by her head, she rummaged in the storage locker by her waist, emerging triumphantly with a bag of waxy, golden brown cubes. She popped one into her mouth and chewed on it happily before offering the bag to Wilford. "Sapwood toffee?"

Wilford's eyes lit up. "Forgot we had those onboard. Mmmm, those aren't bad at all! Wonder if Dorny's tried making crunchy ones?"

Barrie made a face at him. "You can keep your candied insects in your own spacecraft thank you very much." She was interrupted by a sudden cry from the radio.

"Cloud! Great Kerm above it's covered in cloud!"

Barrie's head snapped up. "What is? Milden – report!"

“Minmus is! I’m flying over the landing site and I can’t see a thing – it’s all buried under a great dome of cloud!” Milden caught her breath. “Sorry, Barrie,” she said contritely, “Sorry, Flight. Spacecraft systems are nominal – I think I’m too high for the plume to reach me, even in Minmus’s gravity. But, Kerm – that’s a lot of ejecta. No wonder the seismometers went crazy.” Milden swallowed hard. “And thank the Kerm you and Wilford got out in time.”

Chapter 76

A Few Good Kerbals

The smell of damp grass filled Erlin's nostrils, Kerbol not yet high enough in the sky to drive off the morning dew. By the side of the road, dewbells stretched towards the new day, their goblet shaped flowers unfurling into carpets of golden petals. The Berelgan stretched out before him; neatly regimented grids of crop fields reaching all the way back to the old fashioned manor house buildings, toylike in the distance. Behind them, the glass domes of the Dunan agronomy complex glinted in the morning sunlight. He bent down to retie his bootlaces, before setting off along the, now well-worn, footpath to the planting site.

The sapling stood in its fenced-off clearing, a single ring of slender side branches just beginning to emerge from the main stem. Erlin opened the gate and walked over to it, retrieving a measuring tape and laboratory field notebook from his poncho as he went. He squatted down by the sapling and wrapped the tape around its trunk being careful not to disturb the still-delicate leaf clusters. Nodding to himself, he made a note of the trunk diameter then measured its height. Finally, he pulled a magnifying glass out of his pocket and examined the leaves at length, occasionally jotting down entries in his notebook.

Dropping his notebook back into its pocket, Erlin fished out a waxed paper package from his inside pocket and sat down by the gate, gazing contemplatively at the sapling. He unwrapped his breakfast and took a slow bite of egg and greenleaf roll. *Looks fine above the soil. Only average height and diameter for its age but that's nothing to worry about.* His eyes dropped to the patch of bare earth around the base of the young Kerm tree. *If only we could see what's happening down there. Take some samples, run a GC or two.* He shook his head in frustration. *And if we were really lucky the probes wouldn't sever anything vital. So we wait and hope that the cuttings take. Then we hope they Knit. Then we hope that somebody can Commune with the new Kerm. But do we really understand what we've made here? Binad faca-factad?*

Erlin swallowed a mouthful of roll and sighed. *It's healthy - that's the main thing. Right now that's all we can do for it.* He finished his breakfast and climbed to his feet, brushing crumbs off the front of his poncho. Closing the gate behind him he walked back to the road and set off back to the laboratory buildings, head bowed in thought.

There was a knock at the door. "Phone call for you, sir."

Al looked up from the schematic he was studying. "Did they leave a name?"

"It's your brother sir. He said it was urgent - something about the weather being bracing but fine." His secretary gave him a confused look.

"I'll take it in my office." Al turned to the engineers beside him. "Approved. We'll give that a try first. He signed his name on the corner of the schematic, nodded to everyone and left the room. He marched along the corridor to his own office, flipped the privacy sign on the door to Do Not Disturb and closed it behind him.

"Al Kerman."

He was answered by a snort. "Kerman he says. You've been flying that fancy desk too long, little brother."

"And don't I know it. What've you got for me, Chad?"

"Medics have got her trussed up like a Year's End wagga but they say she'll fly again. In a few months. If she doesn't do anything stupid while she's waiting."

"And by 'stupid' they mean 'anything they tell her not to do'?"

"That's about the shape of it," his brother agreed. He paused. "She's good, Al. No shortage of guts - she flew those lashed-up torpedo bombers at Humilisia for Kerm's sake. Don't know much about the flying end of things but I've never heard of anyone badmouthing her on that score either..."

"There's no shortage of good pilots in the world either," Al interrupted. "With guts to match."

"Nope. But I'm thinking there's not many who'd keep their heads screwed on under unknown fire, figure out what was coming at them and damn nearly out-fly it."

Al paused. "No," he said thoughtfully. "No, that takes a little more than good stick-and-rudder work. How did you plan to set this up?"

"Rank rubs off, little brother. The Fleet Commander has his head screwed on too, or so I hear. I'm thinking it might be on tight enough for him to spare an ear for Commander Valentina's old sergeant."

"And if he doesn't like what he hears?"

Another snort. "He chews me up, spits me out and busts me down to deputy pot-scrubber on some Kerm-forsaken airfield at the north end of nowhere. Suits me - I never liked warm weather anyway." Chadmore paused. "For sure he's not going to kick me out, Al. Not whilst I've still got both legs, all my arms and enough left in my head to walk in a straight line."

There was a knock at the door. Fleet Commander Gusden looked up from the papers strewn across the scuffed and worn table serving as his temporary desk and saw the stolid face of his adjutant in the doorway.

"Flight Sergeant Chadmore Kerman to see you sir."

Gusden nodded. "Show him in please." He waited for the door to close before running an appraising eye over the kerbal standing stiffly in front of him. "At ease, sergeant. What can I do for you?" He waited for a second before raising his eyebrows. "Well? Speak up, soldier."

Rank rubs off, Chadmore reminded himself sardonically. His tongue felt glued to the roof of his mouth. "It's the Commander, sir." he said at last.

Gusden looked at him neutrally. "Yes?"

"I wanted to talk about her, sir. That is..." *Oh, Blight it all.* "Permission to speak freely, sir?"

"Granted," said Gusden dryly. "If only to stop you wasting any more time, sergeant."

Chadmore winced inwardly at the Fleet Commander's pointed tone. "I think Commander Valentina deserves an honourable discharge, sir."

The temperature in the room dropped several degrees. "And what leads you to that fascinating conclusion, sergeant?" said Gusden conversationally.

"Duty to Kolus, sir. The Commander can do more for our country outside of border security, sir."

"Is that right?" Gusden leaned forward, resting his forearms on his desk. "Enlighten me."

"The Space Program, sir."

Intrigued despite himself, Gusden sat back in his chair. "I have it on good authority, sergeant, that a considerable number of our brave kerbonauts wouldn't know one end of an airplane from the other. No doubt this is one reason why spacecraft are notoriously lacking in wings. Would you care to explain why I should transfer one of my best officers to a program that she appears to be manifestly overqualified for?"

"Because they're not winged yet, sir."

The corner of Gusden's eye twitched. "Be careful, sergeant," he said softly. "I'd hate to lose a good kerbal to pot scrubbing duty – or worse. Now - what do you know about winged spacecraft – and how?"

"No more than the trade press do, sir. I know about the Skyhawk program and C7's ambitions for it. I know that C7 are still recruiting test pilots but apart from that?" Chadmore kept his face carefully expressionless. "I never could pry a secret out of my little brother, sir. And working for C7 hasn't made him any more talkative."

"Your *brother*, sergeant?"

"Yes, sir. Director Al Kerman. Director of the Skyhawk program I'm guessing, although I don't even know that much for certain."

Gusden drummed his fingers slowly on the edge of his desk. "I need to find extra duties for my flight sergeants," he said, half to himself. "They're obviously not busy enough. Have you been recruiting for C7 for long, sergeant?" he added.

Chadmore held himself very still. "I've been thinking about this for a long time sir," he said quietly, "but no Kolan is working for them because of me." He saw Gusden's 'carry on' gesture from the corner of his eye. "Since the first Mün landing, sir. Sitting under those flags, somewhere between Kolus, Firesvar and Wakira – and for a handful of days it didn't matter where we were. We put all the troubles of the world to one side - a bunch of kerbals listening to two other kerbals walking on the Mün."

For the first time since entering his office, Chadmore looked Gusden squarely in the eye. "I've known pilots who've ejected before, sir. I've seen what it can do to them and I've got a good idea how long the medics will be keeping the Commander grounded for. If we're still fighting by then, then I honestly believe that whatever she can do up in space will do more to end the war than anything she can do on the front lines." Chadmore drew himself to attention. "If the Fleet Commander disagrees, this soldier volunteers for any duty or additional discipline that the Fleet Commander sees fit!"

"At *ease*." Gusden pulled a file out of his desk drawer and made a note. "I'm not in the habit of handing out discipline for opinions honestly expressed, sergeant. But if I ever hear of any kernal under my command being anything less than wholly committed to their duties – *and their duties alone*... I trust we understand one another, sergeant?"

"Yes, sir. Thank you, sir."

"I'll take your comments under advisement, sergeant. Dismissed."

Chadmore saluted, turned smartly on his heel and marched out of the room. Gusden watched him leave before getting to his feet and quietly walking through to his anteroom. His adjutant looked up from his files. "Sir?"

"A coffee if you'd be so good. And please find me Director Lodan's number at the Kerbin Space Agency."

—————

Val gritted her teeth and pulled herself up in what seemed like the hundredth chin-up of the session. A mash of talc and sweat glued her hands to the exercise bars, their arched middle

section shaped to provide headroom for the exerciser and, Val thought privately, resembling an upside down set of handlebars from her first tricycle.

The brace around her midriff and lower back itched abominably. Val finished her chin-ups, swung her feet forward and carefully lowered herself onto the set of steps placed under the exercise bar. Stiffly, she climbed down onto the grass and stood for a moment, working her exercise top back and forth under the brace. It helped a little.

Other pieces of exercise equipment dotted the lawn like pieces of abstract sculpture, most of them supporting a sitting, standing, or in many cases folded over, kerbal dressed in soft grey running trousers and matching top. Many of the kerbals were wearing braces of varying sizes and designs, some of them also wearing their clothing knotted at the shoulder or hip, the better to stop an empty sleeve or trouser leg from catching on anything. Hospital staff kept a discreet watch, intervening only when necessary. Tall hedges screened off the exercise area, ensuring a degree of privacy for them and their charges.

Gusden followed Al through a leafy archway and stood quietly by the hedge, watching the other kerbal come to terms with what he was seeing. One of the hospital staff spotted them and walked over to greet them, eyebrows lifting slightly at the sight of Gusden.

“Good afternoon, Fleet Commander. How may I help?”

“We’re here to see Commander Valentina,” Gusden replied. “We’re earlier than we expected, so please – at her convenience.”

“She should be finishing her session any time now, sir. Please take a seat and I’ll let her know you’re here.”

Gusden and Al perched on an old fashioned wrought-iron bench designed, Al thought, to discourage anyone from sitting down for too long. He saw the grey garbed figure limping towards them and, relieved, got politely to his feet. Gusden followed suit, smiling faintly at the look on the newcomer’s face.

“At her convenience, the kerbal says, when he’s the one turning up early. Make this quick please, Gusden, before these ever-so-fetching garments stick themselves to me permanently.”

“As you wish,” said Gusden mildly, ignoring the incredulous expression on Al’s face.

“Although you might be more polite to our guest after he’s come all this way to meet you. Val – meet Al Kerman. Al, this is Commander Valentina.”

Al dipped his head. “Good to meet you, Commander.” He studied the other thoughtfully, taking in her cropped black hair and deep, copper-brown eyes, wrinkled at the corners and sizing him up just as thoughtfully. Somehow the unflattering grey exercise-wear and heavy spinal brace around her middle only added to her air of calm authority.

Another of the hospital staff hurried up with a poncho and handed it to her respectfully. Val smiled at him in thanks and worked it over her head, scowling briefly as it rucked up over

her brace. "So, what can I do for you, Al?" Val narrowed her eyes. "Al Kerman – I know that name."

"Possibly," said Al. "I flew Cloudbrowsers once upon a time. PM1 – and then PM2. PM2 was the better plane by far," he added blandly.

"Production model 1..." Val looked at him with sudden respect. "Are you still flying for C7?"

"Not unless you count desks," Al said dryly. "I'm mostly a manager these days." He glanced around before turning to face Gusden. "Perhaps we could find somewhere quieter, sir?"

Gusden nodded. "Agreed. Is your back well enough for a short walk, Commander?" Curiosity piqued, Val nodded. Gusden eyed her for a moment then led the way through the hedge and across the hospital lawn to one of the small, Doreni style formal gardens that dotted the grounds. "This should be sufficient." He gestured at Al. "Please continue."

"We're building spaceplanes," Al said. "And we're going to need pilots for them. Current state of the art is our Skyhawk single-seater rocket plane but even stretching the envelope as far as we can, it ain't useful for much more than a single hop into the black and a dead-stick landing. But we're working on something just a bit bigger." Val listened in fascination – and growing excitement – as Al sketched out the details of the MACE air-breathing rocket engine. "It's an old idea – looked good on paper but..."

Val rolled her eyes. "Paper planes always look perfect and fly perfect – on paper."

Al favoured her with a rare grin. "Exactly. But this time, we're thinking the real deal is going to look even better. The engine is specced and tested. Airframe construction for the demonstrators is on-going. We've got a long string of problems still to solve before we're anywhere near a production model but the first task is to get that engine into a fuselage and get that fuselage into the sky. Then we get it past the sky."

Val's eyes lost their focus. "Why?" she asked at last.

"Lots of reasons," said Al. "Some of them aren't important and most of them I can't tell you about anyway. Yet. But the big one is Starseed. If that's ever going to work, we're going to need a lot of kerbals in orbit – and putting them there three at a time in an oversized tin can just ain't going to cut it."

"So we fly them there," said Gusden softly.

"And we bring the plane home again," finished Al. "Check it over, refuel and relaunch. So – what do you say, Commander? How would you like to come fly for us?"

Val stared at Gusden's unperturbed expression. *That figures.* "What about Ferl and Cal?" she said.

A shadow flickered behind Gusden's eyes. "We'll look after them," he replied. "We can't afford to lose good, able bodied kerbals and even if Cal can't set foot in a cockpit again without getting the shakes, there's more duty slots ground-side than we have people to fill them."

"So why do I get to get out? Sir."

"Because, in the words of our dear Press, we need more beacons of the kerbal spirit, Commander. We don't have enough people to fill all those duty slots either."

Val shivered under her poncho. Then she turned resolutely to Al. "Count me in."

The fibres threaded through the soil, a gritty, mineral laden clay now enriched by the remains of generations of plant life - clover to begin with, then stouter legumes and finally other crops. Consumed, reformed, passed along the countless webs of prey and predation that wove the soil together in an intricate tapestry, woven on a loom of other fibres.

Fibres that were recognisably self.

Hormone gradients rippled through the soil. The fibres followed them, no more able to resist than a flower could resist growing towards the light. Flurries of signals poured along the hairlike threads as they met and touched. The ripples became cascades, biochemical torrents that drew other fibres to the trails marked out by the pioneers. At a hundred, then a thousand, then still more points, the fibres twisted together.

Meshing.

The signals intensified, racing out from the contact points like the waves from a handful of gravel tossed into a still pond. Cancelling, amplifying, setting off secondary waves of signals. Modulating, feeding forward, feeding *back*. Random bursts gradually absorbed into the whole; acquiring definition, purpose, and above all, *meaning*.

Knitting.

Thought exploded through the soil in a searing burst of revelation. And with thought came identities. Thirty-eight nascent personalities, imperfectly overlapping, same but not same. Thirty-eight sets of memories suddenly crammed into a single consciousness with no time for reason or rationalising. The explosion faltered, abruptly sucked down into a spiralling maelstrom of doubt, panic and then naked terror. Collapsing inward, triggering a last desperate message, a frantic cry for help before the inevitable shattering.

And in a final silent scream, a tsunami of black spots flooded over the leaves of thirty eight young Kerm trees.

Gerselle jammed her head into the leaf cluster. The leaves whipped around her forehead, Communion hairs tearing through her skin like a thousand needles and embedding themselves in her skull. A tornado of discordant, shrieking thoughts ripped through her head like an ice pick; raw, uncontrollable terror searing every nerve in her body.

In the distance somebody or something shouted her name. A streak of green light blasted through the chaos, shimmered and resolved into a chain of figures, all holding hands. A

hand reached out for her; the face behind it somehow familiar. She flung herself at it, fingertips straining across the gap, scrabbling for purchase.

Gerselle! To me!

Fingers hooked over hers, grasping, catching hold, clasping her by the hand. Reassurance and understanding swept through her, a lifeline to cling to against the shards of dislocated memories and fractured personalities that battered at her, threatening to sweep her away with them.

I've got you. Hold on my love – hold on! Jonton flung his thoughts through the maelstrom separating him from Gerselle. Distantly he felt her momentary panic disappear, felt her resolve as she reached out in welcome to the fragments of Kerm mind despite their terror crashing through her. Slowly the storm began to abate, the shards flocking around her, melding with her, drawing strength and reassurance from her presence.

Reassurance washed over him from a different side. An image of a Kerm tree appeared, cupped within Enely's hands. The tree shimmered, became thirty eight trees surrounding a lone kerbal. A beam of light rayed out from one tree, reflected off the kerbal and connected to a second tree. Another, differently coloured, beam bounced off the kerbal, linking two more trees together. He heard Enely's voice calling out to the shards.

Don't be afraid. You sense many things but they are only one...

Rainbow fans of light danced between the trees, deflecting off trunks and kerbal alike, connecting the trees one by one. The kerbal vanished, leaving thirty eight trees enmeshed in a web of light.

You are many – but you are one. You are Kerm.

The flock of shards, thronging around Gerselle, began to quiver. Jonton sensed confusion then a sudden spark of curiosity. One shard shivered, rocked violently for a moment then burst free, soaring over to Enely's trees and trailing a cloud of smaller shards behind it. A stab of pain lanced through him and he heard Gerselle crying out. A second and then a third shard broke free, trailing glittering fragments behind them. Gerselle screamed and a horrified realisation broke over him.

Stop, Enely! It's too fast - too soon! Let them go!

The remaining Kerm shards erupted from Gerselle's mind. Frantically, Jonton hurled himself at her, tried to wrap himself around her, to catch the expanding cloud of fragments and gather them to him. For a second they held.

Gerselle! To me!

The fragments of memory and personality swirled, twisted around him and then blew apart, everything that Gerselle was and had been, tumbling past him like leaves driven by a hurricane.

Jonton! Help me...J...

GERSELLE!

The fragments streamed past him and out of sight. The mental link connecting him to Gerselle flickered, dimmed and went out.

Chapter 77

Names

Jonton's agonised mental cry barely registered with Enely. The sudden lurch as both of his friends dropped out of Communion rocked him momentarily but then his mind's eye filled with a rapidly approaching swarm of Kerm shards. He thrust out his image of thirty-eight linked trees at them and poured all his concentration into projecting thoughts of his own, long-gone and much younger Kerm, imagining it growing and deepening into Elton's soothing presence.

The first shard struck the cluster of trees, shimmered and flowed into and over it. One of the outer trees swelled, acquiring greater definition and form. Every ridge of bark, every leaf vein popped out in sharp relief and the glowing traces, linking it to the other trees, intensified. A second shard ploughed into the larger tree and ricocheted into the centre of the cluster in a discordant scrape of flint dust and scorched bark that lifted the hair on Enely's neck and made his eyes water.

More shards crashed home. A handful struck just the right tree in the Grove, swelled into grandeur and added their light to the mesh. Enely felt the pleasing warmth of sun on leaf, smelt the richness of good earth after rain, but despite the *rightness* of those feelings there was something missing; like gaps in a row of teeth, begging to be prodded by an ever-restless tongue. The rest of the shards lay strewn around between the trees; a carpet of fractured, brilliant icicles slowly melting in the sun.

For a second, Enely stretched out his awareness, hunting for Jonton and Gerselle but finding only worrisome silence. Clamping down on his growing unease he turned back to the wreckage of Gerselle's Kerm. Tentatively, he imagined himself lifting one of the icicles, only to snatch his fingers back as it *flowed* under his touch, an ugly bruise of colours on its surface blossoming into a whiff of hot tin and spoiled meat. He tried again, millimetre by millimetre, as if trying to peel an intact spiderweb off a leaf without disturbing its myriad threads.

The icicle quivered but lifted free at his touch. Enely brushed his fingers over its surface doing his best to project thoughts of comfort and reassurance. Then he turned to the next shard.

Only long-ingrained habit prevented Jonton from ripping his head free of the leaf cluster. For long seconds he lay still, fists clenched, calves knotted, a steel band of dread and impatience clamped around his guts. On another bed, Enely twitched and groaned, hands moving in a childlike parody of a kerblet stacking blocks, the sour reek of sweat hanging over him like a miasma. At last the leaf hairs slipped free of Jonton's scalp and he flung himself across the sleep room to Gerselle's side.

She lay unmoving, eyes rolled back into her head.

The steel band around Jonton's middle constricted. He lifted Gerselle's wrist, feeling for a pulse and almost collapsed with relief. It was there; thready, weak but clinging to life. For an instant, hope flared but then the awful last moments of Communion came crashing home. The shattered fragments of Gerselle's mind whirling past; her pain searing through the link; her last terrified plea for help. Numbly, Jonton let go of her wrist and watched her hand flop nervelessly onto the bedspread. Blank white eyes stared at him and his brief moment of hope guttered and went out.

Mechanically, he climbed onto the bed beside his life partner and cradled her in his arms. Only that same long-ingrained habit kept him from sweeping the Kerm leaves from her head.

Enely stared helplessly at the neat rows of shards, lined up in his mind's eye. Filaments and fronds of *something* still oozed from them, blindly crawling towards their neighbours. The larger fronds lay quiescent, turning brown at the edges. He reached out to the nearest shard, trying to touch the memories within but they swirled beyond his reach like a swarm of bees seen through frosted glass. He bent closer, nerves thrumming, alert to the faintest sound or scent.

The filaments quivered and lashed out, smothering Enely's face. Panic-stricken, he cried out, only to find his mouth unable to close. He *felt* the fronds crawling over his eyes, blocking out the mindscape, insinuating themselves through the delicate tissues between eyeball and skull. His hands hooked into claws, fighting the urge to rip out the thick tangles of filaments, that his screaming mind insisted were crawling up his nostrils and down his ears. Then the sickly queasy wriggling stopped and suddenly Enely could *see*.

And *hear*.

And *smell*.

He hugged the shard to his chest, wincing at the discordant snarl of sensations, and staggered over to the half-formed presence in front of him. He held out the shard, feeling it

flow under his hands, filament encrusted icicle morphing into a warm, sinuously folded form. Enely came *forward*, leaving his kerbal self behind, his entire consciousness reaching out, flowing over the piece of Kerm like a protective film. Probing, feeling, searching for the missing pieces, for the seams between *these* memories and *those*, for the subtle links between *this* concept and *that* instinct. Turn *here*, then twist *there* - gently...gently...and *now* the sudden explosion of light illuminating the sensorium around him!

Retreat...breathe... and become kerbal again. Enely stared at the newly grown tree, shining alongside its companions in his imagined Grove.

The next shard was easier, the sensation of invading fronds crawling behind his eyeballs less of a shock, although Enely's scalp still crawled at the feeling of *something* squirming up his nose. The shard melted against him, flowing into a compact rippled mass, trailing ropes of quivering, iridescent mind-stuff behind it. Under his direction, the ropes spread out, coiling through the growing Kerm mind, holding the mass in place. As he retreated from it, Enely felt a twinge of unease in the back of his mind.

One by one, the shards fitted into place, brown-edged pieces washed clean and made whole again. But with each new gap filled, each new connection made, Enely struggled against growing unease, that swelled into fear and threatened to spill over into outright panic. Squabbling voices clamoured in the back of his mind, each shouting to be heard over the rest. The Kerm mind shuddered, newly stitched mental seams beginning to unravel under the strain.

Stop!

The squabbling continued unabated. Silently, Enely berated himself. *Shouting at an untrained mallek never solved anything.* One at a time he began talking back to the voices, offering a quiet word, or the mental equivalent of a soothing pat or a scratch behind the ears, to each. *The malka can smell fear - agitated drivers make agitated malleks. But if they think you know what you're doing...*

Don't be afraid my friends. You are many - but you are one. You are Kerm. Enely summoned up a memory from one of the shards. It looked familiar. *Nematode webs I think. Jonton would know if he was...* He didn't allow himself to complete the thought. *Agitated drivers make agitated malleks.*

For you, this is a part of your world. Enely paused, rifling through half-remembered images from another shard before finding what he needed. *And for you this is a part of your world. But they are the same world.* The images slipped over one another, sections of both neatly overlapping. Enely summoned up an image of a hilltop dotted with Kerm trees. *This is what your kerbals see. Many trees - but only one Kerm.* With an effort, he flipped back to the image of overlapping soil tapestries. *One world - one Kerm.*

The voices fell silent. Then a curious sensation raised the hairs on the back of Enely's neck and rippled upward. All around him, thousands of individual memories swooped and spun about each other. Touching, aligning and merging, reorganising themselves into new, more

compact structures and in doing so, making space for other memories to join the great dance. Waves of thought flowed through the Kerm mind, healing, tightening, snipping out redundancies. And like a cloud of interstellar gas collapsing under its own mass, the contracting mind began to glow, grew ever brighter and then ignited.

Light shone all around Enely and a single voice called to him.

<kerbal?>

Yes - I am kerbal

<there were more kerbals. My kerbal, another kerbal, you. You are not my kerbal>

No, I'm not your kerbal. Your kerbal was called Gerselle. The other kerbal was called Jonton. I am Enely.

<what is Enely? You are kerbal. I know kerbal, I do not know Enely>

Enely is my name. A word that other kerbals give me so they know who I am.

<I am Kerm. Do I have a name?>

Not yet. Would you like a name?

<yes. If kerbals have names, I would like a name. My kerbal Gerselle showed me other kerbal, showed me Jonton many times. I will have both their names> The young Kerm paused. <My name is Jontongerselle, Enely>

Enely smiled. That's a long name for everyone to remember so why don't we shorten it a bit? I think Jonelle would be a pretty name for you.

<Jonelle...Jonelle. Yes, yes, Enely, that is a good name. I will be called Jonelle>

I'm very pleased to meet you, Jonelle, but I must go away for a little while and find Gerselle and Jonton. They'll want to meet you too.

<yes, yes! Talk to Jonton, talk to Gerselle, talk to Enely. Come back quickly>

I'll be as quick as I can, Enely promised.

The leaves lifted from his scalp. Enely swung his feet off the bed and wearily ran his fingers through his hair. He was greeted by silence.

Oh no.

Jonton lifted his head. The awful look on his face stopped Enely in his tracks. *Oh Kerm, no.* Weariness forgotten, he crossed the room and knelt down by Gerselle's bed, taking in her motionless body and rolled-back eyes. "Oh, Jonton, I'm..." His throat constricted, choking off any further words.

"She's gone," Jonton's voice was remote, empty. "Shattered. I saw her go. I tried to hold her but she's gone." Unconsciously, he stroked Gerselle's hair, brushing a stray lock back from her cheek.

Enely's stomach clenched, all the half-fears that he'd pushed to one side during the Awakening, hitting him like a blow to the midriff. Jonton's last anguished words tore through his heart. *But I didn't stop - couldn't stop. I wasn't strong enough or fast enough either and now she's...* He looked up, afraid to meet the other's eye. "Gone? Not dead?"

"She might as well be," said Jonton. "She breathes but she...she's not...my Gerselle..." His face spasmed, great silent tears suddenly rolling down his cheeks. He buried his face in Gerselle's poncho, shoulders shaking in silent, wracking sobs.

Enely choked back his own tears. "I'll be right back." he said thickly. "He ran through to Gerselle's kitchen eyes casting about for her telephone. He grabbed her address book from its shelf and fumbled through it. *Need another Keeper, maybe another one. Someone to tell Elton, someone to talk to Jonelle too, if I'm not there. Better call the Berelgan too but that can wait.* Enely clenched his jaw. *What was his name...from the next Grove over, came to visit a couple of times. Pat...Patbro!*

Enely rifled through the address book, found Patbro's number and punched it in with trembling fingers.

"Hello, is that Patbro Kermol? It's Enely Kermol here. Yes, the one staying with Jonton. No we're at Gerselle's at the moment. No...I'm afraid not." Enely paused. "There's been...been a bad accident with her Kerm. Jonton's not in a state to do anything right now and we need another Keeper." Enely's shoulders sagged. "Pillars preserve you, Patbro. Yes - we'll talk about it once you get here - easier that way."

Going to need more help. The address book fell open at Meleny's page and Enely looked at it in sick misery. *Oh Blight me, I can't drop this on them by phone.* He turned to a different page, closed his eyes for a second, then picked up the phone. "Hello - is that Ferry?"

"Ferry and Fredlorf are on their way over. Patbro is too but he'll take longer to get here from his Grove." Enely patted Jonton awkwardly on the back. "I brought you a *djeng* - it's on the table when you want it." Enely took a deep breath, "I hate to do this right now my friend, but I promised Jonelle I'd be back as soon as I could."

Jonton regarded him through red-rimmed eyes. Enely nodded. "It worked," he said softly. "We got there in time." Jonton turned his head away, jaw working convulsively. He stabbed a finger over his shoulder at the spare bed. Enely reached out to pat his friend on the back again, before thinking better of it and taking his place under the leaf cluster with a rising sense of trepidation.

The leaf hairs burrowed eagerly into his skull and Enely's calves clenched with the effort of remaining still against the writhing, itching sensation against his scalp. A pinprick of light flared in his mind before yawning open onto an unfamiliar mindscape. Simpler by far than Elton's, much of it a canvas still to be painted, but still with flocks of sparks gambolling around him, their movements nimble and assured.

<kerbal...Enely?>

Enely smiled despite himself. *That's right, Jonelle. It's me, Enely.*

<Where is Jonton? Where is Gerselle? I want to talk!>

Enely's smile collapsed. Hoping against hope he cast his mind *outwards* but sensed nothing in reply.

<Enely?>

I'm sorry, Jonelle. We don't know where Gerselle is. Which is truthful enough, he thought sadly. Jonelle seemed to sense that something wasn't right, her mental voice puzzled.

<Gerselle not here?>

No, Gerselle isn't here. A thought struck Enely. *But there's somebody else you can talk to - another somebody else like you. Another Kerm but...*

<NONONO> The sparks swarmed around him, more of them flocking in from across the rapidly darkening mindscape. Enely felt barriers slamming into place, shutting away the higher complexities of Jonelle's growing personality. The sparks shifted into unfamiliar but unmistakably hostile formations. *<My ground, mineminemine! Kerm go away! Not talk to Kerm!>*

... he won't hurt you! It's alright, Jonelle - it's alright! He was Jonton's Kerm - his name is Elton!

The sparks froze. The mental barriers cracked open a millimetre. *<Kerm has a name too?>*

Yes, he does. He chose his name just like you chose yours.

<Kerm want to talk?>

I hope so, Jonelle. We'll have to ask him. He might be frightened too.

<I'm not frightened of Kerm!>

No - but we are. Kerbals get frightened when Kerm fight.

<kerbals can run away> The indifference in Jonelle's voice rocked Enely back on his heels.

What about me, Jonelle? What about Gerselle and Jonton? What if we run away too?

<Gerselle always comes back. Jonton and Enely will come back too>

Not if you and Elton get into a real battle, Enely thought to himself. *It doesn't matter*, he said soothingly. *Elton won't want to fight you.*

The barriers lifted a little further and Enely sensed the young Kerm peering at him suspiciously. *<will think about it>*

Thank you, Jonelle. I should go now - I need to go and help Jonton.

<yes. Help Jonton find Gerselle>

—————

Enely emerged from Communion to find Jonton sitting upright on Gerselle's bed and sipping his *djeng*, knees drawn up to his chest, eyes still bloodshot and red-rimmed. "How is...she?" he asked.

"She," Enely confirmed. *And with a voice like Gerselle's, although I don't think you need to know that right now.* "She's young." he added. "Nothing like Elton. He's almost kerbal-like in many ways - which I think we have you to thank for, my friend. All your time spent an-Kerm seems to have influenced him." He recounted his suggestion that Jonelle talk to Elton - and Jonelle's reaction. "I think Elton has a lot to teach her - but we'll need to be so very careful."

Jonton nodded. An awkward silence descended.

You seffleck, Enely Kermol. You bjedla, cowardly, sefflek. There is no good time for this. Your water was his and you broke your promise. Now live with that! "I will leave your Groves of course," he said aloud. "You trusted my promise and I broke it. I saw what... I saw Gerselle. And I wasn't fast enough to stop it."

Jonton looked at him expressionlessly. "We can talk about this later," he said at last. "Leave me now, Enely - I want to be alone for a while."

What did you expect, sefflek. "Of course," Enely replied quietly. He left the room without looking back, closing the door behind him with an audible click. He stared at the front door willing it to open, then sighed, sat down at the kitchen table and buried his head in his hands. Glaring at the clock only made the seconds tick past ever more slowly, the pictures on the walls mocking him from their frames. He paced up and down the kitchen for a while before stopping, afraid of disturbing Jonton. Eventually he slumped onto a sack chair, listlessly paging through one of Joenie's storybooks for want of anything else to read.

The doorbell rang, startling Enely to his feet. He opened the door and let in a visibly anxious Ferry, followed by a grim-faced Fredlorf. Eyebrows raised, Ferry pointed at the sleep room door, saw Enely's answering nod and quietly let himself in, closing the door behind him. Fredlorf stood for a moment then shook his head and folded himself onto Enely's abandoned sack chair. After a minute, Enely joined him, sitting cross-legged on the carpet, back rigidly straight.

"Is she...?" Fredlorf asked quietly.

"No," said Enely. "But her mind is gone. Shattered."

"Can she come back? Can she be..." Fredlorf hunted for the right word. "Mended? Healed? I don't know - whatever happened with Elton."

"I don't know," said Enely. "Jonelle - her Kerm - lives." He stared at his feet. "I was able to do that much. But Gerselle. I don't...I don't think there's any hope for her, Fred."

Fredlorf studied him, noting the deep-seated bags under his eyes and the shadows that lurked behind them. "I should go an' see Jonton," he said. "Will yeh be alright out here?"

"No," said Enely. "But Jonton will be hurting more. Go on, Fred."

By the time Patbro arrived, Gerselle's kitchen was full of sombre-faced villagers. Most of them recognised him and stood aside to let him through. For those that didn't know him, his grey robe and green-trimmed collar were enough. Ferry looked up as he entered the room and hastily beckoned him over. He made his way through the small crowd around Gerselle's bed and knelt down beside his friend.

"I came as quickly as I could. Enely said there'd been an accident?" He took in Gerselle's limp body and deathly pale features beneath a crown of Kerm leaves and swallowed hard. "What can I do?"

Jonton looked at him gratefully. "I need you to go back to my Grove, Pat. Tell Elton that Jonelle is awake but..." He closed his eyes. "But Gerselle didn't make it. Her body is alive but she's gone." He paused "And I need you to fetch Joenie from Meleny's."

Patbro's expression didn't flicker. *Preserve me - I don't want to go anywhere. Just want to stay here with you old friend and tell you everything's alright.* He flicked another glance at Gerselle. *Except we both know it's not.* "Commune with Elton, fetch Joenie," he answered. "Not a problem, I'll be back as quick as I can."

"Thanks, Pat. I... thanks."

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Later, Patbro would simply be thankful for the lack of traffic. The rough country lane between Jonton's and Gerselle's Groves was not a road for the unwary traveller, let alone one with more than half his mind on other matters. He parked at the foot of the hill leading up to Jonton's hut and walked up the path, half hoping that the door would be locked, forcing him to go back and get the key. He stood in front of the old kerm wood door gathering his courage, then twisted the old-fashioned latch ring and pushed. The door swung open and the familiar, cloying scent of cinnamon greeted him.

Closing the door behind him, Patbro hurried through to the sleep room. Hastily he lay down on the nearest bunk bed and, before his nerve could fail him, wedged a pillow behind his neck and lifted his head to the waiting leaves. The transition to Communion was swift and smooth. Elton waited for Patbro to speak, sensing the turmoil within his mind. Eventually, with the mental equivalent of a quiet cough, he reached out to the tongue-tied kerbal.

<good afternoon, Patbro. It is good to meet you again>

Good afternoon, Elton, said Patbro. Absurdly he felt himself frowning. *But how did you know?*

<that it was afternoon? A simple matter of shifting warmth on my leaves and talking to Jonton> Elton said gently. *<but I don't think you're here to talk of such pleasantries, Patbro. In fact, if you'll forgive me for saying, I was really expecting Jonton, or possibly Gerselle>*

They couldn't, Patbro said thickly. *They... just couldn't.* A blurred image stuttered over the Communion link then, with a vast effort of will, he brought his thoughts into focus. For a

second, Elton saw Gerselle in the front of his mind, pale, eyes closed, head cradled by a weeping Jonton. Then the image blew apart in a storm of pent-up grief.

Instinctively, Elton retreated, narrowing the Communion link to the barest trickle of shared feeling, to shield himself from Patbro's distress and to hide the welter of conflicting emotions flooding his own mind. Indifference welled up from an older, deeper part of him, only to be trampled by guilt and sudden horror. *I am no longer that Kerm!* He flung his thoughts back to his Awakening: his own struggle to break free, aided by Enely, Jonton only able to break free with Gerselle's help. *No - there was more.*

Memories spun free.

Memories from a past life, of time spent communing with Jonton. Memories - and shadows of Jonton's memories - from his time spent an-kerbal. Those were elusive, slippery, reaching down into a haze of associations and emotional cues.

Hands unclasping a golden torc, reflected in the shining eyes of a much younger Gerselle...

Snapshots of times spent together. Sometimes with other kerbals too but always with Gerselle...

Sacrifices willingly made. Some large, some small, none regretted. None ever regretted.

Arguments and raised voices. Tears and self-reproach. But always a way through, a way back together made all the sweeter by the momentary strife.

A hundred small gestures of affection, made without thinking; a smile of thanks, a mug of djeng brought without asking, a shared joke, an extra task undertaken uncomplainingly at the end of a long day so that the Gerselle wouldn't have to...

A disturbing thought loomed large in Elton's mind. What would Jonton do *without* Gerselle?

Memory spun into understanding - and the understanding swept the indifference away, never to return.

Waves of coloured spots spiked over his leaves, ebbing and flowing in no clear pattern, driven by a hopelessly tangled morass of biochemical cues from a system asked to express something that it was unable to - hadn't evolved to - express. The spots raced through their full range of colours, peaking at utter blackness and then disappearing. A different wave swept over him. From top to bottom, from twig to trunk, the leaf clusters twisted shut.

And Elton wept.

Patbro slipped his head out from under the tightly whorled knot of leaves and staggered to his feet *Well I told him. Pillars preserve me but I told him.* He looked up at the bare looking branches running across the ceiling. *What on Kerbin do we do with a grieving Kerm?* Patbro flushed dark green and stared at his feet. *Stupid question. Same as we do with a grieving kerbal - or as near as we can anyway.* He wiped the corners of his eyes and straightened his robe before letting himself out of Jonton's hut.

The walk to Meleny's house somehow seemed to last forever whilst also being over far too soon. Patbro plodded on, insensible to the occasional wave or friendly greeting from one or other of the villagers. He opened the gate, walked up the short path to her house and tapped tremulously on the door. Then he squeezed his eyes shut, opened them and rang the doorbell.

All too quickly, he heard approaching footsteps and the door opened on a somewhat taken aback Meleny, Joenie and Adbas peering round the corner behind her. "Afternoon, Patbro. If you're looking for Thombal, he's out at the moment but he'll be back soon. Mug of *djeng* while you're waiting?"

Unable to help himself, Patbro flicked a glance at Joenie's tousled head. Puzzled, Meleny followed his glance and then saw the stricken look in his eyes. The blood drained out of her face. "Gerselle?" she whispered.

Patbro nodded mutely.

Meleny's face stiffened, then she turned to the two kerblets behind her, forcing a smile onto her face. "Joenie dear - Patbro's here to see you."

Joenie emerged from around the corner and looked warily at Patbro, sensing that something was wrong.

"Hello, Joenie." Patbro gathered himself. "I've got some bad news, popkin." The look on his face stilled Joenie's automatic complaint. "There's been an accident with your Mum's Kerm. She's asleep - your Mum I mean - but we can't wake her up. Your Dad's with her and he asked me to come and fetch you." Patbro held out his hand. "Please come with me, Joenie. Your Dad... he needs you very much right now."

Chapter 78

Instincts

"Tell Jonton that I'll be over as soon as I can."

"Of course I will," said Patbro. "Come on, Joenie - the sooner we start, the sooner we'll be there." He nodded at Meleny in unspoken gratitude, raised his hand in farewell to a solemn Adbas and led the way down the path. Silently, Meleny and Adbas watched them go.

As soon as they were out of earshot, Joenie tugged on Patbro's hand. "Is my mum dead?"

Patbro glanced down at her. "No," he said carefully. "She's not dead..."

"I saw you look at Meleny," Joenie said. "It was one of those looks grown-ups use when they don't want to lie but they think telling the truth will be too scary." She scowled. "I hate it when grown-ups do that."

"She's still breathing," said Patbro, "I wasn't lying to you, Joenie, your mum isn't dead. I don't even know what really happened - I didn't get a chance to speak to your dad before he sent me to get you - but Enely said there'd been an accident with her Kerm."

"Was it a bad accident?" Joenie's voice quivered.

"I don't know, Joenie." Patbro ground his teeth in frustration but managed to keep his voice level. "I just don't know."

A bitefly landed on Patbro's arm and he slapped it away. Joenie carried on walking, face scrunched up in thought. "Mummy *might* be asleep," she said. "Like Daddy was when his Kerm got black spots." She trembled, eyes brimming. "It was horrible. Daddy kept screaming. I tried to fight the tree for him but I was only little and couldn't do anything. Then daddy fell asleep for three days and when he woke up he wasn't the same any more. Mummy used to shout at him a lot, then she took me away to stay in her house with her Kerm. She used to talk to it a lot but she never screamed."

Joenie sniffled and wiped her nose on her sleeve, then blushed and turned her face away. Patbro pretended not to notice as she carried on talking. "I think Daddy started getting better after my birthday. Maybe the butterflies helped. He was always talking to his Kerm - Mummy said he was part of the Kerm, helping it to look after the Grove but I didn't know what she meant. One day, daddy told me all about it, how he had arms and legs and branches and roots and leaves." Joenie giggled and she put her hand in front of her mouth. "Daddy told me that the beetles tickled him. He talked to me in my head and showed me the worms chasing each other."

Patbro smiled. "You're lucky", he said. "I can't talk to my Kerm the way you used to talk to your dad. All I get see is a big mess of everything in the soil all jumbled up together."

Joenie nodded. "I haven't asked Elton to teach me about the soil animals," she confided. "Elton's nice but he's a bit scary too, like Grandpa. I don't think he wants to talk to kerblets very much."

Patbro opened the passenger door on his truck before walking round the other side and climbing in behind the wheel. He checked that Joenie had her seatbelt on before looking all around and pulling away. "I think Elton does want to talk to you," he said. "I think he'd like that very much."

Joenie looked at him through narrowed eyes but Patbro's expression was quite serious. "Leave it a little while though, Joenie. Elton's worried about your mum too and might not want to talk to you right now." He started the motor and pulled onto the road.

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The truck stopped opposite Gerselle's hut and Patbro climbed out. The few small Kerm branches visible above the roofline swayed and rustled despite the lack of breeze and Patbro stared at them uneasily. Then the creak of passenger door opening and sudden patter of footsteps drove all other thoughts from his mind. "Joenie - wait!"

Joenie stumbled, scraping her shin on a stone but scrambled to her feet and ran for her mother's hut, heedless of the blood trickling down her calf. Patbro sprinted after her. "Come back, Joenie!"

Joenie ignored him. She pelted up the path, hurtled through the front door and pushed her way through the crowded kitchen, nearly tripping over Enely and leaving a trail of indignant kerbals behind her. One of them opened her mouth to speak before her elderly companion nudged her in the ribs. "Close your mouth lass. That's Gerselle's young 'un."

Mortified, the younger kerbal clapped her hand over her mouth. "Oh Kerm - oh the poor girl."

Enely sprang to his feet, eyes widening in alarm. The sleep room door banged open and Joenie charged through. "Daddy!" She skidded up to the bed and stopped short. "Mummy?" She shook Gerselle's shoulder, careful not to disturb the leaves wrapped around her head. "Wake up, Mummy. Please. I'm here now."

"Joenie!" Patbro raced into the room, the scent of cinnamon catching the back of his throat. He saw Joenie shaking her mother's shoulder, saw Jonton getting to his feet; the villagers around him backing away as if in slow motion. Jonton's head turned towards him and Patbro stopped in dismay, quailing at the look in his friend's eyes.

"Jonto..."

"Fetch Joenie. That's what I said." Jonton's voice shook. "Not 'let her run away from you.' Not 'let her see her dead mother before I could do anything'." He clenched his fists, molten torrents of rage and grief blazing from his eyes. "I asked you to do one thing. ONE SIMPLE BJEDLA THING!" Jonton's gaze scoured the room. "AND YOU! NOT ONE OF YOU COULD STOP A LITTLE GIRL! NOT ONE OF YOU!"

Joenie backed away from her parents, trembling like a cornered creva, gaze darting around the room. In the ringing silence following Jonton's outburst, she bolted for the spare bed, squirmed past its stunned occupants and slid under the nearest leaf cluster. Jonton saw the movement from the corner of his eye and spun round to follow it. "Joenie! No!" He threw himself after his daughter, Patbro following close behind and narrowly avoiding a low branch. Jonton's head scraped through a cluster of leaves, hairs brushing across his scalp and then recoiling from the roiling inferno of emotions raging beneath the surface.

Vines erupted from the ground hurling both kerbals back. Their writhing tips seemed to taste the air, unfurling into double rings of needle sharp teeth from which clusters of thinner, paler tendrils emerged like pulsating tongues, glistening with ichor.

Patbro landed hard, gashing his forehead on the floor. He rolled over and sat up, blinking blood out of his eyes. The kerbals on the bed screamed in terror, freezing as the vines lashed at them. The other villagers stampeded for the door, barging past Enely and knocking him to one side. The leaves closed around Joenie's head and for a second, the thrashing vines froze. Seizing their chance, the kerbals scrambled off the bed and ran for their lives.

Connecting to her mother's Kerm felt itchy compared to connecting to Elton but Joenie was in too much of a hurry to care. Ignoring the waves of agitation dashing against her, she called out with her thoughts as she'd been taught. *Mummy! Where are you, Mummy?*

There was no reply. Joenie tried again, making the words in her mind as big and as loud as she could. *Mummy - I've come to find you!* The agitation around her boiled over into fright.

<Gerselle!> <dangerdangerdanger> <make safe!>

The vines whipped around and over Joenie's inert form, wrapping her in a protective cage. One of them found the scrape on her leg and began to probe it. Jonton staggered to his feet, grabbed the roaming vine and tried to pull it free, crying out as it twisted out of his grip and slashed at him, its cluster of dripping tendrils trailing lines of fire across his face. He staggered back, eyelids aflame.

The sound of her mother's voice all around her brought Joenie up short. *Mummy?*

<I am not Mummy. I am Jonelle.> <confusion> <you are Gerselle but not Gerselle>

Joenie frowned. The voice wasn't talking like her mother even if it sounded like her. Then she remembered that Elton's voice always sounded like her father's. *Are you Mummy's Kerm?*

<I am Kerm. I do not know Mummy.>

Yes you do. She talks to you all the time. She's talking to you now. An image of Gerselle's head wrapped in leaves flashed through Joenie's mind. *Where is she?*

<said before. I do not know Mummy. I know Gerselle and Jonton and Enely and now Gerselle-but-not-Gerselle>

Mummy is Gerselle, stupid! She has to be here. Mummy? Mummy!

<Gerselle is not here! I told other kerbal called Enely to find her. Want Gerselle, not shouting kerbal!>

She is too here! I saw her head in your leaves - she must be here. Tears pricked the corner of Joenie's eyes. *Why are you hiding her - why are you being mean?*

<what is mean? Go away bad, angry kerbal! I want to talk to Gerselle! >

She is. She is talking to you! I saw her. Joenie burst into tears. I want my Mummy now! The waves of grief and anger radiating off her made Jonelle wilt. *I hate you - I hate you!*

Overwhelmed, Jonelle curled in on herself, withdrawing her vines and retreating behind her mental barriers. Instinctively she curled her leaves up too, slipping them free of Joenie's head. With a final anguished cry, the link to Joenie broke and echoing silence descended.

Jonton rushed over to his daughter, a still shaken Patbro following at a discreet distance. Joenie lay twisted around on her bed, her face buried in her pillow, muffled sobs squeezing their way around its edges. Her feet flailed at the wall trying to reach Jonelle's trunk. Jonton dropped to the floor and tried to wrap his arms around her, only for Joenie to squirm away from him.

"Go 'way!"

"It's me, sweetheart. It's daddy. I've got you."

"I want Mummy."

"So do I, my love. So do I." Jonton climbed onto the bed beside her. "Come on, up you get - that pillow will be getting all soggy."

Sniffling, Joenie uncurled herself, peered at him through tear-blurred eyes and screamed.

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Horried, Enely watched the vines flow over Joenie's body. Their writhing grew more and more agitated, tips peeling back to reveal needle teeth and then squirming closed again.

One vine flew free, a second joined it and then they all seemed to crumple in on themselves, sliding off the bed and leaving Joenie looking curiously exposed.

He heard Joenie's scream, saw her scuttling away from Jonton and for an agonising moment he froze, torn between his friends and their newly awakened Kerm. *As if you have a choice, sefflek*, he thought. *Unless you want your weakness to finish what it started.* Face set in a grim mask, he skirted around the room, eyes fixed on the ground around Jonton's abandoned bed. Bracing himself, he darted forward and leapt, hitting the bed in a tangled heap. Behind him, the sleep room door flew open and Meleny hurried in, panting for breath.

Offering up a silent thanks for the distraction, Enely slipped his head under Jonelle's wilted leaves. They squirmed over his forehead as if fighting against the touch of kerbal flesh but aeons old instincts were not to be denied. The last thing Enely saw, before the white light filled his vision, was Meleny putting her arms around Joenie.

Jonelle? Jonelle - are you there?

<Enely?>

Relief swept over him. *Yes, Jonelle - it's Enely.*

<nasty kerbal is here?>

Nobody else is here - just me.

<good. Nasty kerbal very loud, very angry. Said I was hiding Gersellemummy. Jonelle's voice was flat. <not hiding Gerselle. Don't understand mummy>

Enely cast his mind back to life in his old village. The nursery hut, thick walled and whitewashed to keep out the worst of the desert heat. A place of sanctuary for new mothers carrying pouched kerblings or with very young kerblets. He showed Jonelle an image from inside the hut; female kermol sitting on brightly coloured cushions, sipping from glasses of water and watching their youngsters at play. Fluffy headed kerblets crawling around in search of playmates or peeking over the edge of their mother's pouches.

Can you see the small kerbals?

<yes. Many small kerbals. Some being carried by big kerbals>

That's right. The big kerbals are all mummies. They look after the small kerbals. All the small kerbals have a mummy - a special kerbal to look after them. Enely sensed a sudden spike of curiosity.

<why?>

That's... complicated, Jonelle. Can you just believe me?

<...yes. I see your picture, must be true. But it is very strange>

I suppose it is. Now the...

<the angry kerbal said mummy was called Gerselle. She said I was hiding her. I don't understand why. Gerselle is not here. Why did the angry kerbal say she was?>

Enely swallowed hard and concentrated on the sight of Gerselle lying under the Kerm leaves. *Because she saw her talking to you.*

<confusion> <this is not right. The kerbal in my leaves is Gerselle? But Gerselle isn't here>

No, said Enely gently. She isn't. And that's why we need your help, Jonelle. He focused on his image, remembering the healing vines burrowing into Jonton and imagining them crawling out of the earth and slipping beneath Gerselle's skin. With a shock of recognition he remembered that the tips of the healing vines had also split into clusters of paler tendrils. *We need you to keep Gerselle alive.*

<confusion. whywhywhy?>

Please, Jonelle? Something in his voice brought the young Kerm up short.

<I will do this for you Enely. But it is very strange>

I know it is, said Enely but thank you. He paused. *I have to go now though - I need to talk to Joenie.*

<Joenie?>

The angry kerbal. Her name is Joenie.

Jonelle's mental voice faded to a whisper and vanished. The light faded and Enely found himself face to face with a pair of blurry eyes. He blinked them into focus and the rest of Meleny's face swam into view. Behind her, Jonton was sitting with one arm around Joenie, murmuring to her and holding a dripping cloth to his face with his other hand. He lifted his head as Enely sat up and let the cloth fall away.

Enely choked back his own scream. Jonton's face was a grotesquely inflated mask, one eye half lidded and the other swollen completely shut. A line of weeping sores marched across his forehead, the skin around them split and bleeding. When he spoke, his voice was mushy, his jaw moving as little as possible.

"Did you get through?"

In reply, Enely pointed at Gerselle's bed and then down at the ground beneath it. Jonton followed his gesture, his suddenly clenching jaw pulling his sores further open. "You're sure they're healing vines?"

"Yes. They're all the same I think." Enely lowered his gaze.

"Do you think it'll make any difference?"

"No," Enely replied at last. "But as the song goes, you never know till you try." He glanced at Joenie's tear-streaked face. "And I think we have to try."

Jonton's arm tightened around Joenie's waist. "I think so too," he said. "And, Enely... you can wait with us if you like."

Enely felt a great weight lift off his shoulders. "I would like that very much," he replied. "Thank you."

Behind him, the vines wound their way up the foot of Gerselle's bed.

Chapter 79

The Straw and the Mallek

"Copy, Prospector. We see you on the mains. Welcome home!"

For the first time since their final midcourse correction burn, Wilford felt himself relax. Bringing *Moho 3* back from orbit had been positively tranquil compared to the crushing reentry at Minmus transfer velocities that he, Barrie and Milden had just endured.

He shivered inside his spacesuit. Rationally, he knew that the flight control team had been watching over them from launch to plasma blackout - and had probably been following *Prospector 2*'s systems in more detail than he'd been able to onboard. Rationally, he knew that the thermal protection systems - and their safety margins - had been thoroughly flight-proven by the *Pioneer* flights. Rationality however, couldn't hide the sight of burning chunks of ablator resin shooting past the capsule window or dispel the cold, gut-level knowledge, instilled by endless simulator sessions, that their survival depended on such a terribly thin margin of error in their trajectory.

Radio chatter from the retrieval boats filled the cabin. Barrie rolled her eyes and turned the volume down. "Not that the welcome isn't appreciated but I can't hear myself think with that racket going on!"

"Pressure equalisation valves closed," Milden reported. "Dumping RCS propellant."

The capsule rocked on its parachutes then settled, the brief thrust from the venting propellants not disturbing its fall. A muted hiss sounded overhead followed by the familiar thump of closing valves. Wilford checked the altimeter. "Passing through fifteen hundred. SAS to OFF."

"Beacon is on, floats are armed," said Milden. "Did we miss anything?"

"Not a thing," said Barrie. "Hit the water, cut the chutes and we're done. Okay, brace for impact."

Wilford watched the altimeter unwind. *Three hundred...two hundred...one...*

The impact drove him into his couch hard enough to knock his teeth together. The capsule lurched, spray fountaining past its windows, then steadied, right side up, bobbing like a cork. He heard a pungent oath from across the cabin and, to his astonishment, realised it was Milden swearing.

"Chutes gone," said Barrie. "Not sure I'd care to try *that* with a gronnek but each to their own."

Milden's cheeks flamed in the gloom. "Um - we're not on hot mike are we?" she asked.

"Luckily for the tender ears of the flight controllers, we're not," said Barrie dryly. She toggled her microphone. "Flight, Prospector. We're in the water, blunt end down."

"Glad to have you back, Prospector," Nelton replied. "Recovery boats are on their way and I'm told it's a fine day for a swim out on the Great Tranquil Sea."

"Copy that, Flight. Sure could use the bath. Somebody needs to figure out how to build a spaceworthy sweetmoss pool for the colony ships."

"Something to put the pool in would be a start," said Nelton. "But I'll add the suggestion to the list."

By the time the recovery teams arrived, a distinct swell had developed and Wilford was beginning to feel more than a little queasy. From the introspective look on Milden's face, he guessed that she wasn't faring any better. The knock on the hatch came as a welcome distraction.

Barrie unbuckled her harness and pressed three fingers to the hatch window. She counted to twenty to give the divers time to get clear, then pulled the locking handle down and swung open the hatch. Fresh salt air blew into the capsule almost visibly dispersing the fog within. Peering over Barrie's shoulder, Wilford caught a glimpse of cloudless sky and a smear of green on the horizon. He undid his own harness and reached under his couch.

Barrie scrambled out of the capsule and into the waiting life raft. One of the divers poked his head above the hatch sill and stretched out a hand. Wilford handed him a heavily insulated tube with a loop of cord attached to one end. "Hang on to this," he said. "The propellant lab will want to see it as quickly as possible and it's a long way back to Minmus if you drop it."

The diver's eyes widened behind his mask. He slipped his wrist through the loop and, clutching his end of the tube tightly, proffered the other end to Barrie. He watched her clip it to her belt before turning back to Wilford and helping him through the hatch.

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Dunney eyed the scratched and worn coffee pot as it burbled away, a faint smell of burnt coffee residue lifting from the hotplate. Like its owner, the pot was showing signs of wear and, he thought, hard wear at that. Through the window, the main Alpha tracking dish

revolved slowly against the sky. Dunney tucked his hands behind his back and watched it turn.

He was interrupted by the sounds of hurried footsteps and the office door clicking shut behind him, followed by the thud of a large stack of files landing on a desk. The pot gave a last protracted gargle, like a kaya clearing its throat, and stopped. Dunney poured two cups, handing one of them to Lodan as he sat down by the fire.

"So what's the verdict?"

Lodan put his cup down. "Enough ammonia to be worthwhile but mixed with water and Kerm only knows what else. Certainly enough to keep the labs busy for a while."

Dunney frowned. "Vacuum distillation ought to do the trick then - and if there's one thing we're not lacking for out at Minmus, it's vacuum."

"Indeed. Although we may have other options first - the snow samples were apparently almost pure ammonia."

Dunney's eyebrows rose. "Were they now? Interesting - very interesting indeed. Perhaps a big drill is what we need then, rather than a still. Or, to begin with, maybe just a crew of strong and willing kerbals equipped with shovels."

"I think not," said Lodan, his voice suddenly cold enough to freeze the ammonia under discussion. "Or has it slipped your mind that it almost took the lives of two good kerbonauts to bring those samples back?"

Dunney bit his lip. *Kerm*. "I'm sorry... you're right of course, Director. My enthusiasm gets the better of me." He averted his eyes from Lodan's expression. "Have the Site D boys had a chance to run a test yet?"

"Not yet," said Lodan. "Although I understand that they were none too enthusiastic about handling large amounts of anhydrous ammonia."

"Better the kraken you know, I suppose," said Dunney. "Personally, I'd be none too enthusiastic about handling *any* amounts of enriched uranium, but each to their own." He toyed with his cup, unable to meet the KSA director's eyes. "I don't suppose..."

"No," said Lodan heavily. "There, I remain at the Council's pleasure. I'm told that my budget requests are 'up to their usual exemplary standards', with a strong overtone of 'but gathering dust on a desk.' The one time I did manage to get through to Obrick, I merely received a double earful of platitudes for my trouble." He drained his cup and stared at the ceiling. "The Duna shuttle programme is on hold, the LV-N programme will be on hold after the ammonia test fire series. Booster construction for Pioneer 7 continues on schedule, as does the first production run of Rockomax Type 6s reserved for Starseed. R7 development is on hold until further funding can be released. I could go on." Lodan rubbed his eyes. "The ecology and agronomy programmes are on a different budget, so at least the Berelgan is moving forward with those - and Erlin is managing to eke out a token life support development programme too, which is something."

"But otherwise, we're grounded," said Dunney. He saw his own frustration mirrored in Lodan's eyes and bit back a more pointed comment.

"Yes," said Lodan. "I'm flying out to the Capital next week and I fully intend to sit outside the necessary doors for as long as it takes to put a head-knocking meeting together. But until then we are, as you say, grounded."

The air cannon boomed, launching its canister on a fast, flat trajectory. A small packet, dangling on a short length of line, fell out of the speeding projectile. The gunner swore, "Reload, Blight you!"

His loader scrambled to obey, grabbing hold of the cannon barrel for balance. He fumbled another canister into the breech, slammed it closed and hit the deck. "Clear!"

The patrol boat heeled over, spray shooting over the bows. The gunner swung his weapon round, spun the elevation handle and fired again. A second canister boomed across the waves, trailing a parachute behind it on a rapidly unspooling line. Both parachute and canister hit the water with a distant splash. The enemy vessel roared past and the gunner began counting under his breath. He reached fifteen and gave up in disgust as it raced into the distance unimpeded. *Too short or too weak to foul the prop. No damn good either way.* He ran for the wheelhouse, rapped on the window and held up a fist, thumb pointed down. The pilot lifted a hand in acknowledgement and keyed her microphone.

"Unidentified vessel, you are in violation of Veidan territorial waters. You will stand down and prepared to be boarded." The fleeing vessel ignored her as she expected it would, the afternoon sun sparkling from its foaming wake. The pilot turned to her navigator, stooping over his chart table and binnacle. He scribbled two words onto a card and handed it over. She scanned the message, lips moving silently and keyed her microphone again, voice shifting subtly. "Come on, whoever you are. Give it up and we can all go home for *djeng*."

Closer to shore, two motor dinghies rode at anchor, their crews sitting hunched over their radios. "...whoever you are. Give it up and we can all go home for *djeng*." In the first boat, the kerbal sitting in the stern sat up straight. "Sixty minutes out, bearing west-by-south from Staanton Point."

One of her companions was already busy with kneeboard and grease pencil. "Well that's nice of them," he reported. "Coming straight for us unless they decide to head someplace else first."

"Standard sweep with a flank-and-spank finish then. We head east, track them in and save our juice for the final sprint. The noisemakers handle most of the sweep, including the dummy run." The sergeant grinned humourlessly. "Sun'll be nice and low in an hour. Send those lazy kafratt herders the plan and lets get to it."

The navigator nodded and flipped his kneeboard over, revealing a patch of metal foil glued to the back. Angling it catch the sun, he flashed a brief message over to the second dinghy. The sergeant slipped off her bench and checked the straps securing their gear. One

of the nondescript canvas carryalls clanked as she cinched up a loose strap and the intermittent squeak of hawser against cleat from the bow, told her that the fourth member of her crew was already busy with the anchor. She emerged in time to catch the answering flashes and hear the distant coughing splutter of a diesel powered outboard motor starting up.

“Anchor raised ma’am.”

The sergeant thumbed a button on her own outboard which started up with a purr. She glanced at the charge meter and, checking her compass, fed power to the motor and swung the small craft around, heading due east.

For the best part of half an hour they cruised the Southern Ocean at a leisurely, battery-conserving speed, the navigator busy with chart and chronometer, the other crew members keeping a sharp eye out for other boats. Then one of them saw it; a white v-shaped trail of foam, laid ruler straight across the waves. He gripped his crewmate by the shoulder and pointed. The sergeant’s gaze followed his and she nodded in satisfaction. “That’ll be them,” she murmured. “Looks like the net chuckers managed to spook ‘em, even if they did sweet Blight all to stop them.” She raised her voice slightly. “Right you lot - rig for stealth and we’ll follow them in. Out of the sun, nice and steady and if any of you flash anything shiny, I’ll skin you.”

Her crew didn’t bother to reply, each of them double checking the other’s kit for reflective items. She eased the throttle forward a notch and threw her tiller over, swinging the dinghy round in a looping turn that ended with them dead astern of the fleeing vessel and shadowing it at a discreet distance. She waited for their target to change course, ears straining for the sudden crack of deck guns. When it showed no sign of noticing them, she let out her breath in a tightly-controlled sigh of relief and glanced at her own chronometer. Then her ears pricked up at the distant sound of a diesel motor.

About bloody time.

The sound swelled to a muted, and then not so muted roar. The second dinghy barrelled in from the north, prow angled high, foam trailing from its exposed hull. Suddenly it heeled over, flanking their target and matching speed with it. “ATTENTION UNIDENTIFIED VESSEL. THIS IS THE VEIIDAN COASTAL PATROL. REDUCE YOUR SPEED IMMEDIATELY AND MAKE YOUR COURSE DUE NORTH.

The sergeant swore as the enemy vessel held its course, wake boiling from its stern. “Brace yourselves - we’re going in!” She slammed the throttle hard against its stop and her vessel surged forward.

“UNIDENTIFIED VESSEL. THIS IS YOUR FINAL WARNING. REDUCE YOUR SPEED TO FIVE KLICKS AND MAKE YOUR COURSE DUE NORTH.”

The dinghy bounced and jolted, buffeted by the larger vessel’s wake. The sergeant worked the tiller in short, precise movements, jaw set, eyes locked on the looming hull rolling and swaying bare metres away from her own craft. Her crew scanned the deck rail overhead,

grapple poles at the ready, bracing themselves for contact. The dinghy skipped sideways and steadied. Three poles swung up, slapped wickedly curved hooks over the rail, and were discarded. Three armed kerbals grabbed their boarding lines, tugged them once and swarmed up the side of their target, rolling over the rail and coming up in a poised crouch, then running for cover, weapons at the ready. Shots rang out from the other side of the boat, rapid, staccato cracks audible over the noise of the decoy dinghy.

The boarding team darted aft, keeping low, leapfrogging from cover to temporary cover. A baton whipped out, dropping the lone sentry on their side of the boat and then they were through, charging up the steps to the bridge, kicking the door open and bursting in.

“Drop it! Down - *now*! Hands over your heads!”

Two of the bridge crew took one look at the armed intruders and hit the deck, hands clamped over their ears. The third lunged for his own weapon, yelling at his companions to stand and fight. A single gunshot crashed out, deafeningly loud in the confined space and he dropped to the floor screaming.

“The next one goes through your head! Now stay down!” The marine dashed forward, kicked the discarded handgun to one side and landed between his would-be assailant’s shoulder blades, driving the breath out of the downed kerbal with a grunt, before snapping on a pair of wrist restraints. Behind him, he heard his teammates dealing with the other two. Doubled over to stay below the bridge windows, he sprinted over to the throttle levers and pulled them back to all-stop.

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The dinghy slipped in behind the drifting boat, juddering as it bumped the larger vessel’s stern. The sergeant thumbed off her outboard motor, swung her grapple pole up against the rail to secure her boarding line then pulled herself up the rope, hand over hand. The rattle of gunfire from further forward told her all she needed to know. Glancing all around for possible sight lines she flattened herself against the deckhouse wall and crabbed her way round to the inspection ladder, alert to the slightest movement around her. Scrambling up the ladder she belly-crawled round the foot of the radio mast and peered over the edge of the roof.

As expected, the boarding team were pinned down by the bridge. Her first shot saw one enemy sailor staggering back, hand clamped over his shoulder, his gun skittering across the deck. Her second shot narrowly missed a second sailor as she ducked into cover but the sudden confusion was all the distraction her beleaguered boarding team needed. Another sailor fell to the deck and then another fell screaming in the sudden quiet. Three more grapples appeared over the deck rail, rapidly followed by the second boarding team.

One of the enemy crew spun on his heel and then froze. Shoulders slumping, he placed his gun on the deck and stepped back, hands raised in surrender. The rest of his crewmates quickly followed suit. The sergeant unclipped a radio from her belt. “Seawall Four-Alpha, target immobilised, requesting seed pick up on my beacon.”

"Copy that Four-Alpha. Pick-up is inbound, ETA 20 minutes."

"And the Kerm was planted safely?"

Chief Ambassador Obmy gave him a dour look. "Naturally. It's not ideal territory; the sapling may find the southern reaches to be constrained by the Hartock mountains, but it plugs a gap." He shrugged. "Besides, planting it any further north would have caused unacceptable Blightborders with neighbouring inland Groves."

"We appreciate your continued aid," Chadwick broke in smoothly. "But did I hear you correctly? Plugging a gap?"

"Indeed," replied President Maller. "Please do not doubt my words; Veiid appreciates its alliance with the Confederacy but at the same time, we must note that despite our great efforts, the so-called Children of Kerbin remain a persistent menace. Their unsanctioned plantings disrupt our planning, forcing us to use less than optimal Grove layouts and depriving both our nations of much valuable territory."

Chadwick frowned. "Our coastal patrols have doubled since we signed our concord - and continue to increase. We are diverting significant resources to increasing our air cover and rapid-response capability. With respect, I believe that the Confederacy is upholding its side of our bargain."

Maller lifted his hands in a placating gesture. "And Veiid has no reason to doubt your commitment but nevertheless." He lowered his hands. "We feel that a second line of defence is required."

"What did you have in mind?" Aldwell asked.

"A firebreak." Obmy led him over to an immense, antique Kerm wood table that occupied most of the space along one wall of his office. Under its glass top, Aldwell was surprised to see historic pen and ink maps of Veiid resting side by side with the latest HOTSPOT and SKYMAP satellite imagery from the KSA. Obmy pointed at three side-by-side maps depicting different sections of the Veiid eastern seaboard. "It's not a new idea. In fact the very oldest Groves in the Northern Reaches are suspiciously well laid out already." He tapped at the map. "You know our twin jewels of course, Bolanerbat and Boladakhat. Both cities protected by mountains and the sea. Now look - strung between the jewels, between the Guardian Peaks here and the Hartocks here..."

Aldwell saw. "A double line of Groves." He studied the map. "Quite closely planted too."

"Almost perfectly planted," Obmy corrected him. "And making full use of the Lakes as borders between Groves to allow overlap without Blight. A remarkable job of surveying - quite remarkable. Even with the KSA satellite maps to guide us, we were unable to find any significant improvements."

Chadwick raised an eyebrow. "Clearly your ancestors of the Age of Sail were also on less than cordial terms with their neighbours."

"Sobering is it not?" said Maller. "Centuries later and we're solving the same old problem in the same old way."

Aldwell couldn't help but agree. "I presume you intend to extend your ancestors' work?"

"You presume correctly," said Obny. "We're planting similar double lines between the southern Hartocks and the Trenchers and between the Trenchers and the Scorpa Range in the far south. The lines aren't closed yet but when they are, they will protect the rest of Veiid from the depredations wrought by those over-zealous fools." He saw the other's cheek twitch. "I mean no offense, Aldwell. As you well know, we respect the Confederacy's official position on this matter. But we do not extend that respect to terrorist organisations, whatever views they choose to adhere to."

Chadwick's features remained composed. "Ambitious," he commented. "No doubt your firebreak also depends on loyal Veiidan patriots," his voice remained carefully bland, "to keep a watch for any terrorists. May I ask what happens to any that are caught?"

"Naturally, they will be detained," replied Obney. "and charged under the Bill of Land for breaching the peace of nations and endangering the fair and equitable allocation of land to Kerm, Kermol and Kerman. Much as we might prefer this to remain a matter for the Veiidan courts, we recognise that the Court of Twelve Pillars has jurisdiction in any dispute invoking the Bill of Land. If found guilty, the defendants shall be declared *skilda bar an taleka*." An inscrutable expression crossed his face. "Veiid shall respectfully petition the Court to devise a suitable sentence - the ancient remedies under the Bill are...not consistent with modern jurisprudence."

Chadwick exchanged a long look with Aldwell. He couldn't see any obvious flaws in Obney's proposal and from the look on Aldwell's face, neither could he. "No indeed," he said at last. "And how long do you estimate the firebreak will take to finish?"

Maller shrugged. "That rather depends on the Kerm does it not? And our continued cooperation and diligence against the Children of Kerbin."

Chapter 80

Darkness Falls

"I'm *fine*, Meleny. The tingling has stopped, the punctures aren't weeping as much and even the swelling is going down."

Meleny rolled her eyes. "Certainly. You just look like you have a sockful of tubers under your skin rather than a basket load of breadfruit. And changing your dressings twice a day rather than four times a day is real progress. It's been over a week, Jonton - you are *not* fine."

Jonton rubbed his one, fully open, eye, unable to hide a wince as still-tender skin shifted under his bandages. Spots of blood bloomed on the dressings over his other eyelid. He ducked his head, unable to face Meleny's look. "What about Joenie and Jonelle?" he said.

"Joenie can't understand why you haven't been to the medical centre already," Meleny replied, a touch of asperity in her voice. "As for Jonelle - if you're even thinking about trying to Commune with her, then you're a bigger fool than I thought." Meleny eyed the droplet of fresh blood trickling down Jonton's eyelid. "And believe me, that's quite a trick right now."

Jonton spooned up the last of his soup and pushed his bowl away. "We've been here before. Communion is not what I meant and you know it." Under the bandages his skin turned pale. "I close my eyes to sleep and all I see are two bodies wrapped in Kerm vines or worse." Jonton took a deep, shuddering breath. "I was sleeping better after Elton's Shattering. I can't leave Joenie alone with her, Meleny - I just can't."

"Oh we've definitely been here before," said Meleny. "And nothing's changed. I'll stay here and look after Joenie. She'll enjoy helping me with Katisa and Edbas isn't afraid to come and play with her. Enely will look after Gerselle and Jonelle." She ignored Jonton's flinch. "Neither of us will let Joenie into Gerselle's sleep room alone, or let her climb Jonelle outside. She'll be fine." Meleny threw up her hands. "And Pillars preserve me, it might even persuade Enely to stop tiptoeing around you. He's worse than Fredlorf was, the one time I left him to hold Katisa for a minute."

Jonton sighed. "Yes, not having Enely walking on eggshells around me would be nice." He reached for Joenie's old curly-straw cup and took a long slurp of sapwood and milk. "They'll want to know what happened though," he said at last. "I can hardly tell them I was attacked by a Kerm."

"We've been here before too," said Meleny. "Tell them you were bitten by something and got a bad reaction. For all we know that may not be far off the truth."

Jonton summoned up a rueful smile "I'd hate to see the insect that did this," he said. Even to himself, the joke sounded flat. He rolled the end of his straw between finger and thumb, rocking the cup back and forth across the table. "Will you be alright here, if Enely drives me over? What if..." He broke off at the sight of Meleny's patient expression. "You'll be fine," he murmured. "You, Joenie, Edbas and Katisa. Just fine."

As if in reply, Meleny's midriff squirmed and a tuft of downy hair appeared over the seam of her poncho opening. Meleny dipped a finger into her pouch, smiling as it was promptly grabbed by a tiny hand and popped into a tiny toothless mouth. Presently, small, chirruping snores began drifting upwards. Despite himself, Jonton's answering smile turned into a grimace, fresh spots of blood appearing on the other side of his dressings.

Maybe I do need to get this looked at. "I'd better go and find Enely and Joenie," he said resignedly. "And then think about packing a bag."

"So - what seems to be the problem?"

Jonton resisted the urge to describe a wholly fictitious broken toe and settled for giving the medic a slightly incredulous look. "I'm not sure," he replied carefully. "I think something may have bitten me but I've never had this kind of reaction to a bite before. I was hoping it would go down on its own and it has a little bit but..."

The medic nodded. "Have you taken anything for it?"

"I tried greenwort tea for the first day," said Jonton. "That didn't have any effect so I left it for a day and started taking anti-inflammatories instead." He took a half-empty pack of tablets out of his pocket with an apologetic look. "These ones - I'm not much good with medical names. Anyway, they just made me nauseous."

The medic glanced at the packet and made a note on his pad, a crease appearing on his brow. "Did you get any other side effects. Sweating palms? Intimate rash?"

Jonton shook his head. "No, just the nausea." He tapped his swollen cheek. "Which wasn't a great deal of fun I can tell you."

"I'm sure it wasn't," said the medic. He unpicked the knot of fabric at the base of Jonton's neck. "Now, I'm just going to take these bandages off and have a look underneath. Just tell me to stop if it gets too painful."

The first layer of bandage unwound easily. Jonton gritted his teeth as the second layer peeled away, breaking open the scabs on his injured eyelid. Pus trickled over the corner of his mouth, nearly making him gag. The medic pulled away the final, bloody swathe of fabric, flinching at the sight of the rank and sodden dressings underneath. Eyes screwed up against the pain, Jonton didn't notice.

"Okay, I'm just going to tip you back a bit. With a hiss of compressed air, the chair back tilted flat. The medic fastened an absorbent drape around Jonton's neck. "Normally this might sting a bit but I think these are about ready to fall off on their own." He slipped on a pair of gloves and gingerly peeled up the corner of one dressing. "Easy does it - and there you go." He dropped the pad onto a tray with a faint thud and turned to the next one.

"Well *something* got you real good. I'm going to take a couple of samples for the lab but right now, I think we'll let one of our Kerm take a look at you." The medic dabbed at Jonton's face with a damp surgical sponge and noticed the flicker cross his patient's face. "Sorry about that - nearly done. Okay, I'm just going to tip you back up again." The chair hissed again, lifting Jonton into a sitting posture. "If you could just hold this here and *here* and follow me please."

Jonton followed him into an airy, pleasantly lit room. One corner was wholly occupied by a section of Kerm trunk, its branches spreading across the ceiling. A wedge shaped sweetmoss pool surrounded by well-tended grass borders took up much of the floor space. The medic pointed towards a curtained off enclosure, its plastic drapes looking distinctly incongruous against all the greenery. "Please could I ask you to shower and change before getting into the pool. You'll find everything you need inside the cubicle."

Several minutes later, a damp and faintly pine-scented Jonton emerged from the shower clad in a pair of loose fitting shorts. He slipped into the sweetmoss pool and stared up through the Kerm branches, feeling his pulse begin to pound.

"There's a set of steps just under the water if you need to brace your feet against anything." The medic was lying on a slim futon bed, head resting under one of the larger Kerm leaf clusters. "I'll be with you in a couple of minutes. Try and relax - the healing vines might tickle a little but they're nothing to be afraid of." He smiled. "Although I'm surely not telling the Sage of Barkton anything new there."

Jonton swallowed hard. Images of swarms of needle sharp teeth slashing dripping white tendrils across his face raced through his mind,. His pulse throbbed painfully against his skull, fresh blood beginning to well up through the open wounds in his forehead. When the vines brushed against the side of his head it was all he could do not to scream. They crept over his swollen face, probing delicately at his injuries.

A choking gust of cinnamon billowed from the ceiling. The vines whipped back, slicing through the water and dragging clumps of moss with them. Jonton barely had time to turn his head before dozens more vines erupted all around him, glistening tendrils exploding from their tips. Jonton's feet spasmed, mashing his toes into the pool steps. White fire shrieked up his legs and settled in his guts like a ball of hot, liquid lead. His vision blurred,

became a darkness fringed tunnel, shadows from the thrashing vines more sensed than seen. There was a terrified cry from somewhere behind his head and then everything went black.

He awoke to silence and a screaming pain in both feet. Shaking, he hauled himself out of the pool and collapsed face-down on the grass.

"What in the seven smoking *hells* just happened?" Jonton lifted his head and saw a very pale around the eyes medic staring back at him. "Never known anything like it, never *heard* of anything like it before!"

Jonton rolled onto his back. A part of him heard hurried footsteps and a door slamming. A distant voice in the back of his mind shouted at him to get up before it was too late, to escape while he still could. Moving, though, seemed like an impossible task, let alone the brain-tangling complexities of getting dressed. He heard door hinges squeak and much more measured footsteps coming towards him. One kerbal or two? Did it matter anyway?

Jonton awoke and promptly screwed his eyes shut against a glaring white light. He tried to sit up only to find his limbs unable to move. Crying out, he thrashed against his bonds, back arching in desperation, He sensed the room lurch around him, felt himself tipping sideways before something righted him with a thump.

"Hold still. Unless you want a splitting headache on top of your other troubles."

Jonton opened his eyes, squinting against the glare. A syringe filled with a pale, straw-coloured liquid floated just out of reach. "Kerm vines... attack...let me go!" He jerked his hands back and forth, struggling to break free. "Let me go!"

A pair of hands clamped around his wrists. "Take it easy now, sir. You're safe here - no need for all that."

"And lucky to be alive," said the medic flatly. "I want some answers. Now."

"Where am I?"

"You're in the Blight trauma ward and about this far from being hauled up before the district Enclave unless I get a *real* good explanation for what just happened. So talk."

Jonton rolled his head to one side, dislodging a padded bolster from under his neck. The medic sat opposite him, a grim look on his face. A large kerbal dressed in the white uniform of a hospital orderly, tucked the bolster back into place. "No need for that either, sir," he said. "We can get you off that gurney and into somewhere more comfortable once you're done talking."

Jonton talked.

Hesitantly at first but gradually the familiarity of his story took over and he recovered some semblance of eloquence. The medic sat spellbound through his descriptions of Elton, a florid

medley of emotions crossing his face as the story of Jonelle's awakening unfolded. He sat back in his chair and regarded Jonton at length.

"I don't know whether to applaud you or have you locked up." The medic shook his head in bemusement. "Either way, that... explains a lot. The attack by your partner's Kerm... sorry, *Jonelle* must have marked you with something that sent mine into a real fighting panic. Which sort of makes sense if the first part of your story is right - any kernal marked by one Kerm would likely be seen as a serious threat by other Kerm. Good thing you were in the pool - the moss probably slowed the vines down some." He shivered. "Bought me enough time to stop it killing you maybe."

A chill ran up Jonton's spine.

The medic shivered again. "It's as well I'm not a drinking kernal. If you ask me, a story like that is better remembered through the bottom of a bottle. A very strong bottle." He visibly pulled himself together. "Anyhow, what to do with you, since setting a Kerm to heal a Kerm sting plainly isn't going to work." The medic's eyes lost their focus for a moment. "We do have some options there but I'm afraid I'm going to have to keep you in under observation for the duration."

Jonton sat bolt upright, fists clenched. "How long?" he asked harshly.

"I don't know. You'll need a full diagnostic workup to start with - the samples I took won't be nearly enough." The medic's voice wasn't unsympathetic. "After that - it's too early to tell I'm afraid but at least a week, probably more. I know you're worried about leaving your daughter for so long but I think you'll just have to trust your friends to look after her."

He saw the appalled expression on Jonton's face and offered him a bleak look in return. "You're going to be our test subject my friend. I hope to the First Council that I'm wrong but something tells me that you won't be the only Kerm-stung kernal I have to treat before all this is done."

In a remote valley, tucked away beneath the Trencher mountains of Southern Veiid, a kernal watched two figures approaching across the scrubland. The distant streak of greenery around the narrow watercourse winding down from the foothills contrasted vividly with the sparser ground cover beyond and then the ochres and russets of the Hook escarpment curving around the horizon. A thin, keening wind stirred up the dust, piling it against boulders and boots alike.

The figures drew closer, close enough to be recognised and moving more cautiously now, disappearing behind a tussock of coarse grass here, a rocky outcrop there. The watching kernal unfolded a cloth and draped it over the the lip of the cave entrance, it's white on black bisected circle logo standing plain against the orangey stone. She saw one of the figures pointing, then they both veered towards her, no longer bothering with the sparse cover. The soft crunch of leather on gravel announced their presence as they rounded the

final bend of the trail and ducked into the cave beside her. She rolled up the cloth and tucked it away in her pack.

"You took your sweet time getting back. Boss is starting to get restless."

"He's going to get even more restless when he hears that we're boxed in." The scout upended his water bottle, swishing the meagre mouthful of water around his mouth before swallowing. "New Groves planted right up to the foothills and beyond. Overlapping too, near as we could tell on foot - not that there's much around here for the Blight to ruin."

"Planted in a tearing hurry by the looks of it," his companion added. "No kermol at all over yonder," he pointed at the Hook, "and precious few at the next nearest Groves neither. We did see one patrol though, heading north. Kerm knows what the poor beggars did to draw duty at the armpit end of Veiid."

"Can we get through the mountains?"

"Not with the supplies we'll have left by the time we catch up with the boss. The nearest pass is about half a day away but the way in is blocked by another Grove. Couldn't find anything else within striking distance."

The watcher shaded her eyes and squinted at the distant Hook. "But yonder Grove lies unguarded?" The scout nodded.

"Then its fate is sealed." She picked up her pack and slipped noiselessly out of the cave. The two scouts looked at each other wordlessly, then followed her.

Kerbol was low in the sky by the time the three scouts reached a fringe of stunted trees clinging to the mountainside. Two other members of their party stepped out from the shade and watched them approach. One of them opened her mouth to speak before catching sight of the almost identical expressions on their faces. She slung her weapon over her back with suddenly trembling hands and quietly fell in behind the scouts as they marched past.

The setting sun turned the campsite into a maze of knife edged shadows. The row of tents arrayed at the edge of the clearing lurked under the trees, doors yawning open to reveal ill-defined shapes inside. The loose semi-circle of stones in front of the tents resembled a set of giant's teeth, crooked and worn from overuse. A white box, its lid marked with the bisected circle emblem of the Children of Kerbin rested beside one of them,

As the scouting party emerged from the trees, the kerbals sitting atop the stones stopped talking and looked up from their seats.

"Well?" One of the kerbals got to his feet. "You're late. Explain."

The first scout gave a succinct summary of their expedition.

"No way through? Not even across the mountains? No." Their leader smiled. It was not a pleasant smile. "I believe the cowards leave us little choice then." Two of the other Children leaned forward expectantly, an unhealthy sheen in their eyes and spots of dark green flaring

on their cheeks. Their leader reached under his poncho and withdrew a small Kerm wood disc on a simple chain.

"I have made the pilgrimage," he said softly. "I have travelled to Kolus and consulted the Sage. I have seen our history - and it is on our side. On the side of all *true* heirs to the kerm..olia." He licked his lips, voice caressing the final syllable. "We are *warriors* for our Kerm my brothers and sisters. Its roots will be more cunning and..." He bared his teeth, any pretence at a smile vanishing. "Its kerbals will be the stronger."

A feverish buzz of anticipation greeted his pronouncement. The scout bowed his head in acceptance, then looked up, emotions locked away behind walled up eyes. "When?"

"We travel in the cool of the night. We plant our Kerm at dawn."

Kerbol rose over the Hook, bathing the empty village in gold. A Kerm sapling stood alone in the centre of the village square, leaf clusters unfurling to greet the new day. The scout stared at it, the mask-like expression on his face slipping for an instant, revealing the roiling stew of emotions beneath. He gripped his spade, taking what reassurance he could from the smooth timber of its handle.

The other Children clustered around him, their leader standing alone before them, white box by his feet. He bent down, lifted out a large yellow and brown mottled gourd, and held it aloft. A whiff of cinnamon graced the morning air, pungent even at a distance and the scout's nostrils twitched. His leader placed the gourd back in its cooler, picked up his own spade and slung it across his shoulder. "Today we are kermolia. Today we fight for our Kerm."

The Children fanned out across the deserted village square, surrounding the sapling in a precise circle. Their leader lifted his spade over his head in a two-handed grip, before stabbing it into the ground, levering out a clod of dense gritty soil that crumbled as it fell. Emboldened, the other Children followed his lead, spades rising and falling in unison, the scrape of steel against hardscrabble loud against the desert quiet. The scout dragged his blade through the grit, eyes fixed on his feet. *Its just another tree, Chop the roots, pull the stump and we're done.*

But it isn't just a tree, whispered another voice in the back of his head. *And warriors - hah. You know enough Old Kerba to put the lie to that. Kermolia weren't warriors - they were protectors.* He dropped his spade, lifted his head and stared at the sapling, mask falling away from his face. Behind him, a ring of uplifted blades gleamed in the dawn sun...

The blades came down. Chopping through the hardscrabble, shearing through roots and fibres, the blades came down.

And the vines rose.

Screaming, the scout turned to run but a wiry *something* whipped around his ankle, pulling his foot out from under him. He rolled upright, spitting gravel as he tried to scramble to his feet.

Then the vines came *down* and everything went black.

The Veiidan patrol returned the next day. They wondered at the criss-crossing of animal tracks leading towards the village. Then they rounded the corner, looked out across the village square and wondered no more.

A pack of desert dogs fled yelping, leaving their half-finished meal behind. An insistent warbling drone filled the air, dense clouds of insects crawling over oozing fibres and splintered Kerm roots and swarming over the hideously swollen figures sprawled in the dirt.

Three members of the patrol turned away retching. Their leader stared in stunned disbelief, the blood draining from his face. He walked forward, outstretched fingers reaching for a toppled branch and its clusters of glossy green leaves. A stray fly buzzed into his open mouth and he spat it out, oblivious to the sounds of vomiting behind him. Then he saw - truly saw - the bodies beneath the leaning trunk and the thin, corded vines speared through the writhing black carpets that covered them.

His gorge rose, disbelief turning to fear laced with sick despair. Stiff-legged, he turned away from the devastation and marched over to the nearby radio hut, the message that would shatter his world already churning through his head.

Chapter 81

Shattered

*Mama take this badge from me.
I can't use it anymore.
It's getting dark, too dark to see.
Feels like I'm knockin' on heaven's door.*

- Bob Dylan

Geysers exploded all around *The Shield of Kolus*, the enemy gunners coming perilously close to the mark despite her crew's best efforts at evasion. The forward turrets swung round, returning fire with deafening effect. Dense clouds of cordite smoke wreathed the corvette's flanks, lit by rippling muzzle flashes as her smaller guns laid down a continuous barrage against the smaller Doreni vessels. Her captain stood impassively on the bridge, issuing orders in a voice loud enough to be heard over the din but never hasty or panicked enough to be called a scream. The younger officers responded in kind, their commander's iron control more than sufficient to stiffen their own spines.

"Their reserves have split, ma'am. Shore radar is picking up two flanking squadrons, they think north-south envelopment."

"Very good. Signal *Pride* to fall back; burning barn retreat. *Tenacity* will close the door once the Doreni have found the mines. Five and Six squadrons to plug the gap."

"By your orders, Ma'am."

"Radio?"

"Ma'am?"

“Immediate sitrep for Fleet Commander Gusden. Message begins. Humilisia stands. Reserves committed, Second Fleet engaged but holding.” *And Kolus stands*, she added silently. *We do not abandon our Kerm nor murder those of the Doreni.*

Chadlin pinned the newly minted insignia tabs onto the young kerbal’s collar, the chrome steel circles bisected by their horizontal bars, a deliberate echo of the Doreni flags fluttering above the imposing edifice of the Doreni National Guardhouse behind them. Once a heavily fortified corner of the walls surrounding the Doreni capital, the Guardhouse had been a museum for as long as Chadlin could remember. The irony of its hasty repurposing was not lost on him.

He shook the new officer’s right hand and pressed a ribbon-bound buff envelope into his left. The sombre faced kerbal stepped back and saluted his President, waited for Chadlin’s return salute and marched briskly off the stage. Chadlin’s eyes tracked him for a moment before snapping back to the next soon-to-be officer marching past the rows of assembled dignitaries towards him.

The queue moved forward one space. At its far end, another uniformed kerbal emerged from the Grand Portico and waited, stony-faced, for his commission.

The soldier deposited a last armful of wood by the uprooted tree stump, removed his heavy steel gauze mask and gorget and began stripping off his stained and torn leather jacket.

“The armour worked then?”

The soldier bit back his first response. “Yes, sir. Blighted tree fought like something from the seven smoking hells but the armour held.” He draped his jacket over the stack of branches, casting a baleful glance at their drooping clusters of leaves and unfastened the canvas belt holding his equally battle-scarred padded trousers up. “And that was a just a young one. Begging the platoon leader’s pardon but taking a big one down is going to need a damn sight more than steel gauze and padding. Myself, I’m thinking a backhoe loader would be a start.”

Chadmore surveyed the serried ranks of shivering recruits, all dressed in identical singlets and long shorts despite the weather. He clasped his hands behind his back, tucking his thumbs into the waistband of his own shorts, watching the nearest rows of kerbals coming to ragged attention in response. *Preserve me but I never signed up to train cannon fodder. Troop shortage or no blighted troop shortage, I should send half these un-spanked kerblets back to their farms where they can do some good.*

“Alright, listen up. My name is flight sergeant Chadmore Kerman. You will refer to me as Sergeant.” Chadmore paused. “I’m gonna spare you the rousing patriotic speech about duty and service and the fine traditions of the Kolan border security forces. You already know

why you're here and I know that neither you, me, nor Kolus has time for that grolnisch. Likewise, I'm gonna spare you the shouty sergeant routine because we don't have time for *that* grolnisch either."

Chadmore's eyes bored into the front rank of kerbals. "I have served Kolus in three regionalities, under five different commanders. I have seen kerbals die - some of them by my hand - but you will have noticed that I am *not* dead. You might want to think about that when I tell you to do something." He waited for the smirks and nervous laughter, nodding in satisfaction at the utter silence.

"We're all grown kerbs here. I'm not expecting perfection - not straight away. You are here to learn and you *will* screw up. Absorb the lesson, don't do it again and that's all you'll hear from me. But screw up through gross stupidity, through cowardice or through failure to follow an order given by a superior officer..." Chadmore's voice turned steely. "I trust I make myself understood?"

The response was immediate.

"Very good. Let's get warmed up - it's cold out here.

Anti-aircraft fire stitched the sky around them.

"Kraken 2 calling Joker."

"I copy, Two. Too much noise around the target anyway - remind me to have a word with Recon when we get home. All sections - break off and return to base."

Cal listened to his squadmates confirming their manoeuvres. The corner of his mouth twitched at the droll response from one pilot and the rather more frosty reply from their commander. *Gil would have been proud of that one.* Once again memory threatened to overwhelm him; the sudden roar of static in his headset and his own panicked shout in reply. *Oh-Kerm-oh-Kerm-oh-Kerm! Gil's down - no chute! No chute!*

He reached forward and clicked his radio off.

Ignoring the rapidly intensifying explosions buffeting his aircraft, Cal tipped the Cloudburner onto one wing, pulling its nose around to point directly at the onrushing anti-aircraft batteries. Easing into a shallow climb, he flicked open the trigger guard on his flight stick, his other hand resting on the throttle. On his dashboard a light turned from green to a sullen pulsating red.

The Cloudburner leapt forward, pitching down into a screaming dive. Enemy fire punched home in sharp stabbing clangs, ripping open jagged holes in its fuselage. Unperturbed, Cal pulled the trigger and held it down. The cannon under his feet opened up with a roar, far louder than it should have been. Curiously, Cal glanced down through the remains of his cockpit floor, watching the ground hurtling up to meet him. Another shell tore open a wing, shredding cables and other mechanisms beneath. The control stick went slack in his hand as the Cloudburner teetered on the brink of control before tumbling into a spin. The cannon

sprayed shells across the sky, spun on empty for a fraction of a second then shut down, a solid amber light replacing the pulsing red glow on his dashboard.

At last, the Firesvarn gunners scattered from the enemy aircraft scything towards them amidst an expanding cloud of flaming debris. Then steel kissed earth in a cataclysmic embrace.

The last thing one gunner saw before the fire and darkness enveloped her was the enemy pilot gazing peacefully at her through the bloodied wreckage of his cockpit, a faint half smile still tugging at the corner of his mouth.

"Because it's desertion, sir. That's why."

"No it's not. We're staying exactly where we are. We hold the line - just like we were ordered to do. We just won't be planting any Kerm seeds on our patch of hilltop - and for damn sure we're not going to be digging up anyone else's Kerm either. Not if the stories coming out of Veiid are even half true."

"So what happens if somebody else wants to plant a Kerm on our section of hilltop?" The section leader's voice stopped carefully short of outright sarcasm.

His lieutenant raised his eyebrows. "Why, we ask them nicely to leave and if asking nicely doesn't work they can speak to Rifle Kerman here. I'm sure they'll find him to be an eloquent sort."

"Reckon a nice baked tuber would speak louder, sir," the platoon sergeant said. "For our boys anyway. The Firesvarn *seffleks* can have a short chat with Rifle Kerman there. The Kolan *seffleks* too for that matter."

The section leader looked at him in disbelief. "You planning on turning farmer, Sarge?"

"You taken cover behind one too many rocks, son? Or were you planning to live off your rations till the end? Besides, we won't be farming, we'll be running a forward operations and logistics base, specialising in field consumables." The lieutenant flashed his sergeant a tight grin of approval.

The section leader's lips thinned. "I'm having no part of this and neither are my squad."

"Are you disobeying my orders, mister?" The lieutenant's voice was dangerously quiet. "Insubordination and dereliction of duty in the line of fire?"

"I take orders from my lawful superior officers," the section leader said coldly. "Not from a deserter."

The lieutenant's voice turned bitter. "Those lawful superior officers that sent us halfway up the Bouldertops to die and when that didn't work, sent us up to the top? No matter how many good kerbals - good comrades - that we lost. And for what? Defending those murderous bjedla *trees*?" He spat. "That to your lawful superior officers."

The platoon sergeant raised his sidearm. "I'm sorry about this, son."

A single flat crack echoed across the hilltop.

"Here you go, boys. Three 905s, a half of T30 and a pint of LV-1 for the driver. Can I get you anything else now?"

"That's all thanks, Jorfurt." The speaker took a long pull of his 905 and wiped the foam from his lips. Once the landlord was safely out of earshot, he turned back to his companions. "So who's with me? Head to the hills and find a bit of land we can call our own? Keep ourselves away from the fighting with no Kerm to threaten us neither."

"I'm in. Never figured on becoming a farmer until I went back to the old Grove." The voice shuddered. "But I never figured on needing to escape from killer Kerm either."

"You'll need to show me which end of the spade goes in the dirt, but I'm in. Should be a tidy profit in it too, selling Kerm free food. Specially now that import restrictions have gotten so Blighted tight with all the seed checks.

The eldest kerbal straightened her poncho collar and looked up at her companions. "Guess you'll need somebody to tell you what to plant and to go inside when it starts raining. I'm in."

The last kerbal took a sip of his LV-1. "I suppose so," he said. "World's moving on and not for the better. I remember when you'd come in here of an evening and find half the KIS at the bar, talking about spaceships and Mün rockets and all that." He gestured around the room at the quiet knots of drinkers sitting by themselves. "Not any more."

"Nope. Young Jeb got himself to the Mün, we got a lot of fine words from the government and not much else." The eldest kerbal tapped her glass of T30 stout on the drum-like table in front of them. "I remember when Jeb brought these in for Jorfurt's birthday present. Made of genuine recycled rocket parts he said. Wonder what happened to to him."

Chapter 82

The Two Jebediahs

A tear leaked unbidden from the corner of Patbro's eye and trickled onto his pillow. *In a coma. She's still in Jonelle's leaves - there's still a connection there but neither Enely nor Jonelle can hear her. And they've tried. So help me they've tried.*

<And what of my first of Keepers?> The Kerm's mental voice sounded hollow, as if heard from the back of some vast cavern.

He's not getting any worse, Patbro answered, and the medic in charge of his case told me they still have plenty of treatments still to try.

<But none of their normal treatments have worked> It was a statement not a question.

Patbro sighed. *I don't really know what they do without a Kerm to help them, he said. But no, they haven't.*

The mindscape around him clouded over and the sullen lightning flickering around its edges turned a dark, jagged black that charred whatever it touched. Elsewhere, the char was spreading, stealing through invisible nooks and crannies, tinging new swathes of Elton's thoughts with grey.

Elton?

<I am sorry, Patbro. I would not burden you so>

A thin fog seeped out of the ground like hundreds of tiny vines which slithered back underground dragging the the worst of the char with it. The ground rippled and for a fleeting instant Enely sensed the dry chasms beneath, dark and impenetrable. The clouds stretched like rubber and when they snapped back into place, the dark lightning was gone too.

<Patbro - what do you know of travel to other worlds?>

Patbro blinked. *Very little*, he said. *I've seen three rocket launches and I watched the first two Mün landings but I've only got the haziest notion of how it all works. He laughed. I expect young Gildas - Ferry's lad - could tell you more than I could. Why do you ask?*

<Gildas is a kerbonaut?>

Preserve me no, although he doesn't talk of much else! He's only a kerblet - not old enough to go kerman, let alone become a kerbonaut.

Elton fell silent. *<I talked of this with Jonton and Gerselle and Enely. Kerbals travelling to new worlds to find more soil for this Seeding so that the fighting can stop. But I know nothing of such travel or how long it will take.>* A far-off bolt of black lightning shook the mindscape. *<There is too much fighting, Patbro. I wonder if we have enough time.>*

Patbro went cold. *I don't know, Elton. You'd need to talk to one of the high-ups at the Kerbin Space Agency. Or somebody from the old Interplanetary Society maybe. They were the first to put a kerbal into space after all - young Jebediah Kerman, although he's not as young these day.*

The link yawned open. Patbro cried out, his thoughts squeezed back into his own skull under the weight of Elton's sudden overwhelming regard.

<Jebediah Kerman?>

Yes...yes! First kerbal into space and the first one to walk on the Mün for that matter. He could tell you as much as you wanted to know about space travel. Elton - please!

The pressure relented. *<I am sorry, Patbro>* Elton paused. *<I would speak to your Jebediah Kerman - it would be fitting. Will you bring him to me?>*

Patbro sagged against the link. *Me? I wouldn't even know where to start looking. Although...*

<There is another who could find him?>

Jonton would know. To hear Enely talk, Jonton knows everyone from President Obrick on down. Although - maybe Enely could help us himself. He knows one of the senior people at the Berelgan and they've been doing quite a bit of work for the KSA. I'll ask him to speak to Professor Erlin for you.

"The new clover strains are good - much hardier than the standard soil improver types that most Groves use - but they're still plants. So we're experimenting with tougher organisms: algae, cyanobacteria, lichens, things that'll grow almost anywhere. We're hoping they'll grow on the surface, fix nitrogen for us and break down the regolith into useful compounds whilst they're at it." Erlin twisted his fingers together. "Anyway, we're not here to talk about Dunan botany."

Lodan regarded him over the rim of his coffee mug. "No indeed. Nothing so commonplace. Frankly, Professor, even knowing something of the background to this matter, it seems... less than plausible and were it not for a remarkably testy communique from President

Obrick's office, I would not be sitting here this afternoon. I don't suppose you can tell us why this...Elton is so keen to speak to Jebediah?"

"Because Elton knows about Starseed. And for what it's worth he supports it. But according to Enely Kermol - one of the group responsible for his Awakening," Erlin added, seeing Lodan's raised eyebrow. "According to Enely, he doesn't know anything about spaceflight and that concerns him. Why he was so keen to speak to Jebediah and not any other kerbonaut, I couldn't say."

Lodan nodded and glanced at the clock on his mantelpiece. Right on time there was a knock at the door.

"Come in."

Jeb walked into the room, followed by Geneney. The kerbonaut and the flight director both stared at Erlin curiously. Lodan stood up to greet them, his eyes meeting Geneney's for a second. "Ah, Jebediah and Geneney. Take a seat and join us please. Allow me to introduce Professor Erlin from the Berelgan Institute. Professor, allow me to introduce Jebediah and Geneney Kerman."

"Who need no further introduction," said Erlin with a smile. "It's a pleasure to meet you both."

"And likewise to meet you, Professor," said Geneney, accepting a mug of coffee from Lodan. "What can we do for the Berelgan?"

Erlin steepled his fingers and looked at them thoughtfully. "I need you to talk to a friend for me," he replied at last. "A friend who's very keen to learn about spaceflight and has requested a meeting with Jebediah. Although I'm sure he would be more than happy to speak to the KIS's chief flight director too," he added politely.

Geneney exchanged looks with Jeb before his gaze settled on Lodan. The other nodded minutely, a hint of steel in his expression. "I can't speak for Jeb," he said, "but your friend would be very welcome to take a tour of the Space Centre and I'm sure I could find some time for a meeting. However, I think there's something you're not telling us, Professor."

"There is," Erlin agreed. "And I'm afraid my friend would find it quite impossible to accept your kind offer of a tour, although I might be tempted to take it for him. You see - my friend is a Kerm." He watched Geneney's face, trying to ignore Jeb's incredulous snort. "Perhaps I'd better start from the beginning."

Geneney took a seat. "I think," he said, "that would be a good idea."

"A suitably abridged version if you please, Professor," said Lodan.

"Naturally," said Erlin. "Quite apart from anything else, much of it I only have at second hand from various associates of my friend, although I've come to trust them implicitly." He took a sip of coffee. "You will of course have heard of Jonton Kermol, the so-called Sage of Barkton." He sketched out Jonton's background: the discovery of the Kerm seed in his Grove, the events leading up to his an-Kerm transformation and his realisation that the an-

Kerm could hold the key to resolving the Kerm crisis. Jeb listened to the unfolding story in mounting disbelief at the description of Elton's Awakening and rise to sapience, followed by Jonelle's disastrous Awakening.

As Erlin finished his summary and leaned back in his chair, Jeb stared at him. "So let me get this straight. There was a plan for saving the world. All it needed was a mass lawbreaking and thousands of volunteers willing to spend the rest of their lives as part of a Kerm tree. Then I suppose we kept our fingers crossed that enough of those volunteers survived the process without dying or going insane. And now you want me to get involved with this madness?" He stood up. "No thank you. I may be crazy but I'm not stupid."

"Please sit down, Jebediah," Lodan said quietly. "I think we can safely assume that that plan has been put on hold until we better understand the Awakening process. Since Guardian Elton now wishes to learn more about Project Starseed, I can only assume that he's come to the same conclusion. In which case it would be prudent to grant his request on behalf of the KSA."

Jeb laughed derisively. "Better pick a KSA employee then instead of a pensioned-off former kerbonaut. What happens if this Kerm mistakes me for a soldier and decides to run me through with its stingers. No thank you."

"His healing vines," said Erlin patiently. "I've spoken to Elton myself and believe me..." Erlin paused. "Let me put it another way. Elton has lived on this planet since before our ancestors mastered fire. I have seen this because I've Communed with him and shared his memories. There is nothing you could say or do that would either surprise him or compel him to such an action. Please, Jebediah. I don't know why he wants to speak to you but I beg you to go to him."

"We came in peace for Kerm and kerbal," Geneney said softly. Jeb's head whipped round.

"That's unfair, Genel!"

"Yes it is," said Geneney, "We're in an unfair business, Jeb and we've always known that. Everything we do has to be done right first time or someone pays the price - and Kerm knows we've found *that* out the hard way." He stood up and gripped Jeb's shoulders. "I'm coming with you old friend. We'll take a trip out to that Grove, maybe talk things over on the way - and if you're still worried about talking to this Guardian Elton?" Geneney shrugged. "Well he'll just have to make do with a flight director and one-time sub-orbital joyrider instead of a Münwalker."

Geneney let go of Jeb's shoulders. "Or if you're really set against this, I'll go by myself. Because somebody needs to, Jeb. I've watched the news too - and as far as I can see it mostly boils down to people fighting over what they think the Kerm want." He stepped back, silhouetted against the late afternoon sun pouring through Lodan's office window. "Maybe one of us needs to ask one them what they *actually* want."

The lines of headlights stretched for kilometres, cars and goods vehicles alike queueing up to join the main highway out of Barkton. The occasional horn blared in the dark, protesting, Jeb presumed, a driver taking unduly long to move forward another metre. He popped the top on a can of sapwood and handed it to Geneney. "We'd have been quicker walking to this Grove."

Geneney nodded glumly. "I didn't think it would be so bad at night. Hope they have a phone at the checkpoint so I can give this Patbro fellow a call."

"You're taking all this seriously then?"

"It's a lot to swallow," Geneney agreed, "but Professor Erlin was about this far from dropping to his knees in front of you and I've never known Lodan to have much tolerance for storytelling on that scale."

Another horn blared nearby, followed by a sullen crump and the tinkle of metal on asphalt. The sound of slamming doors and angry voices escalated to the noise of breaking glass and the thudding clang of metal against metal. Geneney reached for his door handle but looked at Jeb's withdrawn expression and thought better of it.

A sudden glare filled the inside of the car followed by a protracted horn blast. Muttering under his breath, Geneney lifted his foot from the brake, letting them roll forward another car length. "For the love of the first Grove!"

Jeb looked up. "Why me, Gene. What does it want with me?"

Geneney raised his eyebrows. "Apart from the obvious you mean? I can't imagine why anyone wanting to learn about spaceflight would want to talk to the first kerbal in space or the first one to walk on the Mün."

Jeb stared out of the window. "That was a long time ago."

Geneney shook his head. "Not that long ago, Jeb. Which reminds me - did you ever have any more thoughts about rejoining the roster?"

"Not really," said Jeb. "Doesn't seem much point any more. Crewed program is dead after Pioneer 8 and that's not launching any time soon."

Geneney couldn't argue with that. "At least Bill will get his flight," he said. "Kerm knows he's been waiting long enough. And you never know - maybe Elton can jab a few vines up some bureaucratic backsides and get things moving."

Jeb gave him a morose look. "Well now I know its all over," he said. "Flight director Geneney Kerman hoping for a tree to save the mission. A tree talking to a washed-up kerbonaut whilst the world burns. Yeah - just what we need." He closed his eyes. "You got any tunes in this wagon?"

"Tapes are in the side tray," said Geneney evenly. "but you won't find much unless you're in the mood for light opera or Spierkan marching bands. Winding Road is pretty easy listening for Spierkan pipe."

"You've been spending too much time with the tracking crews," said Jeb, rummaging through Geneney's stack of cassettes. He squinted at one cassette box which depicted a trio of implausibly coloured kerbals posing in front of an equally implausibly coloured desert scene. "What in the Blight is a rainbow steelsnare?"

Geneney coughed. "They're... a bit experimental," he said. "Not really your standard pipe band."

"I'd call that a plus then," said Jeb, flipping open the box and slotting the cassette into the tape player, which promptly emitted a warbling electronic tone followed by a blare of truck horns. For a second Jeb assumed this was due to another angry driver but then the horns segued into a syncopated drumbeat overlaid with some remarkably up-tempo piping. The mournful drone that Jeb associated with Spierkan pipes was still very much present but seemed to want to wander off into a panoply of other sound effects.

Jeb glanced at Geneney's set jaw. "They're different," he conceded. "Winding Road it is then."

Floodlights lit the roadside in a harsh white glare. A steel girder on a chain loomed out of the night, the rest of the crane hidden by the dazzle. The harsh clatter of pneumatic drills drowned out the noise from a road roller as it crawled past behind a line of temporary bollards. Following the emphatic gestures from a uniformed kerbal, Geneney changed lane and pulled up in front of a heavy steel barrier. Overhead, translucent sheeting diffused the worst of the floodlight glare into a stark uniform whiteness that bleached the colour out of everything around them.

Geneney wound down his window. A flicker of recognition crossed the guard's face as he caught sight of Jeb but was quickly hidden behind a professionally impassive stare. "Good evening, sirs. Please unlock your motor and luggage compartments then step out of your vehicle."

"Certainly." Geneney reached under his dashboard and pulled a toggle. A second guard stepped forward, lifted the bonnet and poked a long handled tool inside. No sooner were Jeb and Geneney out of the car than the first guard had beckoned an inspection team forward. One kerbal slid a flatbed trolley underneath it, her partner peering intently into an angled mirror mounted on one end. Another opened the rear motor compartment and began poking around inside. Others began removing the interior panels from the passenger door.

After a brief consultation with the first guard, Geneney set off in search of a telephone booth, leaving Jeb to oversee the systematic dismantling of his car. Their travel bags were removed, upended over a tarpaulin and repacked. Geneney's tape collection was spread out over a nearby bench, one of the inspectors shaking his head at the Rainbow Steelsnare box, much to Jeb's inward amusement.

By the time Geneney returned, the inspection team were busy refitting upholstery panels to his car doors. He frowned at Jeb. "Being a bit thorough aren't they?" He watched his car being put back together for a moment. "Managed to reach Patbro. Sounds like plenty of folks from the Grove have been caught up in the inspections too, so he wasn't surprised that we're running late. He sounded like a nice old guy actually; gave me directions for when we get to the Grove and asked if we'd eaten or if we'd need anything when we arrived."

Jeb shrugged. "Depends how long that lot take."

The inspection wore on and Geneney was starting to consider pulling out his KSA pass and having a quiet word with one of the guards, when there was a sudden flurry of activity around his car. The camera trolley was towed out from under the front motor compartment, the bonnet slammed shut and one of the guards approached them, clipboard in hand. "Your vehicle is clean, sir. Destination and nature of your business please?"

"Visiting a friend in one of the outer Groves," Geneney replied. "We don't expect to be out of town for more than a couple of days."

"Thank you, sir. Please be aware that you will be required to submit to further seed checks before re-entering Barkton."

"Understood," said Geneney, slipping into the driver's seat and sliding it forward. "All set, Jeb?"

"For the last thirty minutes. Let's go."

Apart from a slow trickle of traffic leaving the checkpoint, the highway out of town was almost empty and the Barkton suburbs soon gave way to open fields speckled with lights from nearby Groves. Away from the highway, the roads became much narrower, trees looming out of the shadows on either side, lit only sparingly by the car headlights. After a brief detour and a stop on the verge to consult their map, Geneney was thankful to find a turning he recognised. Presently the forest began to thin out and streetlights began to appear again by the side of the road.

Remembering Patbro's advice, Geneney took a turn to the right, skirting around the village proper before parking at the foot of a shallow hill that led up to the biggest tree he'd seen in his life. The full Mün shone through its branches, catching the elaborate, multi-story kermol hut wrapped around its trunk, with a flat, pale glow. Jeb stared into the shadows wreathing the hut's lower tier and shivered.

Geneney sensed his disquiet. "Everything alright, Jeb?" he murmured.

Jeb shook his head. "Never did like Kerm much as a kerblet. The way their branches rustle without any wind always gave me the creeps. Our Keeper too. Looking back he was just a harmless old kerb who'd been living on his own too long, but when I was young..." Jeb shivered again. "Yeah."

"And that's a big spooky Kerm," Geneney agreed, "Especially in the münlight. Come on - lets get inside."

"Jebediah Kerman?" Patbro couldn't quite keep the awe out of his voice. "And you must be Geneney Kerman. Preserve me but..." He shook his head. "Look at me, standing here like a starstruck kerblet. Please - come inside."

Jeb's nose wrinkled as he walked into the spotless kitchen. Patbro looked puzzled and then his brow cleared. "The cinnamon? Stronger than a normal Kerm I know but you get used to it. Can I get you anything before we go through?"

Geneney smiled. "We're fine but thank you. The traffic out of Barkton was slow so we had plenty of time to eat on the way."

Patbro scowled. "Those ridiculous border searches! It's bad enough getting out of Barkton but getting anything into Barkton is a blighted sight worse. White bean harvest from my Grove was held at the border for nearly a day. If one of the drivers hadn't told them to try using a roll of fencing wire as a sieve, they'd probably be there now picking through the blighted beans for Kerm seeds!" He sighed. "Anyhow, you're not here to listen to my problems. We'd better go through and introduce Jebediah to Elton - begging your pardon but I don't think he was expecting two of you."

"I think your problems are going to be everyone's problems," Geneney said quietly. "But yes, Professor Erlin was very clear that Guardian Elton wanted to speak to Jeb."

Patbro nodded and led them through to Jonton's sleep room. Geneney looked around in surprise at the rows of bunk beds secured to the walls. Jeb just stared at the empty room and the massive Kerm trunk that made up one wall.

"Any bed will do," said Patbro. "Elton won't mind which leaves you use." He gestured at a pair of kitchen chairs beside a crisply made bed. "Geneney and I will wait here for you."

"Actually," said Geneney, "Those sack chairs look fine after being cooped up in the car for so long. I'll just park myself beside Jeb's bunk. That Twelve Riders duvet looks just right for you, Jeb," he added.

A stricken look crossed Patbro's face. "Not that one if you don't mind," he said, summoning up a wan smile. "Although maybe Joenie wouldn't mind lending her favourite bedspread to Jebediah Kerman."

Jeb started towards one bunk before stopping and looking at the one beside it. "I'm not so sure about this, Gene," he said.

Geneney saw the astonishment on Patbro's face and shot him a warning look. "It'll be fine, Jeb," he said gently. "C'mon - kerbals have been Communing with Kerm for centuries."

"They were Keepers though," muttered Jeb. "That's different."

Patbro cleared his throat. "Not all of them," he said. "Not by a long way. A lot of people came to speak to Jonton back when he was the Sage of Barkton and almost none of them

were Keepers. Besides, as Elton could tell you, Keepers haven't been around forever - far from it."

Jeb glanced at Geneney, who did his best to look reassuring. Squaring his shoulders he strode towards the nearest bunk and lay down on it. "Now what?" he demanded.

"You need to lift your head into the leaf cluster and keep it there," said Patbro. "Propping a spare pillow under your neck helps a lot. The leaves make the mental contact with you. You haven't Communed before so they'll probably need to be quite insistent and may be rather uncomfortable to begin with. After that, it's all up to Elton."

Jeb picked up a pillow and held it against his chest, staring fixedly at the leaf cluster suspended above him. Then he jerked his head up and whipped the pillow under his neck, clenching his toes against the prickling, squirming sensation crawling across his scalp. He sensed a sudden vastness yawning all around him and then all was light.

Two grieving minds touch. One, with a friend lost to the space programme, fearful of the Kerm. One, with a friend lost to the Kerm, fearful for the space programme. Images appear: a kerbal in a wingless, skeletal flying machine, a motionless kerbal on a bed, her head swathed in Kerm leaves.

Two grieving minds touch in a boiling foam of memory, a torrent of unleashed emotion. Sorrow. Futility. Hopelessness. Anger. All turned inward, gnawing on the soul, growing like a canker, leaving but a husk behind.

Two grieving minds touch and in the touch comes affirmation. For if the other so different can feel these things too then all is right. It is proper to grieve. It is natural to feel apathy and even despair. It is right to want permission to feel sadness. And with affirmation comes understanding. This will be no instant cure. There will be many more steps to take. But this is the first and perhaps the largest.

Elton?

<Jebediah?>

The kerbal on the bed - she was Gerselle?

<yes. And the kerbal in the machine?>

Was Ornie.

<ah> Acknowledgement rolled down the link between Kerm and kerbonaut. Then. <the flying machine, Jebediah. Was it for travel between worlds?>

Jeb blinked. *No. It was just the Minmus landing trainer.* He sensed Elton's incomprehension. *Professor Erlin said you needed to learn about spaceflight?*

<that is why I would speak to you now, Jebediah>

Right. Then I think we need to start from the beginning. We shouldn't keep Genie and Patbro awake for too long, so the details can wait for tomorrow, but I can give you a summary now?

<that would be acceptable>

Jeb began by outlining the earliest days of the Kerbin Interplanetary Society: Wernher's LV-1 prototype rocket engine, his own final year project and acrimonious departure from the Institute, culminating in the launch of the KIS's first proper sounding rocket powered by their new LV-5 engine. Through Jeb's memories, Elton witnessed the LV-10 disaster, the struggle and ultimate failure to develop clustered engines for a crewed rocket, and a steadily dwindling KIS, even as their plans for the *Kerbal 1* reached fruition. He watched a succession of test flights flicker past, all ending in one catastrophic failure after another, all etched bright in Jeb's memory. Finally, he saw a pair of bright orange parachutes unfurling in the skies and felt the, still undiminished, exultation of a successful test flight.

Geneney watched Jeb stiffen, back arching as the Kerm leaves touched his head. Then, to his great relief, Jeb relaxed, one arm drooping over the side of his bed. Patbro levered himself out of his sack chair and placed Jeb's hands gently atop his chest. "Stops them going numb," he explained. "Happened to me once - wasn't much fun."

There was a long wait. Patbro went through to the kitchen and presently the smell of fresh coffee drifted through to the sleep chamber. Geneney yawned and then clapped a hand over his mouth in surprise. For the first time in far, far too long, a familiar grin was lighting up Jebediah Kerman's face.

The sun rose over a most unlikely rocket ship standing on its launch pad.

Elton sensed Jeb's hidden trepidation atop a rickety launch tower, heard his banter with Bill and Bob, shared the brief claustrophobia of three fledgling kerbonauts wedged into an impossibly small capsule. With new understanding he listened to the conversation with 'Control' and felt the rocket come alive around him, before surrendering to the primal release of energies and raw emotions as the *Kerbal 1* blasted into the sky.

And then Elton found himself looking over another kerbonaut's shoulder through a tiny round window.

<what is that?>

And then he *knew*.

Jeb's memories tumbled around him and the mindscape reeled, scoured by blazing rocket fire that blew apart grey thoughts and lit the caverns beneath. Patches of char exploded skyward and were instantly incinerated. Kerm sparks gambolled around the brilliant motes, swooping and diving, soaring over the transfigured fields of thought below.

—————
Patbro's jaw dropped. All around him, Elton's leaf clusters splayed wide open. Along his branches twigs flexed and rustled, leaves standing on end, springing away from one another as if charged by some inner electricity. Geneney looked up in alarm at the suddenly creaking ceiling, its supporting branches flexing and groaning.

—————
Oh you've not seen anything yet!

The view from an open door, winding queues of figures stretching down the road. The bustle and clamour of kerbals in their dozens and then their hundreds, putting up new buildings, making more rocket parts and other strange new machines. A car on a dusty hilltop, a ball growing vines and making a strange beeping sound. Crowds of kerbals in a field watching the new rockets fly. An oddly shaped capsule - too small for any kerbal - on the end of a single parachute. Elton saw them all, felt the growing excitement.

Then came the pictures. Mere memories of images, rippled as if seen through thick glass, although Elton could still perceive the curved edge of a blurry blue and white ball set against utter blackness.

Those were from our Kerbin 2 satellite, said Jeb. The satellite was spinning so they're not very good but they were enough.

<enough for what?>

Enough to make us think we could send kerbals into space and bring them safely home.

<and Patbro said that you were the first kerbal to make such a journey>

I was, said Jeb. It's a long story but... He stopped at the wave of amusement rolling through his link to Elton.

<I am sorry, Jebediah. My first of Keepers also tells long stories. I think perhaps all kerbals do.>

Jeb pushed his confusion to one side. *Probably, he agreed. One for tomorrow I think - the Moho capsules and boosters were our first proper spacecraft so you need to know more about them if you want to understand spaceflight. But for now.*

White light receded, becoming edged with widening blue. Greens and browns appeared too, lending definition and shape to the blue. Finally, there was blackness. With a twist of perspective, Elton found himself racing the very edge of the night, soaring over a landscape of greens and blues and whites that glowed with its own numinous light. Some of that light he knew, was imparted by Jebediah's lasting memory of his journey.

But most of it was not.

Buffeted and spun by the waves of emotion pouring down the link, Jeb clung desperately to his mental image of Kerbin seen from space. *Kerm... knows what...he's going to do...about*

the next ones. The waves receded, diminished by a rising surge of excitement and curiosity, lifting Jeb high above the mindscape.

<there is more, Jebediah?>

Yep. Better hold on to your... whatever Kerm hold onto. Jeb summoned up his memory of the lander extraction manoeuvre aboard *Pioneer 4*. Four gleaming petals swung open to reveal an ungainly looking machine, its spindly legs folded up its sides. Thrusters fired with a clatter of solenoids, pulling the lander free. The cylindrical bulk of the Kerbin departure stage receded into the distance, revealing the slowly shrinking globe of Kerbin against the starry backdrop of space.

The image shifted. A much smaller globe, its lower hemisphere half hidden by shadow, floated above a lifeless grey plain.

Elton's branches sagged in shock. Internal tubules squeezed shut, denying sap to his suddenly wilting leaves. Münlight poured through the gaps in his canopy, radiant beams piercing the shadows beneath.

Jeb felt the overwhelming pressure of Elton's mind against his own, the astonished Kerm drinking in his memories of Kerbinrise with a fierce, almost terrifying intensity.

<All should see this. All.> The pressure eased a little. *<I thank you...thank you for this, Jebediah Kerman.>* Elton's mental voice seemed to deepen, rolling across the mindscape like an avalanche *<Once again, Jebediah eb belad-onmansatha>* He sensed Jeb's utter bewilderment. *<Something that was often said about another kerbal bearing your name. The literal translation is: Jebediah is a person we depend on to accomplish the greatest deeds.>* Elton paused. *<I do not know what the modern expression is.>*

The mindscape vanished behind a veil of white. A stern-faced kerbal appeared before them, dressed in plain grey robes and sporting an exuberant pair of bushy white eyebrows.

<Jebediah Kerman. Founder and first leader of the Council of Twelve Pillars.> A tinge of regret crept into Elton's voice *<I did not know him personally but many of my kerbals did>* He smiled *<Another long story that can wait for tomorrow. For now, you should know that he was not so very different to yourself, Jebediah. His deeds were the pinnacle of kerman accomplishments - they saved your world from disastrous war and shaped the very fabric of kerbal society into a form which endures to this day. But he too suffered sorrow and loss. He too despaired at the failures, the wrong decisions, those he could not save and the deeds he did not have time to finish.>*

Elton smiled. *<It will be confusing when I talk of this to others. Two Jebediah Kerman's and both so very similar.>*

And for the first time in far, far too long, Jeb allowed himself to smile back. *Not a problem,* he answered. *Just call me Jeb.*

"In other news, refugees continue to flee the increasingly bitter fighting between Wakiran forces and the so-called Clean Earther rebels. This neo-kerman sect is now reported to..."

Lodan switched off the television and slumped into his chair. The mug of Doreni Blue coffee by his elbow smelt sour and stale. He took a swallow, more out of habit rather than any particular enjoyment, staring at the lights from the Alpha tracking dish gleaming in the twilight. He pushed his mug to one side and laid his head on his desk, eyelids closing.

"...construction of Alpha, Beta and Gamma stations is approved. Full expansion of the KSA mandate will require authorisation from the Twelve Pillars...for the moment, I strongly advise against any further unplanned expansions of that mandate. I trust we understand each other Director Lodan..."

"...on this day we - voyagers from the planet Kerbin... first set foot upon the Mün. We came in peace for Kerm and kerbal..."

"...For we have also tasked our greatest scientists with a mission of peace... Our very survival as a species depends on their success and for that we must buy them time. Which is why we now call upon the six Regionalities of Kerbin to unite behind this Council of Twelve Pillars..."

Lodan's eyelids flickered, the voice of a younger Lodan Kerman prodding at the back of his mind.

"I'm well aware of our mandate, Mr President... we identified a serious problem...and we devised a solution to that problem..."

"...under Special Order 41 of the Council of Twelve Pillars, the Kerbin Space Agency will be tasked with overseeing a far-reaching expansion of all spaceflight activities..."

Lodan's eyes snapped open. *Kerm!* He drained his mug of coffee in a single gulp, the darkly bitter dregs bolstering his determination now rather than fuelling his despair. Then he reached for his telephone.

With apologies to Dylan Thomas:

*And you, my kerbals, there on that sad height,
Curse, bless me now with your fierce tears, I pray.
Do not go gentle into that good night.
Rage, rage against the dying of the light.*

Chapter 83

Special Order 42

<very well...Jeb. We will talk again tomorrow but the hour grows late and you have already given me much to think about>

It's been a long day, Jeb agreed, and I've got my share of thinking to do too. So - uh, how do I...

<stop Communing? Like this. Peaceful night, Jeb>

Elton's leaves tugged at Jeb's scalp before lifting free. Blinking, he sat up, patted his head and inspected his fingertips. "Huh. No blood."

"The punctures are tiny and heal practically instantaneously," said Patbro with a smile.

"They'll open more easily the second time too, whichever Kerm you Commune with. You're a marked kerbal now, Jebediah."

"Good to know that tomorrow isn't going to be as itchy," Jeb cocked his head to one side.

"How specific are the punctures though? Will other Kerm know that I've Communed with Elton?"

"I don't follow you."

Jeb scratched his head. "You said I'm a marked Kerb - are these Elton's marks? Does he leave behind - oh I don't know - a personal scent or something?"

Patbro pinched the bridge of his nose. "You know, I have no idea. I haven't noticed anything different with my Kerm after speaking to Elton but another sapient Kerm... hmmm. That's an excellent question."

"Either way, you don't seem too worried about being a marked kerb," Geneney observed.

"Which is probably more than Elton could say right now. What on Kerbin did you do to him?"

Jeb swung his feet off the bed. "What do you mean? I didn't do anything."

Geneney pointed at the leaves scattered over the sleep room floor. "It didn't look that way from where we were sitting. Whatever you did it made his branches fairly stand on end - I reckon we're lucky to still have a ceiling."

"I've never seen a Kerm react like that," said Patbro. He shivered, remembering all the leaf clusters around them closing in waves. "Although Elton is far more expressive than a normal... than most Kerm."

Jeb's face cleared. "Oh... that would have been when I showed him the view from Kerbal 1. He was very... very..." Jeb threw up his hands. "He was all sorts of things all rolled together. I don't know."

"Thunderstruck?" suggested Geneney.

"That was part of it. It all made perfect sense in Communion." A look of awe crossed Jeb's face. "It *all* made sense in Communion, Genie. Didn't matter if we got the words wrong because we knew what they meant anyway. I did most of the sharing but Elton...shared a couple of things with me too. Some faces from the past. They felt a bit blurry, a bit faded - I guess that's because Elton never Communed with them personally but his kerbals knew them so I got their memories second hand." Jeb frowned. "I didn't follow the part about his kerbals to be honest - I'll need to ask him about that tomorrow."

Patbro nodded vigorously. "You really should. You should be there too, Geneney!"

Geneney looked at Jeb's flushed face. "As long as that's all right with Elton," he said. "I don't think I've seen Jeb this excited since... well since Kerbal 1."

Jeb awoke to the nutty, grainy smell of hot natas mingling with the smell of fresh greenery and cinnamon all around him. He rubbed the sleep out of his eyes and sat up, peering at the rows of bunk beds on the far wall. A breeze from the half open window chivvied a drift of glossy green leaves across the floor and Jeb's face lit up in anticipation. He rolled out of bed, grabbed the poncho Patbro had left on the bedstead, pulled it over his shoulders on his way out of the sleep room.

"Morning Elton!" Jeb pushed open the door and sauntered into the kitchen. "Morning Genie, morning Patbro!"

Geneney looked up from his chopping board. "Morning, Jeb. You slept well then?"

"Took me a while to drop off but after that? Like a kerblet in its pouch." He turned to a rather bemused looking Patbro. "I'll get a brew on - where are the supplies?"

"Um - the pot's on the stove," said Patbro. "Filters and coffee are in the corner cupboard down there." He pushed his chair back. "But, please. Let me."

Geneney put his knife down. "Don't worry about it. Do him good to be on the breakfast shift again." He grinned at Patbro's expression. "The boss brewing the morning coffee used to be

a KIS tradition until Derny - now our chef - turned up to volunteer his services. He's more creative than Jeb and better still, none of his brews have been mistaken for leftover window sealant."

Jeb aimed a rude gesture at him from over his shoulder before emerging from the cupboard with a jar of ground coffee, filters and an elderly tin of anise flakes. Levering the top off the tin, he rubbed a pinch between his fingers and sniffed. "Bit old but they'll do nicely." Ignoring Patbro's and Geneney's revolted expressions, he dumped a spoonful into his coffee cup, thought for a moment then added a second.

Geneney ladled the natas into three bowls and added a generous portion of chopped pickles to each. The coffee pot burbled and slurped its way to a standstill and presently the anise laced aroma of hot coffee was adding to the distinctive smells of a traditional Kolan breakfast. Everyone dug in.

Patbro pushed his bowl away with a satisfied grunt and reached for his mug. "So - is there a plan for today?"

Jeb swallowed a mouthful of coffee. "Communing with Elton mainly," he said. "We've still got a lot of space stuff to talk through." His eyes lost their focus for a moment "And hopefully we'll have time to hear some of his story too." He looked at Patbro. "From all the bunks around here I'm guessing that Elton won't have any problems talking to Genie and me together? I'll ask him first of course."

Patbro shook his head. "No problem at all," he said.

"You're welcome to join us," said Geneney. "If you don't mind listening to a pair of engineers getting technical?"

"That sounds... interesting actually," said Patbro. "Like I said to Elton, I've seen three launches and I watched..." His voice tailed away and he stared at Jeb as if seeing him properly for the first time. "I watched yourself and Jondun walking on the Mün, sir." He blinked. "I don't suppose... don't suppose you showed Elton your Münwalk?"

"No need to 'sir' me," said Jeb. "But no - we didn't have time for that last night. Wonder how it works with all of us Communing?"

Patbro tried to bury his excitement. "If group Communion with Elton is anything like talking to Jonton back in the day - why it should be the next best thing to being there!"

Geneney raised his eyebrows, his voice deceptively calm. "Now that does sound interesting," he said. "Always did wonder what it was like. You can give us the guided tour, Jeb."

"Be happy to, Genie. Breakfast dishes first though, I think." He turned to Patbro. "If you think my coffee's bad, you don't want to let Genie's cooking congeal in the pan. Not unless you enjoy washing up with a hammer and chisel."

Patbro just shook his head.

No sooner were the breakfast dishes dried and put away than all three kerbals hurried through to the sleep room. Jeb clambered onto his bunk from the previous night, slipped a pillow under his neck and without further thought, lifted his head into the waiting leaf cluster and waited for the white light to engulf him.

<good morning, Jeb>

Good morning, Elton. You remembered!

<of course. There is much to discuss today, Jeb. Where did you want to begin?>

Could we start with the details we didn't have time for last night? Jeb paused. *And, uh, I thought you might like to see the surface of the Mün now that you've seen it from space?*

<and I think Patbro and your friend would like to see it too>

Jeb sensed amusement and reassurance rippling down the mental link and blushed.

Elton's voice was soothing. *<no, Jeb. I cannot read anything that you don't want to share. You were worried about asking me for something though and I could see two other kerbals at the front of your mind. It wasn't difficult to guess your thoughts>*

Ohh-kay. Going to take me a while to get used to this.

<you will. For now - yes. Patbro and your friend are welcome to join us. I should know your friend's name first though>

Geneney, or Genie for short. Uh, if you could let go of my head, I'll let them know.

<certainly, Jeb>

And with that, Elton's leaves lifted away from his scalp. Jeb sat up and rubbed his head. "Definitely didn't pull as much this time. And Elton says you're both welcome to join us." He watched Geneney and Patbro find their own bunks, Patbro propping himself up and slipping his head into the leaf cluster with practiced ease. Geneney took longer to settle but eventually Elton's leaves closed around his head too. Jeb flashed him a quick thumbs-up before leaning back onto his own pillow.

The light swirled away in tattered ribbons, buffeted by the mental currents sloshing back and forth. Jeb felt a moment of panic as he felt his own link constrict but then Elton's voice filled his head. *<This is my doing, Jeb. Do not fear>*

The link expanded, releasing him into relative calm. With growing wonder, Jeb sensed two more presences floating just out of reach as if seen from the corner of his eye. One of the presences spoke, Geneney's words materialising fully formed in his mind. Instantly, the link narrowed again, deflecting and absorbing his sudden surge of delight.

<be calm my friends. When many Commune it is easy for feelings to magnify from one kernal to the next. Left unchecked this can overwhelm, even harm>

Pogo! Understanding bloomed in Jeb's mind. *This happens with rockets too*, he explained to Elton. *The wrong vibration in the engine can be magnified by the rest of the rocket, sometimes strongly enough to tear it apart.*

<I like this word. Do not worry - I will stop any pogo here before it tears us apart>

That's good to know. Geneney's mental voice was bland but both Jeb and Patbro could sense the unease beneath his thoughts.

<last night you mentioned your Moho rockets, Jeb. I would learn more of them today.>

Jeb collected his thoughts, unsure where to begin. *The rocket was just part of Project Moho*, he said at last. *An important one - without a powerful enough booster, we weren't going anywhere - but it was only one piece of the puzzle. The Kerbal capsule was more or less just a tin can with parachutes attached. For Moho, we had to figure out proper life support, thermal protection, guidance and attitude control - all sorts of things.* He stretched out, reaching for Geneney's presence. *Cover me here, Genie - jump in if I forget anything.*

Patbro sensed Elton's attention focusing on Jeb and braced himself for - two engineers getting technical - as Jeb had put it. To his delighted surprise, he found the details much easier to follow than he'd expected; Jeb's easy-going delivery highlighted by real-life images of partially assembled rocket engines and spacecraft as seen through his own, and occasionally Geneney's eyes. Even when the conversation turned to intricacies of mission planning and orbital mechanics, Patbro and Elton *felt* the patchwork of mental images and rules-of-thumb behind both Jeb and Geneney's understanding, tapping directly into their years of hard-won experience.

<but what of your flight controllers, Geneney? So many kerbals watching over so few - is this necessary?>

Patbro sensed equivocation shivering from Geneney's link but before he could speak, Jeb's emphatic response overwhelmed it.

Yes! When something goes wrong up there it can go wrong real quick. And when that happens you want as many people - and as much experience - on your side as you can get.

The mindscape blurred around them, four green lights suddenly glowing in front of everyone. A gloved hand appeared, one finger stabbing down on a button. The lights didn't flicker and Patbro felt a surge of remembered tension chasing between Jeb and Geneney as their memories aligned.

[OK Gene, I've got a problem up here.]

[We see it too Jeb. Stand by.]

The mindscape swirled, revealing a crowded and cramped space full of screens, lights and kerbals. Patbro felt the humidity, smelt the earthy stench of tense bodies in close confinement, struggled to keep up with the rapid fire jargon even with his newfound understanding.

[Flight Dynamics - what are our options?]

[We're still Go, Flight.]

Surprise and relief washed across them, followed by a metallic click and buzz of static.

[OK, Jeb, we're working this but for now you are still Go.]

And by the time the second stage burned out, they had a working plan for me. I made it to orbit and... well you've seen the rest. Still haven't quite figured out how Gene's team did it but yeah - they're the kind of kerbals you want to have watching your back.

And sometimes, said Geneney, all we can do is double-check everything and hope for the best.

The cramped bunker expanded before their eyes, the number of controllers and screens expanding with it. The image stuttered, bouncing from one screen to the next.

[Flight, Lander. Radar is back!]

A surge of hope. Then a tightly controlled voice.

[Flight, Pioneer. Debris at the landing site - I'm going long.]

A lightning quick burst of thought flicked across from Jeb. Patbro nodded to himself. Of course going long was the best option. Far easier and safer than the alternatives. Somewhere in the corner of his mind he felt a spike of tension from Geneney. Two mental voices called out in unison, one of them too focused to be afraid, the other radiating enough fear for them both.

[Two hundred metres, down six. Slow us up, Jeb...]

[Lander, Flight. Fuel status?]

[Four minutes, Flight.]

[One hundred fifty metres. Down four, forward twenty...]

The spike sharpened. Patbro sensed Elton hovering on the edge of Geneney's consciousness.

[All consoles - aborts and fuel only.]

[Seventy metres. Down one, forward five. Fifty metres. Down point seven, forward three.]

[Three minutes, Pioneer...]

[Forty metres, down one, forward one. Watch that lateral drift...]

Patbro felt the first twinges of alarm from Elton. He reached out to Geneney, finding nothing but a hard, ridged knot of sensation, impaled on the spike. The knot quivered, cushioned by soothing webs of thought spun out from the Kerm...

"Twenty-five metres. Down point five. Looking good. Fifteen metres. Ten metres...contact!"

"...Abort stage override to auto. Descent engine arm off. ATO is in..."

"Flight, this is Pioneer. We are on the Mün. Repeat, we're on the Mün."

The tension spike exploded, the mental blast-wave slamming into a smaller but no less powerful wave of relief erupting from Jeb. The two waves merged, swelled, tossing the mindscape around them like a cork in a tempest.

<Be easy my friends> To Patbro's ears, even Elton's voice sounded shaken. *<I would have no pogo here>*

Hey Genie? Jeb said softly. *It's okay. We made it, remember.*

I...I guess we did didn't we. Really did something that day. Sorry about that, people - hit me harder than I expected.

Don't worry about it, Jeb answered. *Uh - I don't know how well this is gonna work but... you all want to see what happened next?*

<I would like that, Jebediah> Elton's presence gathered around them, enfolding the three kerbals in a great bowl that seemed simultaneously close enough to touch and too far away for Patbro to sense more than a misty patchwork of detail. *<I would like that very much>*

Patbro sensed a burst of images blurring past too quickly to see. They stopped, riffled back and forth and then settled on a single moment. Patbro found himself on his stomach, peering through a gold tinted window at a space-suited kerbonaut.

[You're doing fine, Jeb. Mind your head on the door.]

[Feels a lot tighter than the trainer. Remind me to tell Genie to get that thing measured up.]

[Easy does it. There you go!]

There was a confusing moment of angular shapes then a ladder jerking past rung by rung. Light spilled in around Patbro's peripheral vision, transmuted to a golden sheen by his helmet visor. His heart soared even as his legs felt strangely light despite the stiffness of his suit.

[Flight, EVA 1. Comm check.]

[You're on closed loop EVA 1. Just you, Jondun and the team until you're both on the surface. You did remember the speech, yes?]

[I'll think of something, Fligh... oh forget all that, Genie - this is awesome! Okay - stepping off the ladder now.]

A rising tide of exultation gripped Elton. He took a tentative step back, watched his gloved hands let go of the ladder, then turned and walked out into a landscape of fierce greys and jagged beauty, unlike anything remembered from all his many kerbals. Great boulders threw needle sharp shadows across the ground and the curved horizon seemed almost close enough to touch. He turned, frustration leaping inside as an ugly, misshapen flying machine

replaced his view of the Mün, and tipped his head back to watch a pair of chunky grey boots emerge from an open hatch, followed by a pair of bulky white legs.

[Bend a bit more, Jond. Down a bit...perfect! The next bit's easier if you climb down a rung or two.]

Jondun's helmet emerged from the hatch. Elton watched her propel herself down the ladder in slow two-footed hops. [What's the ground like, Jeb?]

[All fine and powdery but it doesn't seem to be that slippery. This *gravity* though! Feels like I could just jump straight up, knock on Malmy's window, turn a couple of somersaults and still have plenty time to land!]

[We'll pack you a pair of spring-loaded boots next time, EVA 1.]

[Or get Wernher to rig up a rocket assist for the EVA packs! Okay, Genie - it's about flag time I reckon.]

Patbro took a cautious hop forward, plumes of Mündust puffing out from under his feet. Fascinated, he watched the dust particles shooting over the surface, before turning his attention to a thin metal tube secured to one of the ladder rails. He fumbled it free, his pressurised gloves making it a struggle to operate the clips holding it in place, and loped over to join Jondun.

The suit fans whirled in Geneney's ear, the cool, slightly rubbery tasting oxygen drying out the back of his throat. Resisting the temptation to sneak another peek at the view, he depressed a catch on the side of the flag tube and pulled it's two halves apart. He handed the upper pole and cross bar assembly to Jondun, just as he'd seen Jeb do half-a-dozen times in training, and with a grunt drove the lower pole into the regolith as far as he could. He pressed a button on its side and four supporting legs snapped out flat, raising puffs of dust from the Munar surface. [All set, Jond?]

Jondun slipped the unfurled flag into place. [Ready when you are.]

[Going live in five, EVA 2.]

Together, Patbro, Elton and Geneney stepped back from the flagpole and reached out to clasp Jondun's hand. Then they turned to face the lander, it's gleaming boxy shapes and jointed legs standing proud against the Munar dawn. They lifted their heads to see Kerbin high above in the midnight sky, as they listened once again to their much-rehearsed words:

[On this day we - voyagers from the planet Kerbin...]

—————

The emotional after-quakes subsided, leaving Elton's sombre tones behind. *<those were good words, Jeb. Even at such a moment, the Kerm were not forgotten>*

I did my best, replied Jeb.

And then some, said Geneney. We were under a lot of pressure for Pioneer 4, he explained to Elton. The Council wanted a Mün landing to make Starseed look achievable and they were leaning hard on Director Lodan to give them what they wanted.

<but there is no new soil on the Mün. Kerm cannot grow there>

No, agreed Geneney. And Duna isn't much better to tell you the truth but it's going to have to do.

<Duna?>

Geneney summoned up an image of a screen showing Pioneer 4's path from Kerbin to the Mün. Neling and Bill put this together for Hanbal's television lectures, he said. It's not much good for flight planning - was never meant to be - but it's useful for getting across a sense of distance. The image blurred, replaced by three circles around a bright central dot. The bright spot in the centre is Kerbol, then we have Moho, Eve and Kerbin orbiting it. You can't see the Mün or Minmus at this scale I'm afraid. The image blurred again, shifting in and out of focus as Geneney hunted for the right memory. Ahh - here we go. The software keeps Kerbol at the same size for ease of viewing but everything else is to scale. So here's Kerbin again and right on the edge of the screen - that's Duna.

The great mindscape bowl enfolding himself, Jeb and Patbro collapsed with a resounding thud.

<oh...I see>

It gets worse, said Geneney. We use a transfer orbit remember... Help me out here, Jeb - I don't remember ever using this for the Starseed trajectories.

It's been a while since I used it for anything either. Lodan didn't want us to use it for the Capital News interview remember, in case it scared anyone. Hmm, Bob's evening class slides maybe? I remember Luco setting the animation up for him.

A large white screen unfolded in Jeb's minds eye, showing the same four dots orbiting a centre dot. Okay, we launch when Duna is here. A dotted line appeared, curving away from Kerbin. Don't remember the details but Bob was probably showing a minimum energy transfer, which gets us to Duna here. Exact journey time depends exactly when we launch.

We were planning for about 120 days, said Geneney, as a compromise between propellant requirements and flight time.

<that does not seem so long, even for kerbals. The great voyages of the Age of Sail took many more days>

No, agreed Geneney, Crews on the Endurance station have shown that journeys of 120 days are possible. The image of four dots circling Kerbol flickered over the mindscape in a ripple of unease that brought Jeb up short. An image of Kerbin from space drifted past, accompanied by familiar radio chatter. Suddenly Kerbin shrank to a blue dot, a grey dot floating beside it. More radio chatter, now with stilted pauses between each speaker. Another spike of tension lanced out from Geneney and suddenly Jeb understood.

Comms delay...

Exactly, said Geneney. The further a spacecraft travels from Kerbin, he told Elton, the longer it takes for radio waves to reach it. Out by the Mün the delay is about a second, which is manageable. But out by Minmus...

An image of a *Pioneer* lander standing on a flat, mottled plain surfaced in his mind, a kerbal standing in front of it carrying an armful of spindly equipment. The image drew back, revealing a screen and then a familiar view of the Barkton flight control room, off-screen voices calling out in sudden alarm:

["Picking up above-background activity in sectors delta and echo, Flight."]

["Patch me in. Do we have enough signal to triangulate?"]

["Working it, Flight, but I'd say..." A louder, two-tone beep sounded. "Oh, Kerm. First pass error ellipse is too large to call it, Flight but that's way too close for comfort!"]

["EVA1, EVA2. Abort to orbit - landing zone Red, repeat Red!"]

The seconds dragged past, the kerbonaut on the screen bounding away from the camera, seemingly oblivious to the flight director's alarm. Suddenly he dropped his equipment, turned and leapt for the lander. *["Copy that, Flight. Returning to base!"]* He skidded across the ground, boots churning up a double plume of frozen powder as it kicked off again. *["Barrie – where are you?"]*

["Out by Danfen's Dip and heading home at speed. You?"]

["Nearly there."] The kerbal sprang up the ladder, clearing half the distance to the cabin in a single bound, scrambled up the rest of the way and squeezed through the open hatchway. *["Speak to me, Barrie!"]*

The voices began to fade out, a grey tinge of helplessness seeping over everything.

["Surface is tracking minor shocks in Charlie and Foxtrot sectors. Prospector – are you clear for launch?"]

The grey tinge flickered midnight black before vanishing. Elton sensed Geneney leaning forward in his seat, willing the other flight director to give the launch order. Surprise turned to outright astonishment as the seconds and then the minutes dragged by.

["I'm clipped on! Go, go, go!"]

The image cut to black. Geneney sagged against his link, Jeb and Patbro gathering around to support him. Elton waited until all three kerbals had recovered their mental strength before speaking.

<I... see. Even if many kerbals watch over the few, they may not be able to speak to them in time to help. But I still do not understand why the kerbal in the lander didn't leave or why the flight director did not order her to?>

Because there was still hope, said Geneney softly. Even if Nelton had given the order, Wilford would have switched his radio off and ignored it.

<that... that makes no sense, Geneney. Two kerbals might have died instead of only one.

But instead both kerbals lived instead of one of them dying, said Jeb. I know Wilford - leaving Barrie behind, alive or dead, would have killed him more surely than that munquake.

It wasn't the logical thing to do, said Geneney. But it was the right thing. And I can tell you - if Wilford had left it too late there isn't a single kerbal in the space program who wouldn't have been there to help. Staying on-shift until we either brought them home or worked through every last option. Geneney's mental voice cracked. Every. last. option. And if we ran out of options then the flight control room wouldn't have been big enough to hold us all. To watch over them, to be with our friends until the very end. Because that would have been the right thing to do too!

<you also have also given me much to think about, Geneney. But I wonder - how do you find such kerbals for your space program?>

Easily, said Patbro. Jeb and Geneney's presences whipped round. If a kerbal is lost on the mountains, how many more kerbals will join the rescue teams? If a boat gets caught in a storm, how many kerbals will sail into the storm themselves to save the crew? Don't get me wrong - I'm sure there are any number of fine people in the space program. But that's because there are fine people all across Kerbin. And they don't give up either. A surge of approval crackled up his spine.

The mindscape shifted around them, elusive flickers of lightning tasting its edges, skipping out of sight if looked at too closely. It shuddered once, as if prodded from beneath, then stilled.

<then I will not give up either my friends. Not whilst there is still hope. But we have Communed for many hours. We should stop to let you eat and drink and then I would show you some of my story. Patbro - you would be welcome to join us although you have seen much of it before> Elton paused <I would ask one last question though. What does this Duna world look like?>

Geneney took a deep breath. Ruddy orange light rayed out around him, staining the mindscape around him in shades of russet and ochre. Rocks appeared under a dusty cerise sky, dotting a landscape that seemed to go on forever. Elton's dismay struck like a hurricane, scouring up towering clouds of tan dust.

Then the dust clouds froze.

Elton's will struck the three kerbals like a hammer blow, striking unerringly at their most long-buried, primeval cores. Jeb, Geneney and Patbro snapped to attention. The desert would be tamed. There was no, could be no, doubt of this, for had not their Kerm decreed it? And this was proper, for they were... not kerbal but something greater. To be kerm-bal was to be apart from the Kerm and in the deepest, darkest depths of their souls, this was inconceivable.

The Dunan vista shattered, replaced by swirling grey light and a sense of shame so deeply felt as to be almost tangible. *<I... I overreach myself, good kerbals>* The light dimmed, flecks of black char appearing around its edges *<and I crave your forgiveness>*

Elton's voice shook. *<I would still offer my help if you would have it, my friends. When kerbals make the voyage to Duna, you will take with you the knowledge of turning desert to soil fit for growing. This I swear on my First of Keepers and all my Keepers before him.>*

Jeb sat up, Elton's leaves slipping free of his scalp. He looked across the room at Geneney sitting on the edge of his bunk, head buried in his hands. Patbro was already on his feet, swaying drunkenly and holding onto his bunk for support.

"Great Kerm above."

"You... you got that right," said Jeb hoarsely. "Elton told me I'd given him much to think about. Reckon he just returned that with interest."

Patbro tottered over to the window and closed the curtains before switching on a pair of standing lamps. Geneney raised his head, blinking at the sudden brightness. "All the Pillars preserve me in their councils."

"They can preserve me too," Jeb shook his head. "That willpower... dear Kerm above, that...all..."

"Tell me about it. And all the... all the..." Geneney stared at his hands. "Just all of it." He lifted his head at the sudden ringing from the kitchen, squinting at Patbro as he went to answer the phone.

"And then some," agreed Jeb. "I think we got his attention..." He was interrupted by Patbro's slightly wide-eyed face in the doorway.

"Geneney? Director Lodan on the line for you."

Jeb looked up. "Lodan? What does he want?"

"He didn't say," said Patbro. "Although he did say that he'd been trying to get in touch for the last three hours."

Geneney groaned. "I'd better take this," he said. "It's a late one, even for Lodan." He got to his feet and went through to the kitchen, leaving the others alone with their thoughts. Jeb picked up a Kerm leaf from the floor, twisting it between his fingers. Patbro poured himself a mug of water from Jonton's pedestal before propping himself up against Elton's trunk.

"Change of plan." Geneney walked in frowning. "You up for a trip out to Alpha?"

"Not after that Communion I'm not. What on Kerbin is the hurry?"

"I have no idea. Ademone and Nelton are on their way too, although Lodan was being remarkably cagey about why he'd called them in."

"There's a surprise," muttered Jeb. "Anybody else invited to this little party?"

"He didn't say but I doubt it. Too far by road and nobody's going to be flying." Geneney gave Patbro an apologetic look. "We should get going I'm afraid. Get a few hours down the road before turning in." His gaze drifted over to Elton's trunk and he dragged his attention back to Patbro with an effort. "Please pass on our regards to Elton and thank him for his time."

Patbro nodded. "I'll let him know you were called away" he said. "And for myself - thank you both for the Communion. It was... it was..."

"It was all of that," Geneney gripped Patbro's shoulder, "And then some."

The midday sun shone down on the great tracking dish as Geneney pulled up in his reserved parking space and switched off the motors. Straightening his suit, he checked his reflection in the rear view mirror and finger combed his hair into something resembling tidiness.

"Ready?"

"As I'll ever be," said Jeb, opening the car door. "Do you think he'll go for it?"

Geneney shrugged. "If he doesn't, we'll drive him back to Barkton and introduce him to Elton." He slammed his door shut and the interior panelling promptly fell off with a clatter, spilling the contents of the side tray under his seat.

"Oh for the love of the first Grove!" Geneney wrenched the door open and surveyed the mess. "Blight take those weevil chewed, kaya fondling, over-officious wastes of space!" He counted to ten under his breath then, rather more gingerly, closed the car door again.

"Come on - let's go."

The grounds were quiet, even around the Probodyne complex. The receptionist at the main entrance took one look at them and waved them through into the laboratory block. Geneney ran his finger through a thin film of dust on one of the poster boards and sighed. Jeb raised his eyebrows.

"Just thinking about the first time we came here. Brand new research posters up everywhere, everyone piling out of the labs to see us, that poor technician practically falling at your feet." Geneney gestured at the board. "I remember some of those posters from the last management committee meeting and they weren't looking that fresh then."

The conference room door stood ajar at the end of the corridor. Geneney glanced at Jeb, squared his shoulders and pushed it open.

"Good afternoon, Geneney," said Ademone. "You made good time."

"Not too bad. We managed to avoid the worst of the checkpoints in the end. How about yourself and Nelton?" Geneney looked around. "Nelton is here isn't she?"

"She is," said a voice from behind him. "We're not long here ourselves, Gene. We would have arrived yesterday if every Seed inspector between here and Foxham hadn't decided to strip down and rebuild our car before letting us through."

"Tell me about it. Blithering idiots owe me a new driver side door." Geneney stalked over to the drinks table and helped himself to a coffee.

Lodan strode into the room. "Ah, Geneney, Jebediah. Did you manage to speak to Elton?"

"We both did," said Jeb. "Geneney and I were hoping to speak to you about that, Director."

Lodan gave him a sidelong look, stiffening in surprise at the earnest look on the other's face. "Certainly," he said. "I see...he...made quite an impression." He saw Ademone's raised eyebrow and made a snap decision. "You can brief us all as the first item on the agenda. Shall we make a start, good kerbals?"

Jeb waited until everyone was seated, took a sip of water and began. He described his first Communion, watching Ademone's expression gradually shift from skepticism to a cautious wonder. Nelton shot him a look of fierce approval as he outlined his, Geneney's and Patbro's discussions with Elton, carefully skirting around his final promise to them. Geneney gave him a tiny nod.

Then, as he sketched out Elton's history lesson, three very sober pairs of eyes stared at him across the table.

"...I mean it was the Kerm crisis he was describing. Which I knew about. But it turns out there's nothing quite like seeing the problem for yourself to really hammer the scale of it home. Mind you, I think Elton felt the same way about Starseed. Communing with him was an eye-opening experience all round." Jeb looked directly at Lodan. "We can't afford to stop the crewed program, Director. Gene and I were talking it over on the way here and we both agreed what the next steps are with the hardware but couldn't see any way to build or launch it." He gripped the edge of the table, knuckles turning white. "We need a plan, sir."

Lodan heard Ademone's sharp intake of breath. "Which is precisely what we're here to discuss," he said quietly. "Thank you, Jeb." He took a deep breath. "You will remember a certain meeting in my office. We discussed the Kerm crisis and the Council's plans to address it. You and I disagreed significantly on a number of points." Lodan turned to Ademone. "And I had a proposal for Rockomax which, as I recall, you thought was rather heavy-handed."

Faint creases appeared in the middle of Ademone's forehead. Then she sat up straight. "Haven't they been rescinded?"

"No. I spoke to one of my contacts in President Obrick's office - I shall not reveal names for all our sakes - and it appears that they both have legal force still." Lodan leaned back in his chair, favouring the others with a bleak smile. "Under Special Order 41 of the Council of Twelve Pillars, the Kerbin Space Agency remains tasked with overseeing a far-reaching expansion of all spaceflight activities. Under Special Order 42, its Director retains requisition powers on any necessary resources or personnel to enable that expansion."

Lodan lifted a warning finger. "As a practical matter, my ability to requisition is paper thin. If anyone chose to dispute it, I strongly suspect that both Special Orders would be annulled and the KSA Director would find himself behind bars for the rest of his natural life." Lodan spread his hands apart. "The Council takes a rather dim view of overreaching authority figures figures failing to execute their duties with appropriate transparency."

Jeb's expression turned stony. "I think Patbro would call that a boat-in-a-storm scenario, don't you, Gene?"

"If he didn't, Elton certainly would," agreed Geneney, ignoring the baffled looks from around the table. "What Jeb is trying to say, Director, is that if they send you down, they'll have to throw him and me into the next cells along."

"I appreciate the show of solidarity," Lodan steepled his fingers. "But not the lack of logic. If I'm arrested, I expect you and Jebediah to give all due assistance to any lawful authority." He saw Jeb lean across the table. "I would have your words on that."

To Ademone's utter astonishment, Jeb sat back in his chair.

"And I would have your word that you will succeed where I failed," Lodan continued.

A fierce grin split Jeb's face. "Yes, sir."

"A paper thin ability isn't the same as no ability," said Nelton bluntly. "What's the plan?"

"I fear that you're being over-optimistic," said Lodan. "At best I have an idea." The corner of his mouth twitched upward as he turned to face Jeb. "An idea that I borrowed from Jebediah."

Chapter 84

More Boosters

The grin disappeared from Jeb's face. "Me?"

Nelton glanced at Ademone, who was keeping her expression carefully composed. She leaned forward, picked up her glass of water and took a sip. "An idea you borrowed from Jeb," she repeated.

"Indeed," said Lodan. "He had a considerable amount of help with its execution of course." Lodan dipped his head at Geneney. "But I believe the original idea was his."

Geneney's face cleared. "The KIS?"

"Correct," said Lodan. "A group of students and enthusiasts who took a minuscule experimental rocket engine and, by dint of sheer dogged determination, turned it into a fledgling space program. Who managed to parlay their one successful flight into a whole audacious enterprise which succeeded in putting the first kerbals into orbit. A highly unlikely proposition on the face of it but, against all reason and probability it worked - because you were able to rally your fellow kerbals to your cause for little more than food, lodgings and their own chance to fly into space." Lodan leaned forward. "I believe we can do something similar again."

"Two successful flights," said Geneney faintly. "We did manage one all-up test before Kerbal 1."

Nelton made no attempt to hide her disbelief. "That's it? That's the big idea? The world has moved on, Director." She threw Geneney an apologetic look. "The KIS was an incredible achievement, as many former Rockomax kerbonauts would agree. But spaceflight is a business now and running it all on handshakes and shoestrings?" Nelton lifted her hands. "I don't see it."

Geneney downed the rest of his coffee and blotted his mouth. "Do we have any choice?" he asked. "Requisitioning isn't going to work and if we try restarting Starseed in the normal way, I'd give our good Director about half a day of liberty after the first bill lands on a Council desk." He shook his head. "Kerm knows how its all going to work KIS style though."

Jeb pinched the bridge of his nose. "We could run it down the supply chains," he said at last. "Start with the big contractors like Stratus, get them onboard first and take it from there." He looked up. "You remember Pioneer 1, Genie?"

"For lots of reasons. Which one were you thinking of?"

"The one where we were talking about rockets without capsules." Jeb turned to Lodan. "The night the Kerm crisis broke," he explained. "I was wondering who would care about spaceflight with their Groves going up in flames. Gene thought that plenty of people would, except that the rockets wouldn't be going so far and they wouldn't have capsules on top." Jeb's expression turned grim. "I decided that they could get those rockets from somewhere else. I figure most of our suppliers would still agree with me - and if they don't, they can take their business somewhere else!"

Ademone stirred. "I don't think we'll need to resort to that." She looked at Lodan. "You always do choose your words carefully, Director."

Lodan raised an eyebrow.

"Food," said Ademone. "Guarantee that and we'll have more volunteers than we know what to do with. Especially if we make it clear that the families of any volunteers get fed too." She drummed her fingers on the table. "Play up the saving the world angle for the idealists, convince the rugged individualists that *they*, and not the good-for-nothing, paper-pushing government are going to be doing the saving..."

"Keep the media out of it," said Jeb. "They're bound to pick up on it sooner rather than later but we don't put any official stories out. Right, Genie?"

Geneney nodded. "Keep it personal. Back in the early days we did all our flight planning in one of the local bars." He grinned at the expression on Lodan's face. "Well that didn't hurt. But mostly it let everyone in Barkton come and find us if they wanted, ask any questions they liked. Once we started flying in earnest, there was a pretty good chance they could come and meet some of the new kerbonauts too."

"Bob started up a weekly lecture series for the more serious folks," Jeb added. "We did a ton of outreach work, ran tours of the Space Centre - whatever we needed to do to keep the public on board."

"Including the part where Jeb persuaded Adelan to carry a pair of wedding torcs into orbit," said Geneney.

Lodan placed his cup back onto its saucer. "That," he said, "is a side of Jebediah's personality that I would hear more of."

"Nothing much to say," grumbled Jeb. "He was good lad, wanted to give his lady something a bit different for their wedding, and we'd more or less worked through the early problems with the booster. So I asked Adelan to carry his torcs on Moho 4. Bill engraved the couple's names on the backs - did a good job too."

"A suitably important contractor I presume," said Ademone.

"Actually no," said Geneney quietly. "Just someone we met at Jorfurt's one night. Said that watching the Moho 4 launch was the last thing he'd be doing before going back to his Grove to get married. I think his train ticket and those torcs were about all he had to his name at that point. Jeb promised to replace them if the originals... got lost." Geneney leaned back in his chair. "However, it turned out that one of the fellows on the next table over was a very big contractor indeed and *he* was suitably impressed by Jeb's offer."

Nelton shook her head. "Good story but you're crazy if you seriously think that a nice gesture or two will be enough to get Starseed back on track."

To her surprise, Jeb just grinned. "Crazy as a gronnek with its paw in a trap, as one old 'kerb told me once at great length. He was a great old guy - listened to everything we had to say but clearly didn't believe a word of it. That's okay, he was far from the only one - just a bit more open about it. We could respect that." Jeb looked Nelton in the eye. "Two months later to the day, we launched Moho 1. We made that work, Flight - we can make this work too."

"I'll believe it when I see it." Nelton caught sight of Ademone's warning look. "But as Geneney said..." She stared down at the tabletop for a moment. "Fine. You manage to sweet-talk the biggest crowd of volunteers in history - into doing what?"

Lodan leaned forward. "I believe Jebediah and Geneney have already discussed this between themselves." He looked at Jeb. "Would you care to share your conclusions?"

"Kerm - there it goes again."

"Thrust is dropping. C'mon engine - c'mon!"

James flicked a glance at the helium pressure gauge. The needle stuttered again then began a remorseless steady decrease. "Losing helium pressure, Flight - descent engine thrust dropping to match. How's that guidance update?" He turned to the kerbonaut standing beside him and mimed pulling a ripcord. Calley nodded and began tapping at her computer keyboard.

"Still convergent, Pioneer but it can't hold. Recommend mode 2 abort, minimum safe orbit."

"Copy." James' eyes darted from the engine readouts to his navball and back. "Heliu..." The master alarm shrilled in his ear. "Punch it, Calley!"

The lander cabin lurched under his feet, followed by a rapid-fire hammering from the RCS thrusters. The craters outside shot into view, oscillated for a moment, then settled.

"Engine armed! Ignition!"

James stared straight ahead through the cabin window as the ascent engine cover rattled under his feet. Beside him, Calley's eyes were locked on her computer display. "C'mon, c'mon....c'mon! You beauty! Got a periapsis, Flight. Few more seconds should do it... and shutdown!"

"That's a good burn, Pioneer. Bill - what have you got?"

"Descending to retrieval altitude on your mark, Flight. Burn program confirmed and loaded, CSM attitude is green. I have the checklist figures for circularisation once FD is on-loop."

"Copy, Bill."

"I can't be sure without the lander guidance data, Flight but I don't think our phasing will be much good."

"FD concurs, Bill. Let's get you down to thirty first and we'll take it from there."

For the next several hours, the cabin was filled with the steady cadence of kerbonauts reading off checklist items and confirming strings of numbers with the flight dynamics team at Mission Control. In the lander cabin, James and Calley helped with the calculations but could only listen to the flurry of activity from the command module that marked each of Bill's burns.

"Residuals nulled, Flight. I think that's done it."

"That's affirmative, Bill. Nicely co-elliptic and your systems are looking good. Okay team, let's call it there. Nice work."

James' navball froze and the cabin light over his head came on, washing out the luminescent glow from his instrument panel. He dug his fists into the small of his back and stretched, slipping his boots out of their restraining loops. Calley turned and opened the door behind her, blinking as she stepped out of the dimly lit simulator cabin, onto the floor of the Kerbonaut Training Facility. She twisted her helmet clear of its neck ring and set it to one side before peeling off her headset and running her fingers through her sweaty hair. Across the room, Bill was climbing out of a separate simulator.

Calley turned her head at the sound of footsteps behind her. "Hi, Tomcas. What's the verdict?"

"Not bad at all. Couple of things to go through but I'll be letting Gene know we can move onto the ascent and rendezvous aborts next week."

James began stripping off the outer layer of his spacesuit. "Good to hear, Sims - sounds like we're back on schedule. Any news on the capsule?"

Tomcas grinned. "Heat shield's been finished for a while, Jim. Last I heard, they had Bob and Camrie cooped up inside working through the post-installation electrics and environmental checks."

"The lander's looking just fine though!" said Calley, stripping off her own outer suit. "That rover fixed to the descent stage, all folded up as neat as you like. Can't wait to see how it goes on the Mün!" She caught a glimpse of Bill's face. "Kerm. Sorry, Bill - getting carried away with myself."

"No need to apologise," said Bill mildly. "I did mean it when I said that Munar orbit is good enough for me." His eyes lost their focus. "Besides, the science planning team finally approved the Quiet Time radio experiments. The chances against hearing anything are astronomical and I doubt we'd pick up anything anyway with the antennas we have but we can't get all the way out to the Mün and not try."

"Ohh, congratulations - which stars did they choose?" said Calley.

"Cherint Prime and Proxima Cherint. No surprises there. Nearest stars to Kerbol and both reasonably Kerbol-like themselves? It's where I'd start." Bill smiled. "A couple of the keener members of the planning team wanted me to try listening to Zyrix too, as our next nearest neighbour, but that would take too much time out of the observation and photography schedule."

Calley smiled back. "And I don't see them ignoring Kerbin's first kerbonaut photographer when he tells them that. That's a thought though - how much training did you do for Kerbal 1?"

Bill blinked. "There wasn't really anything to train for. I took my camera along in the first place because there wasn't going to be any piloting to speak of. The only controls in the entire capsule were the emergency hatch jettison and the manual backups for the decouplers and chutes. Bob taped the heights for drogue and main chute deployment next to the altimeter and the decoupler timings were just a matter of waiting for the engine noise to stop and pressing the right button if the automatic systems failed. No need to work from the flight clock even."

Tomcas clapped a hand over his suddenly rumbling stomach. "And it seems that *my* flight clock is telling me its lunch time. You folks want to grab something before the debrief?"

"Sounds good," said Calley, "I find that performance reviews are always best done on a full stomach."

The Pioneer 7 crew and Tomcas's simulation team arrived at the half-empty canteen just in time to find everyone standing up to leave amidst a great clattering of cutlery and scraping of chairs. Tomcas spotted Deryn squeezing past and tapped the chef on the shoulder. "Hey, Deryn - what's happening?"

Deryn glanced over his shoulder. "Oh - hi Tomcas. Jeb's called a general meeting. No idea what about."

"Jeb's called the meeting?"

"Yep. Surprised me too. Hardly seen him around the place for Kerm knows how long."

Tomcas waited for the canteen to empty before darting in and snagging a packet of ration cubes from their stand. He ripped the top off and stuffed one of the chewy, dark cubes into his mouth before hurrying after the others. They slipped inside VAB 1 behind the rest of the crowd, James closing the side door behind them. Tomcas saw Jeb standing on a makeshift podium with Geneney, Ademone, Nelton and, he was astonished to see, Director Lodan. A squawk of static stilled the room and Jeb hastily adjusted his microphone.

"Can everyone hear me at the back? Okay." Jeb cleared his throat. "Thanks for coming, folks. We've got a bit of an announcement to make, so rather than hold you up listening to me, I'm going to pass you straight across to Director Lodan and I'd ask you all to give him your full attention."

Lodan accepted the microphone from Jeb and surveyed the rows of faces staring back at him. *Here goes nothing.*

"Good kerbals - Kerbin has a problem." A stifled cough from the back of the crowd was the only sound to be heard in the vast assembly building.

"We all heard President Obrick's bold solution to that problem and we all know that solution has stalled in the face of worldwide events. I believe the time is right to get it back on track." Lodan paused. "I am therefore cancelling the Endurance 2 space station and replacing it with one that is better suited to our immediate needs. The new station - and I am open to suggestions as to what to name it - will be constructed from modules designed for the Starseed colony ships. At present those modules exist on paper only and paper modules will not get us to Duna. We need flight ready hardware and we need the manufacturing and supply lines to produce it in quantity. The new station will be our test program for all of that.

Bill nodded to himself as Lodan continued. "More importantly, construction of the new station will also be our test program for assembling the colony ships in space. As you'll be aware, on-orbit assembly on that scale is a challenge that the space program has barely begun to address thus far and represents an unacceptable failure potential for Starseed. Good kerbals - that failure is *not* an option. Now, before we get into the details, does anyone have any questions?

A forest of hands shot up. Jeb jumped down from the podium and handed over his microphone to the nearest questioner. Lodan listened, smiling humourlessly at her tone of voice.

"Indeed. Cutting right to the point then, I chose to make this announcement in Barkton for a reason. For the moment, Starseed will be critically dependent on volunteers. A vain hope one might say, were it not for the fact that we know it works." Lodan's gaze swept the crowd. "The Kerbin Interplanetary Society - all of you here today - are living testimony to that. Yes?"

Ademone stepped forward amidst a growing rumble of voices. "With the Director's permission, I also have an announcement to make." She waited for Lodan to dip his head.

"As of today, on behalf of my board of directors, I am hereby placing the entire facilities, assets and personnel of the Rockomax Corporation at Director Lodan's disposal. Moreover, as of today, the Rockomax board and senior management, myself included, wish to give notice of their volunteer status and will remain on that status until such time as the KSA sees fit to rescind it."

A faint smile crossed Ademone's face. "A long time ago, a bold kerbal persuaded me to join him in building the first cooperative project between Rockomax and the Kerbin Interplanetary Society. That project was the CORDS program and it proved that two radically different organisational cultures could work together for their common good." The light caught Ademone's face. "The CORDS program was the first step on the road to Pioneer 4. For as that same bold kerbal told me; what matters is that we *tried*. What matters is that future generations will be able to look back at a time when we were magnificent."

Ademone bowed her head then looked up, steely eyes radiating determination. "Rockomax stands with the KIS again. Together we *will* make this work."

A tight look of approval crossed Bill's face at Ademone's words but, as the questions from the crowd continued and the scale of Lodan's plans became clear, his heart began to sink. Mentally, he began adding up the number of launches needed to build the new station, a cold certainty settling over him like a cloud. He looked at Calley and saw the same cold certainty and resignation in her expression. James's face was unreadable. Bill mimed pulling a ripcord and both his crewmates nodded slowly.

"...that's correct. Most of the volunteers won't ever get near the spacecraft they help to build. Theirs will be the hard, unglamorous work of reforging the necessary chains of trust between companies and kerbals around the world. We expect - and Kerbin requires - no less of them..."

"...Not immediately. Restarting R7 development will happen but the immediate priority will be to accelerate Type 6 production to meet the demand for more boosters." Lodan saw a lone raised hand near the door and craned his neck trying to spot its owner. "Yes?"

"We can help with that, Director."

Jeb froze. *Oh Kerm take us all*. Surprised murmurs rippled through the crowd. From the podium, an astonished Lodan watched a parting wave flowing from the back of the assembly floor, row after row of figures stepping aside to let the *Pioneer 7* crew through. Bill cleared his throat.

"We've got two spare boosters here that you'd be welcome to use."

The cavernous assembly building fell utterly silent. On the podium, Geneney and Ademone exchanged startled glances and Lodan's normally imperturbable expression slipped a notch. He raised his eyebrows at Geneney and was answered by a slow nod.

"The offer is appreciated, Bill. Your crewmembers - may I ask...?"

"We're with Bill," Calley called out.

“Bill speaks for us all, Director,” James’ quiet tones carried to the far corners of the crowd.

Lodan opened his mouth, then closed it and shook his head. “Then I accept your offer, Pioneer 7... I accept it with heartfelt thanks.”

Elton sighed to himself, flexed his leaves, and slipped his fibres through the invisible zones of toxins that marked the boundary between his territory and Jonelle’s. Immediately they began to tingle, then burn with a prickling heat, the sparks marking Jonelle’s defensive echelons of soil-borers making glittering beelines for him. His own sparks twitched in response, momentarily lured by a trickle of pheromones that he couldn’t quite suppress. As always, his instincts flared, skeins of microscopic nodules along his fibres swelling, poised to unleash their own chemical arsenals on the intruders. Then Gerselle’s face swam before him, pale and unmoving, and the nodules subsided.

Elton pressed on through the rapidly intensifying barrage, ignoring the scorching lines of fire cobwebbing across his outer roots and steering directly for the heaviest concentrations of effectors and counter-toxins that revealed Jonelle’s own fibres. The ripping jolt as he brushed against them flattened every root hair for kilometres around, a boiling fury that clawed at his mind even as the second wave of beetles clawed at his own effectors. He held his ground, letting Jonelle rage at him, projecting calm reassurance in return.

As always, the assault grew too much to bear. Elton held out a last, lingering image before breaking the link and making an orderly, stepwise withdrawal. At each step he paused, nodules leaking out just enough of their contents to reveal a glimpse of his own potent weaponry. The thin trail left, or so he hoped, the unmistakable message to Jonelle that this retreat was no sign of weakness but a deliberate decision not to fight. As his scarred and burning fibres pulled back into the cool, damp earth of his own territory, he hoped for both their sakes that his message would be heeded this time.

Enely trudged across the yellowing and wilted village green, grocery bags swinging at his side, trying his best to ignore the angry comments following him. Transferring both bags to one hand, he waved at a huddle of suspicious-looking villagers, who watched him go by before turning their backs on him.

As he drew closer to Gerselle’s hut, yellow grass turned to brown, dotted with sickly, mildew-dappled flowers. The gardens around the hut, once decked out in bold primary colours that only a kerblet could love, was in equally bad shape. Stringy knotweed mats ran riot, broken by clumps of hookwort that were slowly but surely gaining a foothold around the larger bushes. Enely stopped to inspect one of them, noting the aphids crawling over the brown-tipped leaves. He glanced up at the pristine Kerm branches overhead and frowned.

The door swung open with a squeal of un-oiled hinges, eliciting another sigh from Enely. *One more task to add to the list.* Pulling off his boots, he walked over to the kitchen

counter and began unpacking the groceries before the muffled voices from inside Gerselle's sleep room caught his attention. Frowning, he stepped lightly over to the door, threw it open and was confronted by a defiant Joenie and a guilty-looking Adbas.

"Come on, Joenie. You know you're not meant to be in here."

Joenie scowled at him. "Came to see Mummy." She scuffed her feet against the floorboards. "I'm bored. Everyone runs away from me outside."

"Please tell me you haven't been talking to Jonelle, Joenie. You know you promised Jont... daddy, that you wouldn't do that." He was answered by a long-suffering eye roll.

"Course not. I told you - we just came to see if Mummy had woken up."

"Joenie didn't do anything, Mr Enely," said Adbas earnestly. "I'd make sure she didn't."

I don't think you'd be able to stop her, young one. Enely hid his amusement behind an approving expression, carefully ignoring Joenie's mutinous look. "I know you would, Adbas - thank you."

Adbas grabbed Joenie around the waist in a sudden, clumsy hug. "Maybe your mum will wake up tomorrow, 'Nie."

Joenie blushed dark green and threw a mortified glance at Enely. *"I told you not to call me that in front of the grownups!"* she hissed at Adbas. *"Come on - let's go!"*

At that moment, Meleny emerged from the moss room, narrowly avoiding being bowled over by the fleeing kerblets. Enely kept his expression carefully neutral until they were out of sight before turning to Meleny with raised eyebrows.

"I heard them," she replied. "She's sensible enough not to try anything and Adbas would stop her if she did. Try to stop her," she amended.

Enely nodded. "Did you know that Adbas has a special name for her?"

Meleny chuckled softly. "Nie you mean?" She saw Enely's expression and rolled her eyes. "They're *kerblets*, Enely. Did you never have a nickname when you were young?"

"No, never." Enely looked slightly abashed. "Amongst the Hazachim, such things are...personal between newly-weds, or soon-to-be-weds."

"Well they're both far too young for that, although I'm pretty sure Adbas is soft on her." Meleny glanced at the clock. "Anyway, it's time you were speaking to Jonelle - I'll leave you to it."

"Thank you." Enely waited for Meleny to leave the room before lying down on the spare bed. Shivering despite himself, he glanced at the floor around the bed, remembering the eruption of hideously transformed healing vines. Then he lifted his head up to the waiting leaf cluster.

Hello, Jonelle.

<Enely> The young Kerm's voice was flat. *<I want to talk to Joenie, not you>*

I'm sorry, Jonelle. I think Joenie wants to talk to you too but you know I promised Jonton not to let her. I could get Patbro to talk to you again if you like?

<Don't want Patbro. I want Joenie. Want Gerselle more but she isn't here. Don't think she's coming back>

Sorrow chased away Enely's frustration. *I want Gerselle to come back as well. The Communion link made any platitudes meaningless. But I don't know if she ever will.*

<I will keep her alive but I will also talk to Joenie. Now>

Enely's mind reeled under the blow. For a moment there was certainty and a fleeting puzzlement. Why *shouldn't* Joenie be allowed to Commune with Jonelle? In fact why wasn't she already Communing? He felt his legs swinging sideways off the bed, eager to obey. Then his mental barriers, honed from constant use, snapped back into place.

Please *don't do that, Jonelle*. He sensed anger and frustration followed by a wheedling slyness.

<not talking to Joenie makes me sad. I can make all the kerbal plants sick when I'm sad. Lots and lots of them, not just the ones by my roots>

No! Alarm spiked across the link followed by a torrent of images. A team of chainsaw wielding kerbals cutting down Kerm trees, their heavily padded protective suits and bubble helmets impervious to the needle-tipped vines lashing at them. Terrified kerbals fleeing as Jonelle's own vines erupted around Gerselle's bed. The same kerbals, fear and anger in their eyes, watching him walk past. *The kerbals are already frightened by you, Jonelle. If you hurt the plants they'll be frightened enough to kill you.*

A stunned silence echoed around the mindscape.

<I am Kerm. It is right that kerbals should be afraid of me> Confusion rippled down the link to Enely. *<but not Gerselle. That would not be right. Or Joenie.>* Unseen, the ground began to bulge around Enely's bed. *<I protect Joenie. I don't want her to be afraid>*

I know. Enely did his best to project sympathy and reassurance. *I know it's confusing and I know somebody who can help you*. Before he could shape his thoughts around Elton's name, the mental image gave him away.

<No! Not the big Kerm> Jonelle's mental tone turned savage. *<Big Kerm keeps attacking me but I am stronger! Tell it to stop. Keep away from me, stop showing me stupid picture!>*

Picture? said Enely in surprise. *What picture? Can you show me, Jonelle?*

The mindscape cleared. His own mental image of Elton appeared: an ancient Kerm on a hilltop, the elaborate, multi-story hut around its trunk sheltered by sparkling branches. The image drew closer, revealing a shimmering gauzy fabric draped over them. Then it drew closer still and Enely saw that the fabric was made up of thousands of silverlace butterflies, shining in the dawn sun.

Chapter 85

Family Tree

Enely frowned at the silverlace in confusion. Then his jaw dropped. *Sweet Kerm above... Oh I'm sorry, Jonelle, not you.* The sudden flare of pain in his lip and the salty taste of blood in his mouth barely registered. *Butterflies*, he murmured under his breath. *Jonelle, does Elton - the big Kerm - ever say anything else?*

<no. Nothing else. Just the stupid picture, then I scare it away.> Jonelle paused <what are butterflies?>

Butterflies, said Enely. *They're the little creatures on Elton's branches there but I'm not quite sure what he's trying to say. He's showing you a picture of Joenie's birthday present from Jonton*, he said, half to himself, *does he want to talk to Joenie?* The mindscape flickered as Enely shook his head, tugging at the leaf hairs embedded in his scalp. *That can't be right - he'd just ask Patbro to send a message next time they Communed. Maybe he's trying to send you a birthday present, Jonelle - but why choose one that only me or Joenie would recognise?*

<what is a birthday present?>

Hmmm? Oh - kerbals like to celebrate the day their kerblets - their small kerbals - were born by making them toys or giving them other nice things. It was a few years ago now but Jonton... arranged the butterfly tree as a pretty surprise for Joenie.

<Joenie is Jonton's kerblet?>

Startled, Enely turned to face Jonelle's presence. *Yes of course - did nobody tell you that Jonton's her father?* He sensed the Kerm's confusion. *Do you remember what I told you about mummys?*

<yes. They look after the kerblets>

That's right. Well another word for mummy is mother. And along with their mother, most kerblets have a father too.

<why?>

Well it takes two kerbals to... Enely coughed. Never mind - they just do. But just like mothers, fathers look after their kerblets too and give them birthday presents. A blast of cinnamon assaulted his nostrils.

<if the big Kerm is trying to send me a birthday present...is it trying to be my father?>

Images flickered past: Gerselle holding a mottled yellow and brown gourd; a group of kerbals wearing robes and backpacks, standing on a rocky slope; a pair of hands scooping a shallow pit in a patch of gritty soil and placing the gourd in it; Gerselle tamping soil over the gourd before sprinkling water over it. *I hadn't thought about it like that before*, Enely said slowly, *but you grew from his seed pod so yes...yes I suppose in a way he is your father.*

The mindscape heaved, blowing Enely's image of Elton into a thousand glittering fragments.

<NO> NONONO <not right! Not my father! Big Kerm fight me - I fight back! >

Jonelle! It's alright - it's alright! How did Elt... the big Kerm fight you? Did he hurt you?

The mindscape turned pitch black, incomprehensible streaks and whorls of multicoloured light firing back at him, drowned in a torrent of fear and raw anger. Sparks ripped by him, swarming against an relentless intruder more sensed than seen. Buffeted and bruised, Enely clung on to his vantage point, Jonelle's presence expanding all around him. Another wave of sparks rippled past fanning out into twisting streams that coiled around hundreds of invisible *somethings* in a cobweb of brilliant motes. And at last, he saw.

Jonelle - stop! All the sparks are yours - the big Kerm isn't fighting back! Whatever he's showing you the picture is for, that's all he wants to do.

<big Kerm in my soil. Doesn't need sparks to make a fight!>

Enely's mind raced. *Let me help you! I'll talk to Elton and tell him you've seen the picture, that he can stop invading your soil.* He cast about for anything to calm the enraged Kerm. *I'll talk to Jonton too and ask him if Joenie can talk to you!*

The mindscape froze.

<I can talk to Joenie?>

I don't know. I need to talk to Jonton first but I promise I'll ask him. If you let me go, I'll go right now.

The leaf hairs whipped free of his scalp. Enely collapsed against his pillows, a thin trickle of blood leaking from one corner of his mouth.

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Jonton sat up in bed and eyed the large paper bag in Enely's hand with keen anticipation. His friend drew out a large bunch of sunfruit with a flourish and laid them on the bedside table. Jonton tore off a handful of berries and stuffed them into his mouth, a blissful smile lighting up his face. Grabbing a tissue he dabbed the juice from his chin and swallowed, before helping himself to another berry.

"Ahhh. You would not *believe* how much I've been looking forward to some fruit - thanks, Enely. Hospital food isn't as bad as it's cracked up to be but it's definitely been light on fresh produce lately."

Enely decided not to trouble him with details of Jonelle's threatened blighting of the Grove crops. "Last of the season," he said. "You were lucky I managed to save some." He studied Jonton's face, noting the puffy, still-darkened flesh around his eye and the line of scabbed-over puncture marks running from temple to nose. "You're looking better than when I last saw you."

Jonton yawned. "Sorry. Yes - the punctures have been properly closed for a couple of days now but this finishing course of anti-venoms makes me awfully sleepy. I expect Dr. Altop will be here soon to chivvy me out of bed for an hour." He popped another berry into his mouth and gestured at the window. "You couldn't put these over there could you? Otherwise I'll just lie here and munch the lot."

Enely arranged the remaining sunfruit in the fruit bowl on the windowsill before pulling up a chair beside Jonton's bed and perching on the edge of it, hands knotted together in his lap. Jonton looked at him soberly. "No news I take it? How's Joenie doing?"

Enely forced a smile onto his face. "Adbas is looking after her." He saw Jonton's raised eyebrows. "I caught the two of them in Gerselle's room - the young lad assured me that he wouldn't let Joenie talk to Jonelle. Not in so many words of course." He raised a finger at Jonton's rapidly darkening expression. "Meleny was keeping an eye on them too."

"Well that's something." Jonton muttered. "How about Jonelle. How's she doing?"

Enely stared at his hands. "Badly," he said. "She's missing Gerselle and still keeps wanting to Commune with Joenie instead. Patbro was a good distraction for a while but then he mentioned Elton and that was the end of that." He looked up. "The garden's in a sorry state and the village green is going the same way. Which isn't encouraging the neighbours to visit."

Jonton saw the shadows behind his friend's eyes. "Has anything happened?" he asked.

"Joenie's getting the worst of it," said Enely. "None of them let their kerblets get anywhere near her. Pillars preserve Meleny - without her and Adbas around, I don't know what we would have done." He sighed. "The neighbours have made it quite clear that I'm about as welcome as speargrass in the malkaball field too but I'm old enough and ugly enough to handle it."

"That doesn't make it any easier though," said Jonton. "Pillars preserve you too for shouldering it all." He rubbed his eyes. "For what it's worth, they're good people but they've

been through a lot. Starting with a wrecked prickleberry harvest and..." The sudden tightening around the other's jaw stopped him dead. "She hasn't..."

"No," said Enely, "but she's threatened to unless she gets to Commune with Joenie." He forced himself to look Jonton in the eye. "They'd kill her wouldn't they?"

"And Gerselle with her." Jonton held his head in his hands. "I don't know - I just don't know. Right now I think they're still too frightened of the vines to do anything but if the crops start failing on top of everything else... What's your expression about mallek backsides and cactus spines?"

Enely didn't reply. "There's one more thing," he said eventually. "Elton's been trying to - talk to her I guess, or whatever the Kerm do instead. And I think he's trying to send you a message too." He told Jonton about the silverlace tree and his conversation with Jonelle. "Which didn't go well. In fact it's why I came to visit again so soon - I promised I'd ask you..."

"To let Joenie Commune with her?"

"Yes." Enely hesitated. "I don't think she'd hurt her, Jonton. Not deliberately. She wasn't at all concerned about frightening everyone else but she was protective of Joenie." He swallowed. "If she can't be with Gerselle then I think she wants to be with Gerselle's daughter instead."

Jonton's expression turned stony then sagged in bitter resignation. "No choice," he muttered to himself. "And the Pillars preserve me for it." He looked at Enely. "Do it. But I want you there too to protect them both - and to persuade them to Commune with Elton." He saw the skepticism in Enely's eyes. "*He* wants to Commune with *them* - that much is clear, although I don't know exactly why." He gestured at the room around him in frustration. "I need to get out of here and talk to him."

The door opened and Dr Altop bustled in. He glanced at Enely. "Good - you can keep him company. Make sure he gets a proper hour of exercise."

Jonton noted the doctor's rumpled white coat and lined face. "Actually," he said. "I'm feeling well enough to go home, I think. I'm sure Enely would make sure I got there in one piece."

"Don't be absurd." Altop inspected Jonton's scabs. "This is the first time all week that I haven't needed to wake you up for your afternoon walk. He frowned. "And if you think I'm letting my test subject out of my sight when..." He sighed. "Never mind."

A chill ran down Jonton's spine. "You're treating more of them aren't you? More Kerm-stung I mean."

"I am," said Altop tersely. "And I need to get back to my other ward, so I think we'd better stick with our normal routine today if you don't mind." He saw the silent desperation in Jonton's eyes and his expression softened. "Maybe for the weekend, if you're still improving by the end of the week."

"But I need to Commune with..." Jonton's voice tailed away. "Maybe he could help. If there's any venom left in me, maybe he could treat it..."

"Are you *completely* out of your mind?" snapped Altop. "Or have you just forgotten about your first examination?"

"Elton would be different." Jonton sat up, bedcovers falling away from him. "I could talk to him first, let him know what to expect - he wouldn't panic like your Kerm! Please, doctor - I can explain everything." Jonton launched into a hurried summary of his conversation with Enely. "So you see," he concluded, "it's for all their sakes, but especially..." His voice tailed away and he gave Altop a pleading look.

The medic dropped onto the spare chair and fixed Jonton with a brittle stare. "You know," he said conversationally. "If I was new to all this, I'd be taking you - very gently - along to the Blight trauma ward about now. I understand that our standard sedative causes very pleasant dreams. Fortunately - or unfortunately for me - I'm not new to it." He rubbed his eyes. "And you do appear to be healing at last."

Jonton crossed his fingers under his bedcovers as Altop ran his fingers through his hair. "Oh Kerm take it all. Very well - I'll arrange to have you discharged for care at home. On two conditions." Altop held up a finger. "One - that you book yourself in for a weekly check-up until I'm convinced that you're fully recovered." A second finger joined the first. "And two - if Elton is able to treat you, that you promise to ask if he would be willing to help with our most desperate cases."

Jonton swallowed hard. "I will and I do," he said. "I can't promise that he'll agree to help but I can promise to ask him."

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Head down, Enely walked across the much-recovered village green, oblivious to the scattering of kerbals watching him go. A splash of colour caught his eye as he approached the hut and he stopped to squat down by a lopsided square of newly planted star poppies, smiling at the sight of Joenie's little wheelbarrow and her trowel stuck in the soil beside the flowers. He leaned over and tugged at a straggle of browning knotweed, nodding in satisfaction as it pulled free of the ground, a long, rank root emerging behind it. He tossed the dead weed into the wheelbarrow and continued on his way.

Inside, he found Meleny watching over Joenie, Adbas on the floor by her feet working on a jigsaw puzzle. He jumped to his feet at the sound of the sleep room door opening. "Hi, Mr Enely!"

"Hello, Adbas," Enely looked at Meleny. "Any problems?"

"None," said Meleny. "No cinnamon, no drooping branches, thrashing branches, or anything. And Joenie seems quite happy too." She sighed. "I think it's doing them both good to have somebody to play with."

Enely thought back to the gardening tools by the star poppies. "Yes," he said. "I know Joenie used to enjoy Communing with Jonton when he was an-Kerm, so I suppose Communing with Jonelle is even better - like talking to a friend rather than talking to her father." A pensive expression crossed his face. "In some ways, Jonelle is very much like a kerblet."

"Complete with temper tantrums," said Meleny with a shiver.

Adbas looked up from his jigsaw. "I want to play with Jonelle too, Mummy."

"I know you do, sweetheart but we don't want to scare her by letting too many people talk to her at once. Maybe when she gets a bit older."

Enely saw Adbas's face turn sulky. "Your mum's right, Adbas. I tell you what though - it's almost time for lunch and after that I think it's time for Joenie to play with her other friends instead." He patted the kerblet on the shoulder before walking over to the spare bed and settling himself under the waiting leaf cluster. White light engulfed him and the sounds of giggling drifted past his ears.

<hello, Enely>

Enely! Do you want to play the creepy bug game too?

Enely blinked. *What game is that, Joenie?* As if in response, the light swirled away and he found himself plummeting towards a lopsided square of rippling colours amidst a washed out pastel blur.

There's another one there!

It was all Enely could do to fight off his sudden bout of motion sickness. The mindscape wobbled disconcertingly before swimming into focus, the washed out pastels flashing into a migrainous spike of colour before subsiding again. For a second he sensed Jonelle's increased concentration.

And another one! Get it, Jonelle!

<I do not need to. These plants fight back>

Enely watched rings of silvery speckles fanning out from a myriad of unseen points, criss-crossed by darker flecks. A diffuse swarm of blue sparks began to coalesce around the speckles, slowly but surely homing in on the flecks. He stared through them, deliberately letting his mind drift then, as before, he saw. Roots under attack by...something and exuding...something else to lure protectors to them.

<you must find this fighting plant. More of it will help clean the soil near my roots>

Clean up the mess that you made said a tiny voice in the back of Enely's mind. He felt Joenie's frown as she studied the projected image of her poppy patch.

'kay. I'll find it. Enely will help me, won't you, Enely? Joenie's mental voice brightened. *I've been helping Jonelle find the bad bugs in my garden, so she can kill them with the good bugs! She sensed Enely's bemusement. It's fun - you'll see!*

I'm sure it is, Joenie but it's lunch time now - Adbas and Meleny are waiting for us. Enely paused. Has Elton tried to talk to you?

The mindscape snapped back to a uniform white light. *<no. Big Kerm hasn't come back>*

I know, said Enely gently. *Jonton asked him to stay away from your soil.* The weight of Jonelle's sudden puzzlement pressed against his mind.

<Jonton tell big Kerm what to do?>

Yes. He promised me that if you let Elton talk to you that he would be there to make him go away again if you started to get scared.

<this is very strange. Big Kerm doing what kerbal says> There was a long silence. Enely felt Jonelle's presence withdrawing before sidling back again. A sly thread of thought brushed against his mind.

<I talk to big Kerm but only if Jonton and Enely and Joenie are there too>

Of course. Enely kept his mental tone deliberately casual. *Jonton will want to catch up with everyone anyway. But now - it really is time for us to eat. Could you let us both go please, Jonelle?*

<he comes>

Jonelle's mental voice was tense. Enely sensed the flicker of shared nervousness between the young Kerm and Joenie and imagined himself putting his arms around them both. The image of a kerbal with its arms wrapped around a Kerm trunk made Joenie giggle, and the tension eased slightly.

<he comes>

Enely steeled himself before projecting reassurance with all the conviction he could muster. *It's alright, Jonelle - he's not here to fight. He just wants to talk.* He felt the first faint flickers of another awareness at the fringes of Jonelle's mindscape. The awareness expanded, acquiring definition and familiarity and then stopped. A second awareness came forward, as if out of a wall of mist. Joenie's presence darted past him with a cry.

Daddy!

A flurry of images and emotions lit around them, quicksilver bright, whirling past too quickly to follow, before settling on an image of Jonton hugging his daughter. Enely caught snatches of laughter amidst the salty tang of tears. The misty wall at the edge of his vision seemed to absorb the outburst, its steadying presence maintaining a discreet distance. With a final squeeze, Jonton released Joenie and turned to face Jonelle with a respectful bow.

Jonelle. Thank you for looking after Joenie for me.

Jonelle was silent. Enely sensed her confusion and sudden shyness, followed by a sudden flicker of alarm as the wall of mist began to fade. All three kerbals instinctively reached out

to her in reassurance. The last tatters of mist swirled away, revealing a vast, tranquil mindscape bordering Jonelle's yet still separated by a thin black line.

<I also thank you for looking after the daughter of my first of Keepers>

A sapling sprouted from the black line, growing at an impossible rate. A gale of wholly alien emotions buffeted the emerging Kerm tree, its branches creaking and swaying under the onslaught and in the process, damping it. Then the branches shimmered under a sudden cloak of silver-winged butterflies and the gale abruptly blew itself out.

<daddy?>

Lightning flickered around the edges of the second mindscape accompanied by a fleeting wave of surprise. *<I had not thought so in kerbal words but you speak truth...my daughter?>* Elton seemed to gather himself *<Yes, Jonelle, I am...daddy>*

Elton turned to the dumbfounded kerbals. One of the butterflies flew over and perched quivering on Joenie's hand. *<I would be happy to talk more, Joenie>* The Kerm smiled. *<but for now, I would ask you to leave us, my friends. My daughter and I - we have much to discuss>*

Chapter 86

White Cross

Erlin walked up the steps to the Berelgan manor house, rubbing his head as he went. *Definitely less itchy this time. Either I'm toughening up or it's getting better at Communing.* He made his way through the maze of corridors to Halsy's lab and found his deputy perched on a lab stool in front of a large monitor.

"Morning boss. How's the Kerm doing?"

Erlin peered over Halsy's shoulder at the chromatograms on his screen. "Still working on the amoebae?"

"Yup. I think we nailed it with that last attractant set. One more run and we'll have enough for a paper. The cross-checks from Lowig's lab look pretty good." Halsy pushed his stool back. "And you're dodging my question."

Erlin sighed. "It's doing fine as far as I can tell. Have you got time for a coffee?"

"Sure."

Halsy maintained a tactful silence on the way to Erlin's office. Frowning, he watched the Berelgan director flip the privacy sign on his door to Do Not Disturb, before pouring two coffees. "One sugar?"

Halsy raised his eyebrows. "Uh-huh. Come on, boss - what's eating you?" His eyes widened as Erlin unlocked the glass fronted cabinet on the wall next to his desk and removed an antique brass key. "Uhhh, boss?"

"There's a traditional speech I'm supposed to give," said Erlin. "But I haven't really had time to learn it, and to be perfectly honest, you've been running the place for long enough now that you don't need any overblown words from me. So here's the short version." He held out the key. "I, Erlin Kermol, Director of the Berelgan Research Institute do hereby resign my post and responsibilities. I offer the key to the original Archives of Kerbin to my deputy,

Halsy Kermol, in the earnest hope that he will accept them in my place.” Erlin made a face. “And that’s the short version.”

Halsy gave him an uncertain grin. “Good one, boss. That Kerm’s...” He stopped at the expression on Erlin’s face.

“I’m going to call in Obrett - from the Accident Investigation Department - to Commune with our grown-from-frozen Kerm. I’m no Keeper, Halsy. It seems fine to me but I don’t have anything to compare it with. Apart from Elton of course but he’s quite different.” Erlin rubbed his jaw. “I’ll be calling in Gusemy too. He’s a good friend - and he knows Obrett of course, which will help I think.”

“Boss. If you’ll excuse the expression, what the Kerm are you talking about?”

Erlin’s expression was unreadable. “A plan. And if the Director of the Berelgan would extend me a favour, I’d very much like to run through it with him.”

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Jeb drained his glass, pushed back his chair and walked over to the bar. Helping himself to a handful of crispy greenleaf stems from one of Jorfurt’s well-stocked snack trays, he perched himself on a stool and waited to catch the landlords’s eye. Further along the bar a group of kerbals were calling orders for food and drinks. Jeb winced at one request for a creva chilli with extra firewhisker in the rice, before a call for a round of RT5 caught his attention. He looked over at the group, noting their dark green jackets emblazoned with the logo of a prominent local haulage firm. Nodding in satisfaction, he dipped a greenleaf stem into the spice bowl and took a bite.

“What’ll it be, Jeb? Same again, or can I interest you in something a bit different?”

Jeb glanced at the group of hauliers but they either hadn’t heard the landlord or were too busy with their food to notice. “Something different but not too strong if you don’t mind, Jorfurt.”

“Not too strong, hmmm? Well, since you boys haven’t been building any new engines lately, I figured I’d start a new Rockomax line.” Jorfurt gestured over his shoulder at a row of barrels. “Doesn’t sound like you want a mug of 1P or 2M then.” He reached under the bar for a coffee cup and filled it half full of a foaming ruby ale from the first, much larger, barrel in the row. “Give the 1G a try. The first couple of brews were nothing to much to write home about but I think we’re about there with this batch. Just a hint of blackberry to balance out the sunfruit and a slightly darker malt to give it a bit more body.”

Jeb sniffed at the foam. “Mmmm, you notice the blackberry.” He sipped the beer, rolling it around his mouth before emptying the cup with a happy smile and wiping his mouth. “I don’t have Genie’s palette but I reckon you’ve got a winner there! A mug of 1G it is please.”

The bar began to fill up. Jeb ordered a bowl of *djan* chips and sat nursing his drink, chatting with a steady stream of kerbals who came over to greet him, whilst keeping half an ear on the other conversations filling the room. He took another sip of beer and was somewhat

surprised to find an empty mug in his hand. As he set it down on the bar, Jorfurt materialised in front of him.

"Mug of LV-1 to finish the evening, Jeb?"

"Bob might take you up on that but I think I'll pass on the root beer right now thanks." Jeb smacked his lips. "I think I could go another half mug of 1G before curfew, without losing my wits. That blackberry finish really works."

"Sounds good to me. Make that two half mugs please, Jorfurt." Bob slid onto the stool next to him. "Gene's on his way, Jeb, assuming he can extract himself from his group of grumpy farmers."

Jeb cocked an eyebrow at him. "Over-inspected and under-staffed farmers?"

Bob took a *djan* from Jeb's bowl. "Yep. One kermol swore he'd never be growing redfruit again if the blithering idiot - or words to that effect - inspectors were going to make him empty out his entire truck one fruit at a time."

Jeb looked thoughtful. "Patbro said something similar about his white bean crop but then he had the bright idea of unloading them through a fencing wire sieve. You could probably do something similar with grains and such like."

"So we're going for the fruit and veg growers then." Bob took a pull of beer. "Mmm, you were right about that finish." He shook his head. "Sorry. Yeah, fruit and veg growers, or anyone hauling anything much larger than a breadfruit."

"That should cover tubers then. Fine - we can work on the cereal guys later, once we've been out there for a bit. Evening, Genie."

"Evening. Mug of RT5 for me, Jeb, next time you catch Jorfurt's eye."

Jeb grinned. "Rough time with the kermol?" He slid his drink over to Geneney. "Try before you buy?"

Geneney took a cautious sip from the proffered mug. "Mmmm, that's not bad." He took a larger sip. "That'll do nicely in fact. Blackberry and redfruit?"

"Yep. One of Jorfurt's latest." Jeb affected a mock indignant look. "From his Rockomax line no less. This is the 1G - apparently the 1P and 2M are a bit more substantial." Jeb spotted Jorfurt bustling past and held up a coin before pointing at the first barrel in the row. "So it looks like there's a market for our little plan then?"

Geneney nodded. "I would say so." He was interrupted by a large, green-jacketed kerbal weaving his way towards them.

"Heeyyyyy - its the interplanetary boys! Jeb, my kerb - how are ya?!" The newcomer attempted to clap Jeb on the shoulder but only succeeded in stumbling sideways into Geneney and narrowly missing Bob's mug with one flailing arm. Geneney offered the stranger a steadying hand whilst Bob removed his drink to a more prudent distance.

"Ahh, thank you my friend!" The newcomer peered at Geneney, brow knotted in concentration. "Say - aren't you that Geneneneneny fellow? I've seen ya on the TV, sitting behind that fancy desk with all the shiny buttons on."

"Hoy, Len! Quit bothering those folks and get this mug of water into you before you make a bigger fool of yourself." Another green-jacketed kerbal strode towards them, coming to a sudden halt as he caught sight of Bob. "Great Kerm above - haven't seen you boys in here for an age. Thought you were all busy getting us set for flying out to Duna?"

Bob made a face. "Wish we were. Need to build something to fly first and getting all the parts for that with transport the way it is right now..." He shrugged and reached for the snack tray.

"You getting caught up in that grolnisch too?" The other's face darkened. "We've got produce rotting in the trailers one way and goods backed up back to the blighted port the other way. Trucks are needing extra maintenance, they've been taken apart that often."

"I hear that," Geneney put in sourly. "Close the door too hard these days and half my car falls apart. Kerm knows what'll happen if I hit a decent pothole."

"What are the haulers doing about it?" asked Jeb.

"Not much to do. More hands would be a start; quicker the inspections get done, quicker the goods get moving. Can't hire them for love or money though, seems they're either joining up or heading for the hills."

"How about volunteers?" asked Bob, through a mouthful of jerky. He was answered with a snort.

"That would be right. Who the hell volunteers to sort through rotting cabbages by hand, looking for Kerm seeds?"

"Good point." Bob inspected the bottom of his mug.

"Anyway - we'd better be getting this one back home before he starts tripping over his own feet. Good to see you folks."

"You too," said Geneney. He clapped Len on the shoulder. "Take it easy, friend."

Jeb stood in the doorway scuffing at the already-worn floor covering with the toe of his boot and watching a familiar truck pull up in the car park outside. Two kerbals jumped out and began unloading the long, flat packages lashed to the back. The grumbling wheeze of tailgate hydraulics reached his ears and he smiled despite himself, remembering a much younger Calzer and Tomcas unloading kegs for a long ago beach party. He leaned against the door frame for support, eyes losing their focus as the rest of the evening came back in a rush: Ornie gesticulating at distant kerbals, explaining the rules of shepherdball, Ornie squatting by the barbecue pit, trickling spicy sauce over meatcakes. Bob's singing, a blurry image of the bottom of a beer mug, bitter reminiscences with Ornie's the voice of reason.

Jeb wiped the corner of his eyes, forcing a cheerful grin onto his face as the two kerbals staggered past, lugging a slab of cardboard packaging between them. "Wait up - I'll get the doors!" He squeezed past into the bare reception area and swung open the double doors leading into the main building, kicking a door wedge under each. The cloying smell of new paint mingled with the sharp, resinous odour of fresh sawdust enveloped them all amidst a clamour of sawing and hammering. A radio played a raucous tune in the background.

Angle brackets dotted the concrete floor, marking out a central corridor with office spaces to either side and a larger, communal area at the far end of the room. Jeb skirted around a group of kerbals squatting by a junction box set into the floor and past a larger team of kerbals busy assembling the partition walls. He saw Camrie standing by a window, scribbling notes on a large whiteboard and walked over to join her. "How's it going?"

Camrie frowned at a list of names on the whiteboard before underlining a handful of them. "Good. Be better when we can move a couple of filing cabinets across and I've got a desk to work at, but so far, so good."

"Volunteers still coming in?"

"Oh Kerm yes. We could use a few more with cars and I'm not convinced that some of them know what they're signing up for, but we're not going to be short when we open for business."

Jeb studied the whiteboard. "Sorting through rotting cabbages by hand apparently. Which reminds me - have you got half an hour this afternoon to brainstorm a couple of morale boosters?"

"Already on it but sure. Once we're properly up and running, I've primed the logistics teams over at the VABs to send us a two-weekly breakdown of any imported components and whatever hardware they've gone into. As soon as we've got a marketing team put together, I'm planning to have them to work up some cardboard cutouts of the major parts - engines, tanks, capsules, stuff like that." Camrie gestured at the far end of the room. "I figure we'll have ourselves a trophy wall in the communal area."

"Of everything they've helped to build?" Jeb nodded. "Good plan. I was thinking back to those RT-5 tables we built for Jorfurt back in the early days and wondering if we could do something similar here but it didn't seem to fit somehow. I like your idea better."

Camrie tossed her marker pen into a box on the floor. "We're getting ahead of ourselves though. First thing we need to do is sort out the paperwork and get this company incorporated. Which reminds me - have you had any bright ideas for names?"

"Nothing that you'd want to paint on a sign." Jeb scowled at the floor then looked up with a sudden sparkle in his eye. "Have you got a waste paper basket around here?"

"Probably. Why?"

Jeb grinned. "I'm thinking we'll do this the KIS way. Get everyone to scribble down a name on a slip of paper and pull one out of the basket."

Camrie rolled her eyes. "Sure. Just as long as we don't end up calling ourselves the Kolus Kabbage Kompany or some other wild inspiration."

"Point. Management reserves the right to draw three names and pick the best. Okay, you find a basket and I'll go speak to the troops."

Jeb walked over to the radio and switched it off. "Morning folks!" The general hubbub died away as everyone turned to face him. "Good to see so many faces here - takes me right back to the old days. And just like then, what we need to start this company off, is a good name!" Jeb watched Camrie passing out pens and slips of paper to a group of quizzical looking builders. "Which, I have to confess, I'm needing a bit of help with. So - have a think over lunch and if anything comes to mind, scribble it down, and hand it back to Camrie or me. We'll draw three names, Camrie'll pick the one she likes best and that's what we'll go with!"

Jeb spotted a raised hand. "Yes?"

A serious looking kerbal stepped forward. "I've been thinking some about names myself, Jeb, and I was wondering if you had a minute to hear it? It's my cousin gave me the idea see, so I can't properly write it down as mine - that would seem wrong."

Jeb blinked. "Uhh, sure."

The other nodded in thanks. "Appreciate that. Now my cousin Halby - he's a lumberkerb down in Veidd and he tells me one of his jobs is cleaning up after a storm. He takes a walk through the forest and checks all the fallen trees - anything dead or rotted, he marks with a red cross but anything sound gets a white cross. Seems to me, that's what we're doing here; cleaning up after the storm, sorting out the rotted goods, helping folks ship what's sound. So I was thinking that the White Cross Company would be as good a name as any for us."

A murmur of voices rippled across the room. Jeb caught Camrie's eye and received a discreet thumbs-up in reply. He beckoned her over to join him before taking a place on the floor. Camrie cleared her throat. "Well that just saved us some time. I think we've got a winner there, people." The murmur become a rumble of approval. "Moving right on, the next thing we need is a proper logo to go with the name." She pointed at Jeb. "Everyone remembers the tilted rocket, even if they couldn't tell you anything about the Spaceship Parts Company other than the kerbal who started it. The White Cross Company needs something memorable too."

One of the electricians climbed to his feet. "I'm figuring that my cousin might be able to help out there. She does signs and that sort of thing." He looked at Camrie. "I'll ask her to drop by, boss, see what she can do for us."

"Thank you," Camrie made a mental note to speak to him later. "In the meantime, if anyone's got any ideas, I'm all ears. Doesn't have to be much - quick sketch will be fine so we can tell what we're looking at. Now if you'll excuse me, good kerbals, I've got some articles of incorporation to fill out.

"Hoy! Wrong lane, ya..." The trucker leaned on his horn and wound down his window. "You blind or something?! Road freight only in this lane - says so on that big sign back there ya fardling..."

Another, equally irate voice came back at him from the truck in front. "And yourself, mate! Quit bothering the hired help, get your thumb off the horn and shove it back up where it belongs!"

"These are with *you*, Len?"

"Yeah they are. So back off and let them work!" Len rolled his truck into the inspection bay and set the parking brake. He picked his manifest off the passenger seat and scrambled out of his cab, as the white car pulled up behind him. Handing the documents to a stony-faced inspector, Lem set about undoing the long row of buckles holding the side curtain of his trailer closed. He hauled the curtain open and secured it. With a rumbling whine, a forklift truck slid forward and began unloading the pallets of fruit crates from the back of his trailer.

Five boiler-suited kerbals hopped out of the white car and formed an orderly queue at the nearest wash stand. One at a time, they scrubbed up, four of them pulling on blue rubber gloves before waiting by the nearest inspection table.

No sooner had the the first crate had been unloaded, than the fifth kerbal had helped Len heave it onto the inspection table. Under the watchful eyes of the inspectors, the other four rapidly emptied the crate of redfruit, held it up for inspection and began re-packing it. One of them retrieved a roll of tape from his pocket, tore off two strips and stuck them over a corner of the crate. Spotting the frown from one of the inspectors, he held up his hands. "It'll come off. I'm just marking the finished lots, so we don't get them mixed up." The inspector stepped forward and peeled up the tape. He shook his head and stuck it back down before rejoining his colleagues.

By the time a fraught-looking official inspection team arrived from across the bay, the forklift operator was loading the first pallet back onto Len's trailer, each of the crates stacked atop it marked with a white cross. They watched one of the boiler-suited kerbals dig her fists into the small of her back and stretch, before turning her attention back to the redfruit. Len spotted their confused looks and walked over to join them.

"There's another table over there if you're looking for something to do?"

The eldest worker yawned, not bothering to cover his mouth. "Long shift - 'scuse me. Are we even supposed to be here? Looks like you're covered for this load."

Len shook his head. "Nope - I'm due a stint from you yet. Besides, the faster I get through here, the happier the boss is going to be." He jerked a thumb over his shoulder. "And the happier those boys out there are going to be."

"But who are those folks at the table?"

Len shrugged. "Blighted if I know. Hired help is all the boss said and I ain't complaining. They don't say a lot but they're shifting the freight quick enough and that's good enough for me."

The other eyed the white car parked behind Len's truck. On the door, a stylised hand clutched a dripping paintbrush which had apparently just been used to paint a white cross on a tree stump. "Got themselves some fancy paintwork, whoever they are." He shrugged. "Whatever. I was told to get over here and you reckon you're still due a stint?" The worker turned to his companions. "Right you lot! I want to see that spare table set up and I want to see crates off pallets if it's not too much trouble!"

With three full inspection tables working flat-out, the checked redfruit crates quickly began to pile up and, after a brief altercation with the fork-lift operator, Len decided his time would be better spent stacking pallets and supervising the loading, rather than sorting fruit. He tapped one of the jump-suited kerbals on the shoulder and explained. The other nodded and flashed him a quick smile, blue-gloved hands busy unloading yet another crate. Len glanced at his watch, eyes widening in pleased surprise, and went back to work.

"Mug of *djeng* for the road, mate?"

Len cinched up the last buckle on his trailer, wiped his hands on a rag and turned to face the worker. "Don't mind if I do." He took the mug and drained half of its lukewarm, stewed contents in a single gulp. "Thanks." He glanced at the last of the jump-suited kerbals standing, clipboard in hand, beside their car and sighed. "Best get the paperwork sorted then." Mug in hand, he walked over to him. "What am I signing?"

The other looked up at him. "Just our order confirmation and tracking form, sir. Twenty-four pallets of redfruit to Barkton depot, nine of them packed and marked by us." He checked his watch and carefully wrote down the time. "Could you sign here please, by your company name?"

Len read over the form, nodded and scrawled his signature on the indicated line.

"Thank you, sir. Speaking for the White Cross Company, it was a pleasure doing business with you. Oh - and if you could possibly keep the crates marked during storage, we'd be grateful."

Len looked at him askance. "Mind telling me why?"

"Quality control, sir. Your boss has us contracted to help move the same pallets out to Kallahat. It sounds a bit corny, I know but once a crate is marked with a white cross, well we feel responsible for it. And if any other bunch of seffleks..." Len's eyebrows shot up at the unexpected vulgarity, "...starts painting a white cross on their crates and then doing a slipshod inspection job - well we want to know about that too."

Len stared. "You aiming to shop them to the Inspectorate?"

"Hopefully it won't come to that but yes, if necessary." A blue gloved finger pointed at the inspectors. "If we do our job right, maybe those good kerbals in the uniforms will start letting folks like you get away with a single inspection." The finger flipped over to point at

the queue of trucks still waiting to get into the inspection bay. "Which is about the only way we're going to knock those queues down to size."

"And put you out of business." Len received a crooked smile in reply.

"Maybe one day. Right now, if you could put the word around that we're looking for customers, we'd be grateful."

Len shrugged. "Sure. You do good work even if my old grandad would tell you that you're crazier than a gronnek with its paw in a trap."

Obrett waited for the young leaves to lift clear of her scalp before easing out from underneath them and climbing carefully to her feet. She straightened the bedcovers and turned to her companions, a rare smile tugging at her lips. Erlin blew out his cheeks in relief. "It's all right?"

"Very much so," Obrett answered. "It didn't recognise me as its Keeper - which is a good sign all by itself - but once it got used to me it started chattering away, talking about 'things gone' and 'happy kerbals'. I recognised the shape of your test plots too, in all the babble." Obrett's smile turned faintly wistful. "It's been a long time since my Kerm was that young."

Halsy leaned forward, hands on his knees. "So you'd say it was healthy?"

"Yes I would. A normal, healthy young Kerm, grown from a frozen seed."

"Elton will be pleased at the success of his last experiment." Halsy exchanged a look with Erlin, sitting opposite him.

"We'll need to tell the Council too, boss."

"*You'll* need to tell the Council," Erlin corrected. Halsy looked at him unhappily.

"I guess. Now that its healthy and all." He shook his head. "This wasn't a promotion I was looking for."

Gusemy coughed. "I'm not sure I'm following this conversation," he said.

Erlin patted the Kerm trunk by his side, as if for reassurance. "It's quite simple," he said. "Now that we know that a frozen seed can produce a healthy Kerm, there's only one more step to take."

The smile fell from Obrett's face. Gusemy sat bolt upright in shock. "You must be joking!"

"On the contrary," said Erlin, "I've never been more serious in my life. Halsy and I have discussed this at length and he's kindly agreed to take over responsibility for the Berelgan in the interim." He raised his hands. "Please don't go to the trouble of trying to dissuade me, dear friends - my mind is quite made up. Its a necessary step and one that we already know is possible. Unlike Jonton, I will not be taking a leap into the dark." Erlin's tone softened.

"Halsy will make an excellent Director and the Berelgan, agriculturally speaking, is

effectively isolated from the outside world. If anything should happen - to the Kerm or myself - we're in a rare place where we will not harm anyone else."

Gusemy buried his head in his hands. Obrett opened her mouth to speak, then closed it again at the expression on Erlin's face. "You are going to speak to Enely and Jonton first."

Erlin nodded. "Of course. Neither did I intend to do this alone." The question hung in the air.

"*You* will need a Keeper." Obrett steeled herself. "*I* will need to return to my Grove first...and put everything in order before we plant the thirty-eighth cutting."

Chapter 87

Grass Roots

Joemy stacked the last crate of produce on its pallet and checked that the marking on its corner was firmly stuck down. Behind him, a pressure washer started up with a hissing roar, sluicing an evil-looking slurry of decomposing plant matter out of the back of the refrigerated trailer parked in its inspection bay. The aseptic tang of hot sterilising fluid joined the fetid stench of rotting greenleaf, making Joemy cough. Pulling his mask up over his nose, he checked off the cargo on his order tracking form and looked around for the truck driver he and his team were helping.

Another white car marked with the paintbrush-and-tree-stump logo of the White Cross Company was parked in the next inspection bay next to a larger trailer, wisps of vapour wreathing its back doors. Joemy watched a pair of boiler-suited figures, one of them with her hair scrunched up under a blue plastic cap, unloading a crate of greenleaf and mentally wished them luck with the cleaning up. Behind them, another truck rumbled out of its bay, another one taking its place almost immediately.

Outside, the queue stretched down the road and out of sight. Joemy noticed several smaller vehicles dotted in amongst the big trailers and nodded to himself in satisfaction.

"Ah, there you are. Everything checked off?" Joemy spun round to face an elderly kermol dressed in a traditional poncho.

"Everything's repacked and tagged," he answered, handing the other a clipboard. "Could you sign here please, by your company name and..."

"Company name, the kermol says. That's just the name of my farm, son. Ain't big enough to bother any of the big haulers with - I just hire a truck come harvest and move it all myself." A wiry, corded arm waved at the row of vegetable pallets. "This lot's all second pickings - we sell the best stuff right at the gate. Finest greenleaf for kilometres around." The farmer shot

Joemy an appraising look. "Tranquility Shores, Melfrey's - all the fancy sea-view restaurants. All of 'em send their vegetable chefs out to us."

"I'll be sure to remember that," said Joemy. He smiled. "Not that I'll be eating at Melfrey's anytime soon, I'm sure. One last thing, sir - if you could make sure all the marked crates stay marked until they get to Bolfactad, we'd appreciate it."

"For quality control?" The farmer nodded sagely. "Heard all about that from a couple of the other smallholders round my way. Not a problem, son." A movement by his trailer caught his eye and he turned his head to watch one of Joemy's team passing a compact piece of equipment out to her colleague before winding up a reel of hose. He peered at the collapsed plastic sacks strapped against its sides and scratched his head. "I'm guessing that would be your compressor? Never seen one like that."

Joemy grinned. "You wouldn't have. Our office is on the next unit along from the old KIS assembly building, back when we... uh they, were working out of Jeb's place. We got a couple of their engineers to put something together for us. Completely portable, water sacks on the side don't carry enough water to flush out a trailer in one go, so we carry enough spares to make sure the job's done properly. Battery powered, pressurised by compressed air stored in a surplus thruster propellant tank, heated with a couple of propellant line heaters from the same thruster. Or so they told me anyway."

The farmer gave him a crooked look. "Or so they told you. It wasn't your old rocket ship they borrowed all their bits and bobs from by any chance?" He saw the expression on Joemy's face and chuckled. "Thought I recognised you from somewhere, son. Got a good memory for faces still, even if that's about all it's good for. So tell me - which rocket did you fly? And what in the name of my old mother's Grove is a kerbonaut doing out here sorting through greenleaf bushes?"

"Moho Six," said Joemy quietly. "Orbital rendezvous with Richlin aboard Moho Five. Didn't manage to get onto the roster for any of the Pioneer flights, so I figured I'd move sideways a way and go into engineering full time."

The farmer nodded. "I do remember that one. All the folks on the news talking about you sending up two rockets at once and wondering whether you'd pull it off." He frowned. "Not that there's been much about rockets in the news lately. You all are still planning to take us to Duna aren't you?"

"We're working it," said Joemy, trying his best to sound cheerful, "but it's a big operation. Lots of stuff to build and test first before we can think about sending kerbals out there."

"Well you'd better get a move on. President Obrick had it right, I reckon." The farmer made as if to spit but thought better of it. "Kerm crisis he said - well that's what I'd call it too and it's going from bad to even worse. Seems there ain't going to be enough room for all of them trees down here, so we need to get busy shipping some of them off to the next planet over. Not that I'd fancy the farming up there - going to take a Kerm or three to turn that orange dust into anything like soil."

Joemy looked at the old kerbal incredulously. "I wish it were that..." A thoughtful expression crossed his face. "Although..." He moved in a little closer and lowered his voice. "Between you and me, sir, we're having the same problems that you are. Food going out to the factories, rocket parts coming back from the factories - everything's taking too long to shift and it's slowing us right down. That's if we can get the parts made at all - government money has mostly dried up because of the fighting."

The other scowled. "So what're you wasting your time for packing greenleaf, son? I remember when you lot were just starting out. Building all your own gear and folks falling over themselves to help. Engineer like you should be back at those factories lending a hand."

"Because we're going to need more than that." said Joemy quietly, wondering at the farmer's suddenly intent expression. "Hard for people to build spaceships if they're worried about feeding their families. We started the White Cross Company to fix that for them."

"But now we need more," the farmer echoed. "Reckon that's another thing that the President got right. Engineers and agronomists, young and old, kerman and kermol. I ain't no agronomist but, sure as luffas sit by the sea, I'm a kermol. And I'm thinking it wouldn't take so many wagons of greens and beans to feed all your rocket engineers and their families." He gave Joemy a toothy grin. "We wouldn't be feeding them on greenleaf soup, son - don't look so worried. I'm not the only fella round our way wondering what happened to the rockets and plenty of us have had it up to here with the blighted inspections." This time the farmer did spit. "You help us get the trucks past those seffleks, son, and we'll make sure your engineers get what they need. Can't promise them any meat but beans and mushrooms never hurt a kerbal and they'll fill you up just fine."

Geneney steered around a pothole in the road and, muttering imprecations to himself, pulled up at the set of bollards blocking the road into the factory grounds. A uniformed guard emerged from his booth and approached them, three security passes clutched in his hand, lanyards spilling over his fist. Geneney climbed out of his car, closely followed by Jeb and Lucan. The guard eyed them at length, eyes flicking back and forth between their faces and the laminated photographs in his hand. Lucan frowned for a second then relaxed at the sight of Jeb and Geneney's blandly polite expressions.

"Your security passes, sirs. Please wear them at all times whilst on the premises. Guest parking is on the right, bay five has been reserved for you. If you could stay by the car, somebody will be down for you shortly." The guard flashed Jeb an apologetic look before retreating to his booth and flipping a switch on his desk. The bollards sank into the road with a muted whine.

"Let's do as the good kerbal said then," Jeb slipped his pass over his neck and climbed back into the car. Geneney twitched his eyebrows at Lucan, who managed to hide his confusion behind an impassive stare. *Check your repeaters and keep quiet...?* His gaze flicked across to a sudden movement from the booth roof and the confusion turned to chagrin. *Oh. Receiving*

you loud and clear, boss. Pulling his own pass over his head, Lucan got into the car and jerked the door shut.

"Careful with that," Geneney said without rancour. "Too many inspections, remember?"

"Sorry," Lucan buckled his seatbelt. "Cameras at the gate? Seriously?"

"That's what I saw," agreed Jeb.

"Well it explains why the guard was keeping himself to himself. I figured he wouldn't recognise me or Gene but I thought the first kerbal on the Mün might get a bit more attention."

Jeb shrugged. "Compared to the blocks of wood they employ at the inspection points he was downright chatty." He exchanged a look with Geneney. "It does make me wonder what Stratus are up to though."

Geneney gave a non-committal grunt and started his car. Lucan frowned at the half-empty car park as they drove past and turned right into the, almost deserted, guest parking spaces. Geneney swung into bay 5 and switched off the motor. They waited in silence, each wrapped in his own thoughts, Lucan staring at the factory building ahead of them. He was about to suggest going back to the security post and asking the guard to check whether anyone was actually been sent to meet them, when the door to Reception opened and a familiar looking figure strode towards them. Jeb nodded in satisfaction and unbuckled his seatbelt.

"Afternoon, Halnie."

He was answered by a warm smile. "Hi, Jeb. Hi, Gene - good to see you again. Hi, Lucan." Halnie's eyes dropped to the security passes around their necks. "Sorry - force of habit. How was the journey?"

"It went," said Geneney. "Inspections were no worse than usual." He shook Halnie's hand, noting the wrinkles at the corners of her eyes and the skin drawn over her cheekbones. "You're looking well, Halnie."

"Well it's good of you to say so," said Halnie dryly. "Come on inside - we shouldn't keep Thomplin or Shervin waiting."

"Shervin? I thought he was due to retire?"

Halnie shook her head. "There was... a change of plan," she said. "He was kept on to personally manage a number of new clients." She glanced at Jeb. "As part of that, he was also promoted to vice-chair of the Board. Whatever you're trying to sell us, he'll have the final say on it."

Jeb nodded. "Appreciate you setting this up for us, Halnie. How's Thomplin doing, by the way?"

"Still with us," said Halnie with a smile. "and recently sent upstairs to be our VP of sales and marketing. He'll be in the meeting too." She led everyone through the Reception area and

up a flight of stairs, leading to a long corridor with large safety glass windows along one side that overlooked the factory floor. Lucan craned his neck trying to get a better view but couldn't make out any details beyond the factory machinery and a row of kerbals with their backs to him working at one of the production lines

"It looks quiet down there," he commented.

"We're only fully open three days a week at the moment," said Halnie. Lucan saw the sudden tension in her shoulders. "The space program contract is on hold as you know, and the rest of our business has been having the same problems as everyone else with the inspections."

"What about those new clients?" Jeb asked casually.

"We value their continued custom and they appreciate our efforts on their behalf in these difficult times." Halnie led them through an archway before zipping her pass through a keypad on the opposite wall. A door unlocked with a faint snick and she held it open. "After you, good kerbals."

Lucan stepped through into a carpeted corridor, a row of dark wooden doors leading off in either direction, each sporting a small brass plate. At the end of the corridor a cluster of leather armchairs had been arranged around a low table, scattered with journals and magazines. Framed certificates and photographs lined the walls and Lucan was startled to see one picture of a group of kerbals, including a rather younger Jeb, Geneney and Halnie, all posing by a partially completed Moho upper stage.

"Conference room is the second on the left," said Halnie. "Coffee should have arrived by now, so please go in and make yourselves comfortable."

Much to Lucan's surprise, the coffee table sported a selection of bottled soft drinks, including a high quality brand of smoky sapwood. He popped the top off a bottle and poured the contents into a glass, sniffing appreciatively at the released aroma of peat-and-woodsmoke.

"Always good to meet an engineer with taste." Lucan looked up to see a silver-haired kerbal decanting a second bottle into a glass. He waited for the other to take a sip of his drink and set it aside, before offering his hand.

"Shervin. It's been too long."

"A long time since the old Moho days," Shervin agreed. "What's Jeb got up his sleeve this time?" He snorted at Lucan's raised eyebrows. "Don't give me that. The last time Thomplin got a call out of the blue from that scoundrel, it was to invite us down to Barkton to watch him being shot into space. This time he has the nerve to request a private meeting with, and I quote, 'an appropriate decision maker'. He's up to something."

Lucan nodded. "He is. Although from what I saw on the way up, it should benefit both of us."

"That's what he said the last time too." Shervin retrieved his glass. "Although, in fairness, he was right. The kerbal won't have any luck begging any more free tanks off us though, I can tell you that now. Hey now - take it easy."

"Sorry." Lucan's voice was strangled. "Sapwood went down the wrong way is all." Coughing, he reached for a napkin to blot his jacket sleeve. "Ow, that woodsmoke is hard on the lungs."

"Just like the real thing," said Shervin. "You all right now?" At Lucan's answering nod, he strode over to the conference table. "Right. Let's get started. Bring your drink over and take a seat." He waited for everyone to settle themselves before tapping on the table. "We're all busy people, so I'll get straight to the point. I understand that you good kerbals have a proposition for Stratus which you believe will be beneficial to us and presumably to the KSA?"

Geneney glanced at Jeb and Lucan. "We do," he answered. "And before we get started, please be aware that we have the backing of Director Lodan in this matter." Geneney took a sip of coffee. "Project Starseed has stalled for reasons that we're all aware of. We need Stratus Inc to help us get it back on track. To that end we propose an informal, non-financial, exchange of services. In return for resuming your supply of parts and systems to the KSA, we can expedite movement of goods to your other customers."

Shervin burst out laughing. "Of course you do. I'll wager that this was all Jeb's idea too - it has Jebediah Kerman brass neck all over it." Around the table, Thomplin looked faintly disappointed whilst Halnie just looked thoughtful. "I'm sorry, but with all due respect to Lodan, you'll have to do better than that."

Unperturbed, Geneney took another sip of coffee. "So how can we make this work?" he asked. "If the inspection points around here are anything like the ones at Barkton, then I can't imagine you're having an easy time getting materials in our out of here?"

"That would depend how much of it is for border security," said Jeb.

Geneney braced himself for an outburst but apart from a tightening around the jaw, his friend's face remained calm, matched by three studiously inscrutable looks from the Stratus team. Jeb raised an eyebrow. "It wasn't difficult to work out. Security cameras on the gates, a very nervous guard, a mention of new clients whilst carefully avoiding talking about them too much." Jeb smiled at Halnie. "I've been out of comm range for a while but I'm pretty sure I'd have heard about a new aerospace startup. Especially one ambitious enough to be ordering significant quantities of Stratus parts."

"And if our new client was an existing player?" said Shervin.

"Then we'd have heard about it through Director Lodan." Jeb exchanged looks with Geneney. "I haven't forgotten our chat before Pioneer One, Gene, but I think this works out rather well." He turned back to Shervin. "Whatever work you're doing for your new client, it's left you with plenty of capacity. We help you smooth out your logistics problems and get you back to full production. You set aside some capacity for KSA use. We both win."

"How many other companies have signed up to this kind of arrangement?" said Hahn.

"None yet." Geneney leaned forward in his seat. "At the risk of sounding trite, Stratus have been an irreplaceable partner to us since before Kerbal Two and, to be perfectly honest, without you on board, we'll be facing an uphill struggle with everyone else."

"And no doubt we would get some free advertising and our logo on the Starseed ships," said Thomplin blandly.

Jeb grinned at him. "Well it worked the last time but I think it would be a little too corporate for Starseed, don't you? Besides, we can do better than that. You're going to need some background first though."

The Stratus team listened as Jeb outlined the pivotal meeting with Rockomax, Lodan's realisation that he had the theoretical legal standing to relaunch Starseed but without the practical authority to go with it, and his conclusion that a grass-roots volunteer effort would be required instead Thomplin's mouth quirked in a half-smile that was quickly replaced by an intent look as Jeb described the founding of the White Cross Company and its mission.

"We thought that we'd be in for the long haul there," Jeb admitted. "Building trust, helping the haulage companies reduce their backlogs, getting everything moving again." He gave Shervin an abashed look. "Turns out we'd forgotten about the kermol in all of this - but they hadn't forgotten about us. More to the point, it seems that a lot of them are taking President Obrick's speech to heart."

"Ohhh," said Hahn, eyes suddenly shining. She saw Shervin's politely confused look. "But now we need more. Engineers and agronomists, young and old, *kerman and kermol*."

"Exactly," said Jeb. He looked Shervin straight in the eye. "We can't pay you - but we *can* feed you. You, your factory workers - and their families. No queueing, no hoping to Kerm that the next food convoy arrives. We can't promise anything fancy but, as the good kermol said, beans and mushrooms never hurt a kerbal and they'll fill you up just fine." Jeb eased back into his chair and watched Shervin mull it over. Then he took a deep breath. "I mentioned that I'd been out of comm range for a while but I didn't say why. It's a long story - and I'll spare you all the details - but the short version is that I was in a bad place." Jeb squeezed his eyes closed for a minute. "Kerm, this isn't easy." Shervin watched as Geneney laid a hand on Jeb's shoulder. "Thanks, Gene. Okay folks - bear with me if this doesn't go too smoothly."

Haltingly at first, Jeb began to talk about the aftermath of *Pioneer 4*, about his growing despair as his beloved rockets turned from vehicles of exploration to weapons of war, and finally, about the training accident that claimed Ornie's life. Listening to Jeb recall his eulogy for his friend, Shervin's mind drifted back to his first meeting with a much younger kerbonaut on the eve of his first orbital flight.

...seriously though, Thomplin. I've got a lot of good friends on this team. How can I possibly let any of them fly a spacecraft that I wouldn't be prepared to fly myself.

"...apart from anything else, I never did like our village Keeper very much as a kerblet. Luckily - and not for the first time - Gene was able to talk some sense into me, so we set out for the Grove. And by all the Kerm, I can't tell you how glad I am that we did." Geneney listened as Jeb described his first Communion with Elton to the increasingly wide eyed kerbals around the table.

"He wanted to learn all about spaceflight, so I figured that showing him the view from Moho One would be a good place to start, which it was. And I don't know whether it was sharing the memories with a Kerm or what, but preserve me, it brought it all back to me with in a rush." Jeb paused. "So I decided to show him the view from Munar orbit aboard Pioneer Four."

"Which just about brought the house down," added Geneney. "Literally. I never knew a Kerm's branches could stand on end."

Jeb nodded. "Mine too. Or they would have if I had branches. Or... oh Kerm take it, you know what I mean. Anyway, remembering those views of Kerbin in the darkness - and sharing them with one of the oldest beings on Kerbin - really hammered it home. We can make Starseed work. We have to make it work. And Elton agrees." Struck by a sudden idea, Jeb's head snapped round to face Hahn. "You never did join the KIS in the end - never got a chance to fly or really see Kerbin for yourself." Jeb swept his arms out, "But you could. With Elton's help, I could show you - I want to show you! Elton wouldn't mind, he said himself that everyone should see!"

Jeb sagged in his chair. "Sorry, getting carried away with myself." He looked at Shervin. "Anyway, that's what I think. Helping your customers and feeding your workers aside, we need to do this because it's right and because, frankly, we don't have any other options left."

Shervin nodded, before bowing his head in thought. Then he looked up at the three kerbonauts. Hahn caught a glimpse of his expression and her heart skipped a beat.

"That's quite a story. Any other kerbal, I'd be showing them the door about now." Shervin shook his head. "But... we followed you on one crazy ride before and that went places we couldn't have imagined. Kerm help me if we don't follow you on this one too."

"That should keep you going for a week or two." The truck driver slammed the trailer doors shut and locked them, before turning to Lucan with an angry scowl. "Soup kitchens and folks with kerblets queueing for food - they didn't tell me it was this bad."

"But thanks to your Grove, we can give them something worth the wait." Lucan eyed the pallets of vegetables and neatly stacked sacks of dry goods. "Thank you so much - you've been more than generous." The driver waved a dismissive hand.

"You'd need to thank the other Groves round us too but I'll tell them you were appreciative." He climbed into his cab and leaned out to grab the door handle. "You get the rockets flying again and we'll keep the food coming. Deal?"

"Deal." Lucan had a sudden thought. "And I'll do you another one. "You get me the names of everyone back at the Groves and I'll set them all down in a book. And if we ever get out to Duna, I'll make sure the first ship to get there has that book on board. Deal?"

The driver gave him a sharp nod. "Deal - and I'll hold you to it." He thumbed a button on his dashboard and the truck motors rumbled into life. "Won't be me bringing the next load but I'll make sure whichever of the gang they send your way has those names in their cab."

Tipping his cap in farewell, he released the brakes and the truck rolled forward amidst a hiss of compressed air. Lucan watched him go, then turned to the first stack of sacks and began loading them onto a nearby handcart. Unheard, a door creaked open at the far end of the warehouse.

"Where are these all going, Lucan?"

Lucan straightened up. "Derny wanted tubers and mushrooms to go with the last of the greenleaf tonight, and he's putting a bean and veg stew on for tomorrow. I've got everything for that all loaded up if one of you could trundle it out. Rest of the fresh stuff goes in the kitchen, anything dry goes into storage with the rest." Lucan smiled. "Pretty sure I saw a couple of sacks of cornmeal in there, so if you ask Derny real nicely..."

"Cornbread?" The other's eyes lit up. "Haven't had any of chef's cornbread for an age."

"I was hoping for a good bowl of grits myself," Lucan said straight-faced, "but each to his own."

"Bah, what else can you expect from a kerbal who drinks smoky sapwood for pleasure. Right, I'll take this lot out now while you load up the tubers and fungus."

"Already on it. You want to sort out the greenleaf once you're done?"

"Yep." The other laughed. "If we ever need a decent kitchen porter or two out at Duna, we'll not be short of offers."

"Not something I thought the space program would ever need," Lucan agreed. "Nor soup kitchens for that matter." He looked pointedly at the loaded handcart. "Wouldn't want to keep Derny waiting though, if you're serious about that cornbread." A cheerfully tuneless whistle and the receding squeak of rubber on concrete was all the answer he needed.

Precariously balanced on top of the tuber sacks, the mushroom trays were rather too large for the handcart, and Lucan decided to come back for them later. He wheeled his load out of the warehouse, blinking at the glare from white canvas catching the early afternoon sun. The last of the lunch shift were making their way back to the factory, leaving their families behind at the kitchen marquees and a familiar voice caught Lucan's ear as he made his way over to the long trestle tables set up outside the tents.

"Put the knife down lad, before you lose any fingers. You, you, you, you and... you - you're on tuber scrubbing duty. You three - watch those pots and tell me when they come to the boil." Derny eyed a huddle of older kerblets. "You lot - find yourselves a pair of kitchen gloves each. The pepper cactus is over there - you can help me get the spines off. Everyone

gets a go at pounding on them to loosen up the pulp.” Derny looked up at Lucan standing by his cart. “Excellent timing as always, Lucan. Sacks on that table over there if you please.”

“No problem, Derny. Mushrooms wouldn’t fit on the cart so I left them back at the warehouse. I’ll fetch them over with the rest of the tubers.” Lucan saw one of the kerblets looking mutinous but before he could say anything, the youngster had caught Derny’s eye.

“What are you waiting for? Gloves are over there, cactus is over there.”

The kerblet scowled at his feet. “Wanted to work in the factory, not cooking stupid cactus.”

Lucan opened his mouth to speak but Derny just nodded in understanding. “And maybe you will one day, lad. But right now we need you here, snapping spines and pounding pulp.” He gestured at Lucan. “Like we need Mr Lucan there. He’s been to space, walked on the Mün even, but right now?” Derny raised his eyebrows. “Right now, he’s organising truck drivers and hauling sacks of tubers for you lot to scrub.”

Lucan perched himself on the edge of the table. “Tell them what they’re making, Derny,” he suggested.

“Ahh yes,” said Derny. “Hadn’t thought about it like that but these are proper space rations we’re cooking up here. At least they would be if we freeze dried them and stuck them in a pouch. The cactus pulp thickens up the tuber paste and adds a bit of flavour too.”

“You don’t want sloppy food in space,” Lucan added. “We had a ration pack burst on Eve 2 - the crew spent half of their second day in space chasing vegetable mush around the capsule.” Two of the kerblets smirked at him. “So now we test all the new ration packs the same way we test the capsule,” Lucan finished. “We shake them up, put them in the vacuum chamber, and when we’re done, Derny gets to open them. So far he hasn’t ended up with space food all over his face.”

“Not yet,” said Derny.

“What about the one that burst, mister?” asked one of the kerblets.

“We kept changing the recipe until it worked,” Derny replied. “Me and kerbonaut Sherfel that is - she was the one who thought of adding cactus pulp to the tuber paste. Took us plenty of tries to get the vegetable stew just right and that was with both of us in the kitchen, peeling and chopping and boiling.”

The rest of the kerblets started to look more enthusiastic about their chores. Lucan caught Derny’s eye before slipping off the table and walking over to the mutinous-looking one, who was still scowling at his feet. “You can come and help me, lad,” he said. “We could use a strong pair of hands back in the warehouse. It’s not factory work but its a start, and...”

He was interrupted by a sudden commotion by the factory gates. The loading bay doors rumbled open and a truck emerged, towing a trailer emblazoned with the Stratus Inc logo. Escorted by a double row of workers in red caps, marching alongside, it blew a blast from its horn as it cleared the factory gates and swung left onto the main road out of town, heading for Barkton.

Chapter 88

Bridging the Gap

Lodan inspected the stylised cardboard cutouts on the break room wall and didn't even try to hide his satisfaction. He plucked one free and held it up against each of the other two before sticking it back in place.

"You made them to scale?"

"Yes, sir. It won't be possible for all the sub-systems of course, but we wanted to do all the larger components and modules to scale." The manager checked his watch. "We should step into my office - the first afternoon shift should be arriving shortly."

Lodan gave him a quizzical look and opened his mouth to speak, only for his words to be drowned out by a sudden clamour of voices. The dispatchers in the main office area snapped to attention behind their desks and began handing out clipboards to their colleagues pouring in through the front door. To Lodan's pleased surprise, several of them sported a White Cross Company patch on the breast pockets of their boiler suits. The throng of volunteers organised themselves into groups of four amidst much pushing and good-natured banter, each group taking a clipboard and leaving through the side door, shouted orders from the dispatchers following them out.

"Fresh leaves - main depot! It's been waiting a while so don't forget your washer!"

"Beans - main depot! Take a spare sorter in case your haulier forgets!"

"Rockomax site! Dry feet for you today, Haymie!"

"Zaltonic! They're new to all this so be nice and don't play with the batteries!"

Lodan winced and followed the manager into his office. Cheap steel shelving, already cluttered with box files and other paperwork, occupied most of one wall. The other was taken up with a large map of Foxham and its surrounding towns and Groves and, under the window, an old computer and printer sat atop a worn plywood desk. Lodan eyed the equally

worn chair in the corner with some trepidation before walking over to study the map, whilst the manager busied himself with kettle and mugs. "It's only instant I'm afraid, Director, but it's a decent enough brand."

Lodan took the proffered mug without comment, blew on it and took a cautious sip. Seeing the manager's anxious face, he nodded and took another. "Thank you." He gestured at the panoply of threads and coloured pushpins decorating the map. "This is all most impressive, I have to say. I presume this pin here marks a new office?"

The manager beamed. "Absolutely, Director! We began to see a lot more traffic from Kallahat after Jeb - I mean Jebediah's visit, so I started looking around for new office space out by the western depot. I put Helke in charge and gave her a couple of the more experienced dispatchers to get her started. Although if I know Helke, she'll have her own people in place soon enough."

"And the work crews?"

"Enough to staff a third office, once I find the time to scout one out. Stratus are a popular employer around here, Director - word got around pretty quickly that they were properly back in business, especially once we got their soup kitchen got up and running for them." The manager flushed. "Sorry, that's we as in WCC - I'm not trying to take any credit from Lucan or Deryn."

"Of course not," Lodan rubbed his chin. "I know who to talk to about finding new premises for you. Do you have anyone in mind to run it?"

"Absolutely. He'll need office staff but that won't be a problem either."

"Very good. I'll leave that in your capable hands then. Is there anything else you need, or need to tell me about, before I leave?"

"Not that I can think of, Director. Thank you for your visit - the team here all appreciate it."

"You're quite welcome. I shall inform Ademone that she can expect more deliveries in the near future - I'm sure she'll be as pleased as I am to hear it."

Lodan tilted his head to one side and suppressed a faint smile. The immense structure nestling on its dollies reminded him of nothing so much as a gigantic kerblet's stacking toy glued together and set on one side. A latticework of stringers covered the surface of each cylindrical section, the widest cylinder at the back studded with equipment fittings, ductwork and protruding window modules which gave it a curiously insectile appearance. The narrowest cylinder at the front was almost featureless by comparison, although, as far as he could see, still more than wide enough to accommodate a pair of kerbals kneeling side by side. A tapered annular section sat around the middle cylinder like a collar, a webwork of struts securing it to the rest of the structure.

"Main pressure hull is to the rear." Ademone's voice broke into his thoughts. "You can't see it from here but it's fitted with a CORDS-3 adaptor for docking to the main hub module."

The cylinder at the front is the airlock and docking port, or it will be once it's finished. The forward gangway links them together and also provides access to the observation deck."

"One half of which will be the colony ship bridge in the production version," Lodan noted.

"Exactly," said Ademone. She gestured at a set of wheeled stairs parked in front of the airlock tube. "You're welcome to inspect it if you wish." The corner of her mouth quirked upward. "The assembly crews normally get in through the CORDS-3 but I thought you might appreciate the full experience." She watched Lodan make a show of checking his watch. "The launch isn't until this evening, Director. I'm sure I can find a few minutes in my schedule."

"Well, if you insist." Lodan walked over to the stairs and checked the brakes, before climbing up onto the upper platform. For a moment he stared into the open maw of the airlock, a circle of light illuminating the inner depths of the structure and glinting off a set of rungs set into the side wall. "I presume this will take my weight?"

"It will," Ademone replied. "We built it with enough of a margin to handle any less than perfectly judged docking attempts."

Lodan nodded. A thought struck him and he removed his shoes, setting them neatly to one side, before crawling into the airlock on hands and knees. Once inside, he straightened up, brushing one hand over his head and found plenty of clearance between himself and the smoothly polished ceiling. Working his legs out in front of him, he shuffled forward on hands and feet before easing himself out of the airlock and dropping to the floor inside the forward gangway. He walked forward and paused under the circle of light, staring up the access tube at the open space and curved metal surface beyond. The ladder rungs that he'd noticed from outside were sized with a space-suited kerbonaut in mind and he was able to scramble up them with ease.

He emerged into a wide, empty compartment. Light from the outside world shone through apertures of varying shapes and sizes in the outer hull wall and, much to his relief, a maze of temporary baffles had been bolted to the convex floor to prevent assembly technicians, or visiting dignitaries, from slipping. Every available surface appeared to be marked with stencils indicating, Lodan presumed, the mounting points for control panels or other items of equipment. Directly ahead, the outer hull angled sharply inwards to meet the forward bulkhead, creating a windscreen like effect which was accentuated by the round-cornered rectangular holes cut into the tapered wall.

Lodan clambered forward and arranged himself in front of the nearest window hole. The outer surface of the airlock tube stretched out ahead of him obscuring the wheeled stairway beyond. A pang of doubt crossed his mind as the sheer size of what the KSA was attempting became awesomely clear. Two bridge modules back-to-back, the hub module sandwiched between them and supporting a great eight-spoked wheel. Lodan shivered. *Which is nothing compared to the colony ship - the colony ships. But if we can pull this off...* He shook his head. *No ifs. When we pull this off.* He closed his eyes and for a moment the bare metal compartment around him lit up with display screens and control boards. Radio chatter and

status reports filled his ears and the view of the factory floor outside faded into the star dusted vista of deep space, broken by a single red dot.

"Excellent. I very much look forward to seeing the flight article." Lodan buckled his shoe and perched himself on the edge of the stairs. "Will the Type Six be enough to launch it?"

Ademone nodded. "We think so. Even our most pessimistic mass projections are comfortably within payload capacity. In terms of size, it's too wide for our standard fairing but we decided that designing and building a new fairing would be preferable than waiting for the R7 to come online, especially as we now have a spare booster immediately to hand, courtesy of the Pioneer Seven team."

Lodan nodded. "Indeed - and I think Bill would approve. I presume you've carried out what tests you can on the ground?"

"We have. All our modelling is telling us that the stretch fairing will work, that our guidance and control systems can cope with the new aerodynamics and that the booster airframe can handle the additional loads." Ademone favoured Lodan with a half smile. "I understand that the flight dynamics and structural engineering teams have a standing joke every time we fly a new rocket - 'it worked in the wind tunnel, so I *shouldn't* have been surprised'. We had hoped to have the actual flight test results ready for your visit but the launch was postponed due to high winds. You would be welcome to watch our second attempt with me this evening."

Lodan looked thoughtful. "Tempting. If you could find me some office space with access to a telephone, I think I'll take you up on that." He paused. "What are you intending to launch inside the new fairing?"

"Just a standard test mass. Why?"

"There's nothing more useful that could be launched? Under the circumstances it does seem a little profligate to use an entire booster to put a lump of concrete into orbit."

"It does," Ademone agreed. "But even assuming we had the customers, we wouldn't entrust their payloads to an unproven launch vehicle. In an ideal world, we'd be launching experimental Starseed hardware - an orbital refueling test most probably. But we don't live in an ideal world." She gave Lodan a sideways look. "A number of the propulsion engineers suggested that we launch Geneney's old car into orbit but I didn't think he'd be particularly impressed with the notion."

Lodan's mouth twitched. "No," he agreed, "He's quite attached to that car. In any case, I suspect it wouldn't make a very reliable test mass. After listening to Geneney grumble about the good inspectors stripping it down on numerous occasions, I wouldn't be sanguine about it remaining intact during the flight."

He looked at the pressure hull assembly, head cocked to one side. "But back to the point. That's certainly an impressive looking pressure hull but it's a long way from a pressure hull to a functional spacecraft. May I ask how work is progressing on the internals?"

"Not as quickly as we'd like but a lot quicker than we hoped," said Ademone. "If you'd care to follow me?" She closed the door to the assembly bay behind them and set off down the corridor, footsteps echoing on the polished floor. "Insulation panel and outer hull fabrication is going well. We're using essentially the same insulation materials that we used for the Pioneer spacecraft, so we have all the manufacturing facilities on site." She stopped by a window and stood aside to let Lodan look through.

Inside, a profusion of silvery and copper coloured crinkled foils, cut to different shapes and sizes, hung from a maze of overhead conveyers. Rows of workers, standing at room-length worktables, unclipped the foils as they moved past and stacked them into what looked like curved, dull bronze frames. Lodan watched one worker slide a completed frame into a press at the end of her worktable before pulling a large lever. Another worker heaved his press open and inspected its contents before placing the finished insulation panel on another conveyer.

"The outer hull sections are fabricated separately," said Ademone. "We're in the middle of a manufacturing run at the moment, otherwise I'd show you inside the workshop. For now, lets get you suited up."

Lodan followed her along another stretch of bare corridor which ended at a locked door. Ademone zipped her pass through a card reader and the door unlocked with a clunk. Inside, Lodan was surprised to see a locker room with rows of white coats hanging from rails and pairs of white rubber overshoes on racks underneath.

"One size fits all, I'm afraid," said Ademone. She reached into a box and pulled out a pair of translucent blue plastic caps. "You'll need one of these too."

Lodan donned his protective clothing without comment and followed a similarly garbed Ademone onto the factory floor. Pieces of partially assembled spacecraft, each with their attendant group of technicians, rested on a bewildering assortment of benches and stands. Many more pieces sat abandoned, like bizarre pieces of high-tech sculpture.

"As I said," Ademone said quietly, "a lot better than we'd hoped. Persuading Zaltonic to contribute helped us considerably - until the transport problems began I don't think we really appreciated how many electrical or electronic components they actually made." She looked at Lodan. "She'd never admit it in public but I think even Nelton would concede that your volunteer program is working better than we expected."

"Not well enough though," said Lodan. "Not if the number of empty assembly bays out there is anything to go by." He reached under his cap to scratch behind his ear. "Would it be possible to meet your team leaders this afternoon and have them draw up a priority list of subcontractors? The White Cross Company's efforts so far have, quite understandably, been targeted at former KIS suppliers, particularly those where Jebediah or Geneney have

personal contacts." He gestured at the nearest group of technicians. "Clearly that is helping but I think it's time they shifted their focus a little."

Ademone nodded. "I'm quite sure they'll be able to find the time. Thank you, Director."

Lodan stretched, checked his watch and began stacking his papers together. He was just slipping his jacket on when there was a knock at the door and Ademone walked in. "Are you ready to go, Director?"

"I am." Lodan snapped his briefcase closed. "I presume the weather is being kinder to us today."

Ademone nodded. "Conditions at the Space Centre remain acceptable according to the latest meteorology update. The countdown is proceeding on schedule, so we should leave imminently if we're going to watch the launch."

Despite himself, a thrill of anticipation ran down Lodan's spine. "By all means, lets go then," he said. He waited for Ademone to lock her office door before following her down the corridor to the lifts. "I must admit that I've been rather looking forward to this. I don't get to see nearly as many launches as I might like."

Ademone smiled. "Why do you think I chose an east-facing office? I don't always have time to watch them from the launch sites but I try to make a point of looking out for any flights out of Foxham. The conference room is east-facing too for the same reason - a coffee break and a rocket launch has smoothed many a difficult negotiation."

"They do tend to get the point of the negotiation across," said Lodan. "I recall Geneney saying much the same about the Barkton Space Centre."

"I can't imagine Geneney or Jebediah missing that particular tactic," agreed Ademone. A bell chimed and the lift doors opened onto the lobby. "It's my car or yours I'm afraid. I would have requested a driver but I believe that most of them have thrown in their lot with the White Cross Company for the time being." She caught sight of Lodan's expression. "Which is greatly to their credit - and besides, I did give them the choice."

"Ahh. Commendably public spirited of them." Lodan held the door open for Ademone. "In that case, I think your car would be wisest - I'm not particularly familiar with the roads around here."

"As you wish." Ademone took her car keys out of her jacket and pressed a button on the fob. Across the car park, the lights on a modest two-seater runabout blinked on with a muted clunk of unlocking doors. Lodan raised his eyebrows.

"Encoded radio transmitter," said Ademone. "I forget which spacecraft subsystem it was originally developed for but the licensing rights turned out to be quite profitable." She gave Lodan a small, mischievous look. "You have to admit - it is rather space age."

"It's certainly more dignified than the plush kerbonaut bobble-head toys that the KIS came up with," said Lodan. "The last time I visited Barkton you could barely find a car without one of those ridiculous things hanging from the rear view mirror."

"One of Geneney's more playful marketing suggestions," said Ademone straight-faced. She pulled her door closed and waited for Lodan to fasten his seatbelt. "Personally, I rather liked their collectable rocket part earplugs."

As they drove away from the factory, Lodan was pleased to see a small queue of vehicles waiting to get on-site, including one truck hauling a heavily laden covered flatbed trailer. He didn't recognise the company name on the tarpaulins but the satisfied grunt from the driver's seat told him all he needed to know.

The main road to Foxham was mostly free of traffic and Ademone was able to make good time to the Space Centre. Lodan found himself whisked efficiently through a security barrier, past a long row of warehouses and other, less identifiable, buildings and into a private car park. Inwardly sighing as Ademone waved her car keys over her shoulder, he followed her around the front of a modern-looking two storey office block and came to an abrupt halt.

The evening sun threw long shadows from the buildings around him, casting the buildings around him in a soft, fulvous glow and glittering from the almost mirror smooth Northern Ocean to his east. Lodan squinted hard, just able to make out the Rockomax Type 6 sitting on its pad, the steel gantries behind it glowing like bars of solid fire. With a shiver of anticipation he followed Ademone inside and along to Mission Control.

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"...all controllers, please give me a Go / No Go for terminal count."

Lodan leaned against the balcony at the back of the Rockomax mission control room and listened to the flight control team reporting in. On the main screen, the Type 6 booster stood against the launch tower, plumes of orange-tinged vapour swirling around it.

"SK1 TVC verified. Starting first stage engine chilldown."

"Copy. Launch clamp release checks complete."

Lodan gripped the balcony rail just a little more tightly. Below him, auxiliary monitors lit up around the main screen as the unruffled cadence of status reports and system calls continued.

"T-minus two minutes and counting. All systems Go."

"T minus sixty. Launch vehicle is in startup."

"T minus forty seconds and counting. Decouplers armed, starting sound suppression systems."

"T minus twelve... eleven... ten... nine..."

Lodan's gaze flicked across to Ademone who was standing by the balcony with him, watching the monitors.

"...six...five...four..."

The image on the main screen shook, a colossal cloud of steam and smoke erupting from the flame trench beneath the booster and rapidly swelling to engulf the entire launch pad. Streaks of flame shot through the smoke and then blinding light erupted from the base of the rocket, the exhaust from its five main engines suffusing the steam and smoke with an unearthly glow before lofting it skyward on a torrent of golden fire. Lodan's eyes lit up in sheer delight, heart racing as the camera swung up to track the gleaming white booster arcing out over the sea atop an expanding plume of rocket fire.

"Stage one propulsion is Go. SKPs throttling back."

Beside him, Ademone tensed. Seeing Lodan's look of concern, she opened her mouth to speak only to be interrupted by one of the flight controllers below.

"Vehicle is through max-Q. Go for throttle up."

Ademone let out her breath with a faint whuff. "That's the point of highest mechanical stress on the booster," she told Lodan quietly. "According to our models, the larger fairing wouldn't cause enough additional stress to be a concern..."

"But it's good to see the models working in practice," said Lodan, his eyes fixed on the main screen.

"Yes."

"Stand by for SKP staging." For the first time that evening, Lodan thought that he could hear a faint edge of tension in the flight controller's voice. Beside him, Ademone crossed her fingers behind her back.

"Shutdown...and staged."

A different controller spoke up. "Vehicle attitude is stable, Flight. Guidance is Go."

A ripple of applause ran around the room. Ademone nodded in satisfaction. "That was the one part we couldn't fully model in the wind tunnel," she murmured. "We stage the lateral boosters high enough that it shouldn't have been a problem but it's still a big in-flight change in vehicle configuration. Core staging and fairing deployment coming up in the next minute."

The image on the main screen flicked to the launch site and then back to the orbital tracking plot. One of the controllers announced a successful main engine cutoff and then, almost immediately after, a successful separation and SK1 ignition. Lodan crossed both pairs of fingers and, catching Ademone's eye, rested them on the balcony rail.

"Payload fairing deployed. Second stage propulsion is Go."

With that, a more enthusiastic round of applause filled the room. Several coffee cups were hoisted aloft in salute and the flight director grabbed his towel from the back of his chair and blotted his face.

“Excellent.” Lodan turned to Ademone, “Please pass on my congratulations to everyone involved.” Ademone blinked at the sudden fire behind the KSA director’s eyes. “As Jebediah might say, you fly them - but we *all* build them. We’ll get you everything you need to build that station - you have my word on it.”

Chapter 89

A Helping Hand

When the black spots came, they were ready.

The lowermost leaf clusters darkened first, the blemishes swarming upwards, jumping from leaf to thrashing leaf like a plague of malignant insects. Two of the robed figures, keeping vigil over the new Kerm, gripped their companion's shoulders in a silent gesture of good luck, before taking their own places under the leaf clusters. The three medics sitting by their bedsides exchanged anxious looks as the leaves whipped around their patients' foreheads, enveloping the not-quite-skin coloured bands around their temples.

The shards ripped through Erlin's consciousness like broken glass slicing through flesh. Choking clouds of terror momentarily dulled the hot, bright pain before folding in on themselves, whetting fractured edges to a mirror finish. Unseen, his limbs spasmed, throat clenching around a silent scream. A terrified clamour of overlapping voices tore at him, the childlike tones of his Kerm echoing all around him, cascading from rage to fright to abject, terrified pleading; pieces of a shattered mind crying out for its Keeper to save it.

"What the...Keep clear of his limbs - don't hold them down! One of the medics passed his colleague a foam pad. "Hold that over his head in case his neck goes into spasm too but for the love of your mother's Grove keep it clear of the leaf cluster. EEG?"

The third medic turned to him with wide, frightened eyes. "I...I don't know. I've never seen anything like it! Two of them look like something between a normal Communion and a bad dream but the third is just a mess!"

Erlin!

Somehow the tiny, familiar voice insinuated its way through the maelstrom threatening to sweep his own mind into the darkness; soothing, holding...

Erlin!

A second voice joined it, louder this time, steadying, comforting, a lifeline to cling to.

How in the seven smoking hells did Jonton ever survive this alone?

Never mind that now! Just hang on to him!

Images swirled down the lifeline, two white-coated kerbals in a room of complicated glass tubing and acrid smells, one looking despondently at a tarry residue in the bottom of a flask, the other patting him on the shoulder. The same two kerbals grinning out from a photograph, lab coats replaced by ceremonial academic robes. A cafe in a leafy park, two small cups of coffee on a tray next to a meagre handful of coins, the great arches of the Capital building filling the sky behind them.

Erlin?

The lifeline went taut, pulling Erlin back from the abyss. A second line snaked towards him, whipping around his waist and holding him fast. Shaking, Erlin hauled himself upright, climbing hand over hand towards the two blurred figures standing in the eye of the storm.

I'm here. Preserve me but I'm here!

The sudden release of tension hammered into Obrett, rebounding squarely into Gusemy. The mental lines tying them to Erlin shuddered, stretching almost to breaking point before she could damp them down. *Easy... easy you both.* A shard spun out of the maelstrom, stabbing Erlin straight between the eyes before melting into his skull, making him cry out in pain. A second shard darted towards him and Gusemy instinctively lunged forward to catch it, only for Obrett to knock his hand out of the way.

Don't! Leave them alone! An image flickered before him; a limp, blank eyed female kerbal, head swathed in a Kerm leaf cluster. Horrified, Gusemy snatched his hand away. As if sensing his agitation, more shards swooped at them, then hung before them quivering. One of them brushed against his mind in an explosion of panic and disjointed, blotchy images that knocked him back on his heels. The shard shivered, questing towards him before flicking round and diving for Erlin's prone form. Gusemy fought the urge to vomit as the two shards already embedded in his friend's skull bulged out to meet it.

Get out of here, Gus. Erlin's pain-wracked mental voice was barely discernable. *You too, Obrett. I can't...can't hold them with you both here to distract them.* He turned his head to face Gusemy. *You've done all you can old friend... took...took the shock...pulled me back from the edge.* Seeing his friend waver he forced himself to his feet, then fell to his knees as yet another shard slammed into the back of his head. *Go, Gus. For pity's sake, go!*

Forcing down her own roiling emotions, Obrett grabbed Gusemy by the shoulders and spun him round to face her. *Do you want to kill him? Come on, Blight you - do as he says!* For a moment, Gusemy struggled in her grip, then with a look of utter despair etched into his

face, he faded away before her. Choking back a sob, she turned away from Erlin's sudden cry and *withdrew*, leaving the other on his knees amidst a gathering storm.

"What the *Kerm* is going on in there?" the second medic breathed. A jagged EEG trace filled the screen before her, anything that might have resembled kerbal brainwaves buried under a dozen or more almost identical, wildly fluctuating traces.

"Exactly that," her colleague said tautly. "Status of the other two?"

"N...n...normal Communion patterns," the third medic stammered. "V...v...vigorous but within normal limits."

Suddenly the centre screen turned solid white, snapped back to normal, then collapsed to flatline. An alarm shrilled, startling the medics to their feet, then abruptly fell silent, the horizontal line puckering into the subdued waveforms of a deeply unconscious kerbal. Two, perfectly normal sets of EEG traces whisked quietly across the surrounding screens.

Obrett groaned and rolled over, head slipping out from under the leaf cluster. Relieved to be doing something, the second medic hurried over to the bed and helped her sit up.

"Water?"

Head in her hands, Obrett nodded. She heard Gusemy groan and then the snap of elastic against skin as he peeled his EEG band off. The medic pressed a mug of water into her hands and she sipped at it, unable to meet Gusemy's eyes.

"Is he alive?" Gusemy's voice was a hoarse rasp.

"Alive, yes," the second medic said, "but unconscious." She saw the look of dread on his face. "Not comatose though. More like an exceptionally deep sleep."

Gusemy slumped against his pillows. "And thank the *Kerm* for small mercies." He squeezed his eyelids closed. "Because small mercies are all it bloody well gave him." The medic waited for him to regain his composure.

"Before he passed out, we saw normal brain function consistent with someone breaking Communion. We think..."

"So what triggered the alarm?" said Obrett flatly.

The medic squirmed. "Before he passed out, he also flatlined briefly." She held up a hand. "Recovery was almost instantaneous - in my experience, not enough to cause lasting damage."

The first medic gently lifted Erlin's eyelid and shone a penlight into his eye. "Strong pupillary reflex, pulse rate is depressed but steady, breathing is normal." She got to her feet and gave Obrett and Gusemy a reassuring look. "We'll continue to monitor him but his vital signs are consistent with deep, slow-wave sleep rather than neurological damage. Given the strain he's just been under, that's probably the best state he could be in right now."

Obrett lifted her head and looked at Gusemy. "You heard the doctor. Leaving him was only thing you could have done. Gusemy ignored her, eyes fixed on his friend's prone form, and she turned to the three medics. "Gusemy and I should prepare a report for Erlin's case history. There's no hurry - we're not going anywhere until he wakes up."

A savoury aroma invaded the darkness. A wholesome, familiar aroma, redolent of time spent with kerbals... with *other* kerbals.

Erlin stiffened, ignoring the sudden itching from around his waist. For a fleeting instant, a fading melange of scents assailed his nostrils, the knowledge of what each of them meant fading like a dream, melting like cream stirred into milky sapwood; lending texture and flavour but no discernible change.

Which didn't seem quite right.

Erlin's eyes rolled behind their lids, memories cascading through him. Two figures holding him fast against against the maelstrom. Shards and fragments of a shattered mind burying themselves in his as one despairing figure faded away from him. Turning his back on the broken remnants of his Kerm and allowing its essence to melt into his own.

Erlin's breath caught in his throat and he coughed. A spoon clattered against a bowl; he heard the patter of running feet, sensed a warm presence kneeling beside him.

"Erlin?"

Light broke in past slitted eyelids. Erlin coughed again, eyes screwed shut against the sudden glare. Another patter of feet and another presence sensed beside him.

"Boss?"

Erlin forced his eyes open. Two faces stared back at him, wide-eyed with...

Hope? Concern? Fear?

Deep within him something gelled and the faces swam into focus.

"Gus? Halsy?"

"Boss!" Halsy turned away and blew his nose loudly. "Preserve me but... its good to have you back." He turned back to face Erlin, tears running down his cheeks. "By all the Groves, we thought we'd lost you."

A worm of unease crept into Erlin's stomach. "How... how long was I out for?"

"Over two days," said Gusemy thickly. "Even the vines didn't take at first - just curled themselves around you without doing anything. That's when we feared the worst. Even when they took, you didn't so much as twitch."

The sole medic in the room stepped forward with a mug of water. Erlin gave him a grateful look and took a mouthful, sluicing it around his mouth before swallowing.

"Kerm, that's better." His face froze. "Is it...?"

Halsy wiped his eyes and took a deep, steadying breath. "The black spots have gone," he said. "Not a blemish on any of the saplings. As far as we can tell they're physically fine but..." he looked helplessly at Gusemy.

"Mentally?" Erlin finished. His face went very still. "I thought I remembered something before I woke up, Gus, but it's gone now. The Communion is still clear enough - you and Obrett and... and everything else. Then I remember letting the shards go, feeling them begin to melt just before everything went black." He paused. "I need to speak to Jonton. He'll have the answers if there are any to be had."

"We'll call him first thing in the morning." Gusemy checked his watch. "Barkton's a couple of hours behind us so it'll be just after midnight there now. No trains running even if he did set off now."

"Two in the morning?" Erlin blinked. "We're both long past being able to pull all-nighters, Gus - no wonder you look dead on your feet." His voice softened. "Thanks for looking out for me, old friend. Out here - and especially in there. Now scoot. Get some sleep."

To Halsy's eyes, Erlin's smile looked strained and weary but Gusemy just nodded. "I think I'll do that." He gripped Erlin's shoulder, his knuckles turning briefly white. "You just stay awake till I get back. Don't you get tempted to go back to sleep again."

"I'll stay up with him," said Halsy. He forced a smile of his own. "I'll even spare him the worst of the paperwork in case he nods off halfway through."

"Thanks for the lift, Ferry. It was good of you."

"Well it saved Meleny or Patbro from another trip to the Medical Centre. You really should learn to drive sometime."

Jonton sighed. "I know. In my spare time. Which reminds me - are you and Fred still on for Tiles night next week?"

"I managed to talk Fred into it," Ferry replied. "None of the others were keen - Jerdin's still halfway convinced that he'll be impaled on a Kerm vine if you lose a box."

Jonton stared straight ahead. "I'd hoped the village archivist..." He shook his head. "I suppose it's no surprise, given that he's been having to rewrite most of what we thought we knew about Kerm."

"There's only so much change a kerbal can handle in one go," agreed Ferry. "And it's been one thing after another ever since you planted..." He broke off at Jonton's woebegone expression. "For too long now."

"I just keep telling myself that the changes haven't been all bad." Jonton opened the car door. "Some days that's easier than others. Thanks again, Ferry."

"You're welcome."

Jonton watched Ferry drive away, sighed and let himself into Gerselle's hut. He found Enely and Meleny sitting at the kitchen table finishing their breakfast. Enely put his mug down as the kitchen door opened. "The Berelgan called for you, Jonton. The number's on the pad - I said you'd call back as soon as you got in."

Jonton froze. "Did you get a name?"

"Director Halsy Kerman." Enely looked worried. "I hope Erlin is all right."

Jonton was already dialing. He nodded at Enely and held up a pair of crossed fingers. "Good morning. May I speak to Director Halsy please? Yes of course. It's Jonton Kermol returning his call." Jonton's heart thudded in his chest. "Thank you. Good morning, Director. Sorry I missed you earlier - how can I help you?"

The top sheet of the notepad ripped free. "But he's awake now? And the Kerm? No...no I wouldn't expect it to be yet. Oh preserve me yes." Jonton crumpled up the torn sheet of paper and tossed it aside. "No flights, I quite understand. The trains are still running though? Of course - I'll call ahead with arrival times as soon as I have them. Thank you, Director."

Jonton put the phone down with an audible click.

"You're going to the Berelgan," said Enely.

Jonton nodded. "Erlin went an-Kerm last night with the help of Gusemy and Obrett." He saw the immediate concern in both his friends' eyes. "They're all recovering well. Erlin is sleeping now but he was lucid - and entirely kerbal, so far as Halsy could tell - when he came to last night."

Enely blew out his cheeks. "He let the shards go?"

"He did. And Gusemy and Obrett both anchored him rather than..." Jonton swallowed.

"Rather than trying to anchor the Kerm as well."

"A small mercy is better than no mercy." Enely gave him a sad look. "At least we were able to make sure it didn't happen again."

Meleny crossed the room and hugged him. "Are you going to tell Elton?"

Jonton let himself be held. "I don't expect I'll have a choice," he said. "He'll probably be watching over Jonelle and I have to Commune with her anyway." He hugged Meleny back. "I'll be taking Joenie with me of course."

To Enely's surprise, Meleny didn't argue. "I think that would be best. She needs a break from that Kerm." She sat down at the kitchen table. "I've given up trying to stop her Communing with Jonelle - and Adbas has too."

Jonton didn't miss the pointed undertone. "I know," he said tiredly. He opened his mouth then thought better of it and shook his head. "I don't know what we would have done without you - any of you. Where are the two of them by the way?"

Meleny inclined her head towards the sleep room door. "Joenie is in there. Adbas is out rafting with his father and two of his other friends."

Jonton winced. "I'll talk to her on the train. You're right - it'll do her good to leave the hut for a few days." He walked over to the door. "Excuse me a moment."

The white light of Communion faded into a vista of two neighbouring mindscapes, the silverlace draped Kerm tree still standing between them. Jonton cast his mind outward, searching for Joenie, and found her drifting over a densely woven tangle of coloured threads, engrossed in conversation with Jonelle. Frustration, overlaid with determination billowed out from both the youngsters, one doing her best to understand, the other doing her best to explain. The tangle shifted fractionally and a sudden sunrise of comprehension lit up Jonelle's mindscape, followed by a blur of excited thoughts tumbling over each other almost too quickly for Jonton to follow.

A quiet pride brushed at the edge of his consciousness. *<good morning, Jonton>*

Good morning, Elton. May I speak to Joenie for a moment please?

<of course> The Kerm's mental voice came tinged with amusement. *<if you can pull her away from my daughter>*

Jonton watched Joenie dive towards the tangle, sensed her reaching out to it. *That might be difficult*, he agreed. His mental voice turned serious. *I'm afraid I need to take Joenie away for a few days. I've been asked to go to the Berelgan and it wouldn't be fair on Meleny or Enely to leave Joenie with them.*

Elton caught the unspoken feelings behind Jonton's carefully chosen words with ease. *<Enely has already done much for us all and Meleny needs to spend some time with her own family>* he said *<and my daughter needs to learn that Joenie should also spend time with her kerbal family>* Contentment and wonder swirled around Jonton swiftly pulling into a keen focus *<the Berelgan? Professor Erlin has joined us?>*

He went an-Kerm last night, said Jonton. *I'm told that he, Ambassador Gusemy and Keeper Obrett are recovering well...*

<but there is much that he will need to know. Go to him, First of my Keepers. He will need your help>

Jonton reached out to his daughter, who was still engrossed by the shifting colours around her. He studied them for a moment, remembered knowledge from his time spent an-Kerm still strong enough for him to sense their newfound balance.

<Jonton>

Hello, Jonelle. Your tapestry is looking much better today.

<yes, is nearly mended. Joenie helps sometimes but sometimes gets in way too>

She'll learn, Jonelle. You're a good teacher. The young Kerm backed away from him shyly.

I do not get in the way! Joenie sent indignantly as she pulled back from the tapestry and turned to face her father.

<not as much now. Not now you stop trying to touch>

Jonton chuckled. *She's been like that ever since she learned to crawl, Jonelle.* An image of a purple-haired, juice-smeared kerblet sitting beside a bowl of mashed blueberries, flickered past, followed by a wave of embarrassment from Joenie.

Dad!

Sorry, sweetie... Jonton felt his daughter's furious glare and relented. *Anyway, much as I hate to take you away from your lessons, we've got to go I'm afraid.*

The mindscape darkened. *<Joenie wants to stay here>*

I know she does, Jonelle but this is important. Jonton summoned up an image of himself, swathed in Kerm leaves standing against Elton's trunk. *Has your daddy shown you this?*

<yes. Before daddy became daddy, you were part of him>

That's right. So now we're trying to help more kerbals do the same, so that we can have more Kerm like your daddy - or like you. One of those other kerbals is called Professor Erlin and he needs my help - because I'm the only person who really knows what it's like to be part of a Kerm.

<kerbals need help like Gerselle needs help? Gerselle is part of me but doesn't talk any more>

Jonton went very still and Joenie sensed her father's presence closing in on itself. *No. Not like that. But that's why I have to go, Jonelle. If Professor Erlin is...safe, then nobody needs to be like Gerselle ever again.*

Joenie began to snifle, rivulets of bleak grey leaking out from around her feet and turning the mindscape around them the same cheerless shade. Jonton tensed as one of the currents coiled around him, seeping through his mental barriers and tapping the wellspring within...

The barriers crumbled, swept away by a tsunami of grief shot through by roiling black currents of despair and self-loathing. Joenie cried out as the bitterly cold torrent rolled over her, knocking her off her feet and sending her tumbling through the icy blackness...

... and into the branches of a Kerm tree, its leaf clusters all twisted shut. The silverlace erupted around her before settling on the higher branches, safely out of reach. Healing vines emerged from the surrounding soil, their tips clamped tightly shut as they crept towards Jonton.

<forgive the intrusion, my daughter>

Sparks flared as the gnarled vines wrapped themselves around his waist and tugged him over the line separating Elton's mindscape from Jonelle's. Jonton shuddered, clutching at them for reassurance. The black waters gradually drained away, leaving a stagnant grey mud

behind on both sides of the line. Joenie clambered down from her branch and joined her father.

Dad?

Jonton put his arm around her wordlessly. The vines around his waist slithered back into the soil and vanished. Bending awkwardly from the waist, he bowed towards Jonelle's presence. *Please excuse us, Jonelle.*

<you will go. Help other kerbal. Look after Joenie>

I will do all of those, Jonelle. I promise.

The door opened. Meleny turned to see a red-eyed Jonton enter the kitchen followed by a very subdued Joenie.

"Could you start packing, sweetheart? I'll be through in a minute."

Joenie nodded, eyes still downcast, and hurried back into the sleep room. Jonton looked at his friends. "We're both going," he said quietly. "No need to tell Elton - he already knows." He cleared his throat. "I'm sorry to trouble you again, Meleny, but could you give us a lift to the station? Enely - could you...?" Jonton jerked his head towards the sleep room door.

"My water is still yours, Jonton - and I'll keep the speargrass from your fields."

The evening sun poured in through the vaulted steel and glass roof of Barkton Central Station. Joenie ran her hand over one of the ornately wrought pillars holding it up, tracing one of the many leaf cluster motifs worked into its surface. She tipped her head back, eyes following the pillar upwards until it splayed out into a set of supporting arches, each cunningly shaped to resemble a Kerm branch. With a flutter of wings, a bird tried to roost on one, squawking indignantly as it failed to find a purchase between the thin steel leaves decorating its surface.

"An ironic design really. Bar-katon railway station held up by Kerm trees. But you'd know more about it than me, Keeper Jonton."

Joenie jumped, clutching her father's hand and staring at the uniformed kerbal standing beside them. Jonton blinked. "I suppose it is," he said. He searched for something to say. "I expect all that was long forgotten by the time they built this station."

Another column of soldiers marched past, heading for a different platform. Joenie pressed herself against Jonton's leg and stared at them. The uniformed stranger smiled at her reassuringly. "Don't worry - you'll have a compartment to yourselves." He turned to Jonton. "Your seats have already been booked. One adult, one kerblet to Olbinad via Cabaralb and the Capital. We were asked to get you there as quickly as we could so you'll be on the troop transport to Cabaralb tonight arriving lunchtime tomorrow." He pressed an envelope into

Jonton's hands, "You'll be on the first train out to the Capital the next morning. Accommodation vouchers - bed and breakfast, naturally - and onward tickets are all in the envelope."

Jonton frowned. "Not that I'm ungrateful but this is all terribly organised. May I ask who...?" He was unprepared for the look of awe in the other's eyes.

"We don't often get VIP orders from the President's office." The look of awe turned into an abashed glance. "Also - you won't remember me but I Communed with you." The station manager coughed. "Several times in fact and I'm far from the only one here. Even if you weren't getting the official treatment, Keeper - well as far as the team here are concerned you'd be a VIP anyway."

Ohhh-kay. "Why - that's very kind of you. Please pass on my thanks to everyone who organised everything at short notice." Jonton gestured at the soldiers lining up to board their trains. "Especially with all this happening."

An unreadable look crossed the manager's face. "Think nothing of it, Keeper." He shook his head. "It's ridiculous but I still have to take you through security I'm afraid." He saw the puzzled look on Joenie's face and turned to look at her. "Nothing to worry about, young lady. We just need to make sure that nobody has hidden a Kerm seed in your luggage. We don't want anyone planting them where they're not supposed to, do we?" To his surprise, Joenie's faintly scornful look gave way to a vigorous shake of her head.

"Well I wish all our passengers were as sure as you are." The station manager summoned up a professional smile. "If you'd just like to follow me then."

"Please, there's really no need."

"We insist, Keeper. Jerl and me'll be fine in the dormitory carriages with the soldiers. Wouldn't be right to put you and yours in with them though." The train driver pointed at the door to the front cab. "Bill and Rod'll be fine too. We'll keep the noise down at shift change as best we can."

Jonton held up his hands with a smile. "Well in that case, thank you very much. It's very kind of you. He and Joenie followed the driver along the carriage and into a small but homely cabin with curtains at the window and two already-made beds facing each other across a narrow folding table. After giving them a quick tour of the cabin amenities, the driver bowed to Jonton and left, sliding the door shut behind him. Whilst Jonton busied himself stowing their luggage in the storage racks over their beds, Joenie took her bag and disappeared into the adjacent moss room.

Jonton looked up from his book as Joenie emerged in her night clothes and felt a sudden pang at the sight of her wrinkled nose. *So like her mother.* "Everything alright?"

"There's no moss in the moss room," said Joenie. "Only paper. That's *disgusting.*"

Jonton stifled a smile at her indignant look. "I suppose it's hard to grow moss on a train," he said, "and dried moss would be worse than paper. Which side would you like?"

Joenie shrugged. "Don't mind." The carriage juddered under their feet and she grabbed hold of the table to steady herself. "This one's fine." She curled up at one end of the bed and stared out of the window, watching the station and then the scalloped buildings of Barkton town centre sliding by. Jonton put his book to one side and joined her at the window as streetlights and brightly lit windows gave way to and the setting sun, smeared across the horizon in bands of cerise and orange, and the distant firefly glow of Kerm Groves.

"How about a *djeng* before bed?" Jonton stood up and studied the miniature water heater set into the wall. He pressed a button and presently the rushing noise of water beginning to boil filled the little room. "Where do you suppose they've hidden the cups?"

Joenie peered under the table and found a tiny cupboard stocked with two cups and a selection of hot drink materials. "Here." She handed the cups and two sachets to her father. The heater clicked off amidst a throatier rumble of water boiling in a confined space and a green light came on. Jonton clipped one of the cups into its receptacle and pressed the second button, filling the cabin with the fragrance of surprisingly fresh *djeng*.

"Well this isn't so bad. Fresh beds. hot *djeng* and when we wake up we'll be most of the way to Cabaralb." Jonton passed the full cup to Joenie before preparing his own drink. He sat down, watching his daughter rub her temples as she stared out at the darkening sky, a distant look in her eyes. Jonton nodded to himself and sipped his drink in companionable silence. When Joenie pushed her empty cup across the table and retreated under her bedcovers, he simply drew the curtains and dimmed the cabin lights.

"Peaceful night, Joenie."

The train drew up at Cabaralb station amidst a squeal of brakes and a clamour of voices from the next carriage as the soldiers disembarked. Jonton and Joenie followed at a distance, Joenie clutching her bag and sticking close to her father's side as rifle-carrying, green and brown clad figures marched past her in all directions. They stopped by a large marble slab on the main concourse and Jonton looked around to get his bearings before studying the relief map of the town centre carved into its top. "It's not far to the hotel, Joenie. We go out of the station, straight across the main road onto Ralador Avenue and then take the fourth street on the right." He pointed at one of the taller buildings on the map. "That's the hotel there, look."

The billboards outside the station were plastered over with curfew notices and the main road was crammed with drab green trucks parked end to end. Groups of soldiers stood by them, checking backpacks and unloading crates and heavier items of equipment. Jonton caught sight of the warning symbols painted on the sides of one stack of crates and pressed his lips together in a thin, hard line. "Come on, Joenie - I don't think we should be here."

Joenie nodded and followed him across the road.

Further back from the station, the traffic noise diminished sharply, replaced by the sounds of birdsong and the rustling of wind through the trees. A solitary tik-tik whirred past, the clicking of its chain all but swallowed up by the silence. The few kerbals that they did meet hurried past, not stopping to apologise or even look up as they bumped into Joenie's bag or brushed her aside. Jonton scowled and stepped around his daughter, keeping between her and any oncoming pedestrians.

The fourth street on the right led straight down to the harbour, the angular grey shapes of warships at anchor clearly visible in the distance. Jonton stared at them wordlessly, oblivious to Joenie tugging on his hand.

"Is that the hotel, Dad? Dad?"

Jonton shook his head and turned to see where Joenie was pointing. Three towers stood in a triangle, the hut-shaped buildings around their bases merging into a single structure. Circular windows dotted the towers, apparently at random, and a spiral of steel and glass walkways linked them together. A sign above the main entrance proclaimed the resulting edifice to be the Grove Hotel. Jonton blinked. "I guess so, sweetheart. It's in the right place and it's got the right name. But I think I preferred the version on the map," he muttered under his breath.

"It doesn't look very much like a Grove," Joenie said critically, as they made their way across the road and in through a strange rotating door made of glass.

"No," Jonton agreed. "It doesn't." He walked over the reception desk, pulling the envelope of vouchers out of his pack as he went. "Good afternoon. Do you have a reservation for Jonton and Joenie Kermol?"

The receptionist smiled at him, not bothering to check the leather-bound book on her desk. "We do, sir. Could I see your vouchers please?" She examined the embossed cards that Jonton handed her. "Thank you. Your room key is here, sir - will you be needing a spare?" At Jonton's answering nod, she unhooked a second key from under her desk and handed it to him. "Breakfast is served from seven onwards, so you'll have plenty of time to catch your train in the morning. If you need a wake-up call, just call reception from your room and I'll arrange one for you. We have a cafe next door if you need anything for lunch and our restaurant opens at six for dinner." An apologetic look flicked across her face. "We do have a list of local alternatives but I'm afraid I couldn't say if any of them are still open."

"I quite understand," Jonton replied. "Thank you for all your help."

"My pleasure, sir." The receptionist smiled again. "Please make yourselves at home."

The afternoon was not a success. After leaving their bags in their room and a rather meagre lunch, the two kermol set out to explore the town. At first, Joenie trotted along ahead of her father, staring up at the rooftops and more than once, Jonton had to pull her to one side as a lamppost loomed. Eventually though, even the birdsong and the shady, tree-lined boulevards weren't enough to break the oppressive silence or to make up for yet another, nearly-deserted street of stone buildings and stone underfoot.

To Jonton it seemed that every second street revealed a spectacular view of the old harbour, now marred by gun emplacements and the predatory silhouettes of warships against the horizon. Turning his back on them, he led Joenie up a narrower street, lined with shuttered windows, fronted by long wooden tables and benches set out under striped awnings. They emerged in a leaf-strewn park, lined with unkempt flowerbeds and dotted with weed-choked rock gardens. Joenie stared at it all in dismay. "Don't they have Kerm to keep everything tidy? Jonelle would never let all these weeds grow."

Jonton's face tightened at the sight of a large, flattened-down patch of raw earth, its edges ragged with overgrown grass, gone to seed. "I don't think they do," he said. "I suppose all the gardeners must have left when the fighting started. Come on - lets go back to the hotel." He breathed a silent sigh of relief as Joenie just nodded and turned away.

"We only have a limited menu at the moment I'm afraid," The waitress handed Jonton and Joenie a typewritten card each.

"That's quite all right," Jonton answered with a smile. "After seeing the town this afternoon, I'm surprised that you're open at all," He studied his menu. "Could we get a jug of water for the table please?"

"Certainly, sir. Can I get you anything else to drink?"

Jonton looked across at Joenie. "What would you like?"

"Um - could I have a redfruit juice?"

"Of course you can. Would you like ice and mint with it."

Joenie blinked. "I... think so."

The waitress smiled at her. "Why don't you try it with mint and if you don't like it, I'll bring you a fresh one."

"Um... okay. Thank you."

"Make that two redfruit juices please," said Jonton. "With mint and ice for me."

"Certainly, sir. I'll be right back."

Joenie watched the waitress go before looking at her card with a frown. "There's a lot of food here, Dad. I don't think I can eat all of this."

Jonton looked at her in surprise. "It's not all for us. Haven't you been to a restaurant before?" He cocked his head on one side. "Actually, I'm not sure you have. The last time you went with your Mum and me, you'd have been too young to remember. Anyway - you just choose one dish and the people in the kitchen over there will cook it for you. And if you're still hungry afterwards you can have a dessert."

Joenie brightened up. "Could I have apple and sapwood?" She pointed at her menu. "It says they've got apple and sapwood."

"Maybe. If you eat all your first course."

At that moment the waitress reappeared, carrying two tall drinks on a tray. She set one down in front of Joenie, making the ice clink against the side of the glass. Joenie took a cautious sip and her eyes lit up. The waitress laughed. "I guess I won't need to bring you a fresh one." She turned to Jonton. "What can I get for you?"

"The creva rakottka looks good." Jonton looked slightly abashed. "What is a rakottka exactly?"

"It's kind of a layered bake of smoked creva, sliced plom and sour pricklyberry mash. According to chef, it's an old Wakiran dish, from when their sailors used to keep salted meat in barrels of pickled fruit to stop it going off,

"Well I'm not sure about salt and pickles," said Jonton, "but the smoked version sounds delicious. A creva rakottka for me please. With mashed roots rather than natas."

"Perfect." The waitress turned to Joenie, who had already drank half of her redfruit juice. "And what can I get for you, honey?"

"What's special cavalla?"

"Well now, cavalla is just a fancy name for eggs baked in a herby sauce but chef makes hers special by mixing in some grated mushroom and serving it over slices of grilled breadfruit."

Joenie looked at her solemnly. "That sounds nice - can I have some of that please?"

The waitress smiled. "Of course you can, honey. One special cavalla and one creva rakottka coming right up."

By the time their food arrived, the two redfruit juices were long gone and Joenie dug straight into her baked eggs before Jonton had even had a chance to pick up his fork. The waitress put a bowl of flatbread strips "for mopping up" in the middle of the table and left them to their meal.

She returned to find Joenie wiping a piece of flatbread around an already spotlessly clean plate. "Well now, I guess I can tell chef that you liked her cavalla. Can I get either of you a dessert?"

Joenie just nodded, her mouth still full of food. Jonton sighed. "Could I get one apple and sapwood and just a coffee for me please?"

"Certainly." The waitress winked at Joenie. "The apples are a bit wrinkly so we'll just have to give you more sapwood to make up for them."

The next morning, a fed, rested, and noticeably more cheerful Joenie, followed her father back to Cabaralb rail station. After being searched for Kerm seeds, they were whisked onto another troop train bound for the Capital. After a while, the novelty of watching the countryside go by began to wear thin and she retrieved a sketchpad and pack of coloured

pencils from her bag and spread them out over the table in front of her. For a while Jonton watched her drawing, before turning back to the view outside.

The train sped northeast, following the Kolan coastline for a while, then leaving it far behind. Jonton rested his chin in his hands and stared out the window at a countryside speckled with sparse copses of Kerm trees surrounded by lenticular patches of Blight, each marking the site of a new Grove planted to make use of every last scrap of land. Other, more overt signs of war, were clear to see: a convoy of camouflage painted trucks waiting at a level crossing, a backhoe loader escorted by a squad of armoured cars, a ragged pall of smoke hanging over a distant town or Grove. Jonton glanced at Joenie, relieved to see her still engrossed in her drawing. Then he took a closer look at the patchwork of shapes she was colouring in, and sighed.

"What are you drawing, Joenie?"

Joenie looked up. "It's a picture for Jonelle. I'm trying to draw all the colours she shows me when I'm talking to her."

Jonton nodded, suddenly very glad that they'd been given a private compartment again. "That's what I thought. I think Jonelle knows all about those though. Why don't you draw something else for her - maybe some flowers or that paper mallek you made with Enely, or Adbas's new raft."

A flicker of guilt showed in Joenie's eyes. "What new raft?"

"The one that Thombal made for him," said Jonton gently. "The one that he took his other friends to see the other morning when you were talking to Jonelle." He raised his hand. "I know that you like her - and I'm glad that she likes you too - but you need to leave some time for your other friends as well. Believe it or not, you'll even make Jonelle happier that way."

An all too familiar, mutinous expression appeared on Joenie's face. Jonton counted to ten under his breath. "Listen to me please, Joenie - not as your father but as a Keeper." He paused, collecting his thoughts. "A Keeper's job is to look after their Kerm. Which is a funny sort of job when you think about because they're quite capable of looking after themselves." Jonton rubbed the scar on his forehead. "So what do you think it means - how do you look after a Kerm?"

Joenie's brow furrowed. "Jonelle says she gets lonely," she said at last. "Do other Kerm get lonely too?"

"They do," said Jonton. "Not as much as Jonelle, I don't think, but they do. Even before Elton Awoke, it was always very easy to tell if he thought I'd been away for too long. But even more than that, he was always very curious about things that were happening outside his Grove. Do you remember the pictures of Grandma I showed you when I was still part of Elton?" He waited for Joenie's answering nod. "Where do you think those pictures came from? They couldn't have come from me - I was still in Grandma's pouch, remember."

"You looked grumpy," said Joenie. "Did the pictures come from Grandpa?"

"Exactly!" Jonton gestured at her sketchpad. "It sounds a bit silly but Kerm are trees - they don't have eyes. Their world is all about smells but kerbals aren't very good at understanding those." He tapped his head. "All those colours you see when you're talking to Jonelle aren't real - they're just your brain trying to make sense of all the smells that Jonelle is trying to share with you. Having eyes - being able to see things - is a very strange idea for a Kerm and it fascinates them. Even more than keeping their Kerm company, a Keeper's main job is to show them the world that they cannot see for themselves.

Jonton smiled. "I remember when the kerman first started flying rockets out at Barkton. They invited everyone - especially the Keepers - from the nearby Groves to go and see their factory and ask them any questions about the rockets and what they wanted to do with them, so Patbro and Ludvis and I all went. I came home late that night and stayed up for a while with your mother. You were only just big enough for her to take you out of her pouch and let me hold you..." Jonton shook his head. "Anyway, that night was one of the longest nights I'd ever spent Communing, Elton was so excited. I don't know how much he understood - I didn't really understand it all myself - but he wanted to *see* everything."

"I've never seen a rocket," said Joenie. "Well, only on television."

"If they start flying again, perhaps we could both go and watch a launch together," said Jonton. "But it doesn't matter - there are all sorts of other things you could share with Jonelle. Even if they're not very exciting to you, remember that she'll probably won't have seen anything like them in before in her whole life."

"Does that mean I'll be Jonelle's Keeper?"

"If you wanted to be. Jonelle is a very young Kerm. I think you could be a good Keeper for her." Jonton's eyes glistened. "As good as your Mum was." He bowed his head, hiding his face for a minute before looking up again. "It's a big, important job, sweetheart and you'd be by far the youngest Keeper I've ever met. If that's too scary then I'd understand." He looked at his daughter with pride. "You don't have to tell me now. If you want to talk to another Keeper who isn't your old Dad, then I'm sure Enely would be able to help you."

There was a knock on their cabin door and a muffled "Anything from the trolley?" Jonton got to his feet.

"Is it that time already? How about we see what they've got for lunch."

Chapter 90

Lab Coats and Lapel Badges

"Well, at least we got to see the Capital building."

"I suppose." Joenie rested her chin in her hands and stared out of the carriage window. "I wanted to go to the Grand Gardens too and see all the cactuses that Enely told me about. *And* I wanted to see the Wildlife Museum of Kerbin. *And* I wanted to go back to the cafe. There were *people* there - not like that other town." Joenie made a face. "I'm bored of trains - when do we get to the Berelgan?"

"Not until this evening," said Jonton. "I'll be glad to get there as well." He took a drink of tepid water from his bottle and grimaced. "I wish we could go back to that cafe too - one of their crushed ice sapwoods would taste really good about now."

"With mint." said Joenie, making Jonton smile.

"Not for me. We should grow some when we get home though. Fresh prickleberry juice and mint on a hot afternoon?" Jonton smacked his lips, sighed and took another mouthful of water. "I spy with my..." He saw the look on Joenie's face and relented. "You'll like the Berelgan when we get there. It's not quite the same as the Grand Gardens - they have a lot of plants but most of them are for eating and they do quite a bit of research into how to make them tastier or better for you. But the really interesting thing they're doing is working out how to grow plants on another planet."

"What?" Joenie's head snapped round. "The Mün?"

Jonton shook his head. "Duna. You can see it in the sky sometimes but it's so far away that all you can see is a little red dot. The kerman have sent robot spaceships there already to take pictures and test the soil. As far as they can tell, it's just looks like a big desert; lots of dust and dirt but no proper soil. The air is too thin to breathe properly and it's freezing cold - so cold that there are places where you can find huge sheets of ice buried under the dirt." Jonton rubbed his forehead. "So it's a really, really hard place to grow plants but the

scientists at the Berelgan are trying to work out how to do it so we can send people to Duna and not just robots.”

Joenie’s eyes lit up. “Jonelle could help them! She’s been showing me how to mend the soil in our garden - she could tell the scientists how to turn dirt into proper soil!”

“Maybe with some help from Elton,” her father agreed. “Do you remember when Professor Erlin and his friends came to visit? It was just after we made your sandpit and I showed you the worms?”

“With the yellow beads?”

“That’s right. I showed Professor Erlin the worms too and he got very excited because he thought I could help them.” Jonton tapped his chest. “They thought I could be a talking Kerm who could understand their experiments and tell them if they’d worked or not. But now they might be able to just ask Elton or Jonelle to teach them all they need to know.”

Joenie gave him a doubtful look. “I don’t know if Jonelle would talk to them.”

Unless you were there too, Jonton thought. *Which I’m not so sure about.* “Maybe not,” he agreed. “Perhaps they should just talk to Elton to start with.”

Joenie scrunched up her face in thought. “Hold on - I thought you were going to help Professor Erlin become part of his own Kerm. Couldn’t he be his own talking Kerm?”

“Probably,” Jonton held up his hands. “I don’t know how much the scientists already know, Joenie. If they still need to do a lot of experiments then having Elton or Jonelle to help them might make things faster, but I’m just guessing.”

“Okay.” Joenie took her sketchpad out of her bag and began doodling on it, a faraway look in her eyes. Jonton watched her for a moment before retreating back into his second book of the journey.

By the time the train pulled in at Olbinat station, both travellers were tired and saddle-sore. Joenie dragged herself out of her seat and followed her father onto the platform, scowling at the other passengers around her. She dropped her bag and clamped her hands over her ears at the sudden raucous announcement that the the train from the Capital had arrived on platform 2. Jonton grabbed the abandoned luggage and found a place by a pillar for them to stand and wait for the crowd to disperse. He looked down the platform and, much to his relief, saw a poncho-clad kerbal holding aloft a signboard with their names printed on it. He tapped Joenie on the shoulder and pointed. “This way, sweetheart.”

“Jonton? Joenie? Good to see you - I’m...” Their companion winced as another announcement blasted out of the speakers overhead. “Kerm’s sake. Sorry - I’m Mallas. I’ve got a car waiting outside, so if you’ll follow me, we’ll get out of this madhouse.” He led them along the platform and across the main concourse, nimbly avoiding the worst of the crowds. Looking around, Jonton noticed the absence of soldiers around the station although he cast a puzzled look at a group of workers by the exit, dressed in blue boiler suits, with what appeared to be a lopsided white cross emblazoned on the chest pocket.

"Whew, that's better." Fragrant blossom fluttered down from a single enormous sapwood tree planted on a grassy island in the middle of the car park and tall leatherbark trees shaded the parking bays from the evening sun. "Wish they could plant more greenery inside the station too." Mallas stopped by a dusty off-roader. "It's a bit of a drive to the Berelgan I'm afraid but there's a cooler in the back with ice water, bread and fruit in, if you're needing a bite of supper. Hop in."

By the time they'd left Olbinat behind, Jonton and Joenie were both onto their second bottle of ice water. Joenie held hers against her head, letting the beads of condensation trickle down her face. Jonton tore a hunk of bread off the loaf and chewed on it as he watched the fields roll by outside.

They drove through a belt of woodland before emerging into fields again, these planted with a wider range of crops and laid out in neat grids. Copses of trees and the occasional low roofed building broke the monotony, and hedgerows large and small festooned the landscape, marking out roads and separating one field from the next. Mallas pointed out one of the larger copses. "That's our sapwood plot. One of the oldest parts of the Berelgan and very popular with the staff. Wild sapwood prefer marshes and wet soils - one of the first serious research programmes carried out here was to breed a variety that could thrive in drier conditions. Most of the sapwoods you'll see outside the tropics are descended from our trees."

Joenie's eyelids began to droop as the conversation turned to root networks and soil types. She perked up briefly at a mention of worm trails but soon her chin dropped onto her chest and her eyes closed. By the time Mallas turned in through a turreted brick archway and stopped by the gatehouse, she was fast asleep. The lowered voices and muted clunks of carefully closed car doors didn't disturb her, nor did the lowing of a startled creva, as it galloped away from their headlights.

The next thing she knew was Jonton's hand on her shoulder shaking her awake. "Wake up, Joenie, we're here."

There was a soft crunching of gravel outside followed by murmured voices. The back of the car whooshed open, the cool night air playing across her face. Joenie stirred, squinting at the lights outside, sensing the looming bulk of buildings around her.

"We'll get you folks to your rooms," Mallas said softly. "Let you get back to sleep, Joenie, and I don't expect your dad will be long after you. Long way from Barkton by train - don't envy you that journey at all."

Sleeping in a proper bed and bathing in a proper moss room the next morning did much to restore Joenie's good mood and after a quiet word from her father to one of the catering staff produced a bowl of fresh mint leaves for her breakfast juice, she began to feel positively cheerful. She looked up at the sudden knock at the door before turning her attention back to her second bowl of cold natas and sliced fruit. Jonton put his mug down and wiped his mouth. "Come in."

His eyebrows shot up at the sight of a familiar figure in the doorway. "Obrett! It's good to see you again."

Obrett stepped into the small, private dining room. "It's good to see you too, Jonton. Thank you for coming so quickly." She sat down at the table and poured herself a small coffee. "Good morning, Joenie."

Joenie swallowed a mouthful of cereal. "g'morning."

"I'm sorry we couldn't be here earlier," said Jonton quietly. "How is Professor Erlin?"

"Tired but doing well, all things considered," Obrett replied. She gave Jonton a look. "Or so he tells us. Neither Gusemy nor I have asked him to Commune with us yet, and so far he hasn't offered."

Jonton nodded. "It's... not easy the first few times," he said. "If I'd known as much, I wouldn't have been in such a hurry to invoke my Right with Donman. It took me a long time to pluck up the courage to Commune with Ger... with anyone else."

The corners of Obrett's eyes crinkled in sympathy. "I can believe that." She saw Joenie staring out of the window, drumming her feet on the table leg. "I think we're all finished here. Shall we go?"

Joenie hopped off her chair and made for the door. "I thought we were never leaving."

"Joenie," said Jonton warningly. Obrett just chuckled.

"Quite right. Easier if I go first I think - this building is like a gronnek warren."

They followed her along one wood-panelled corridor after another, including a long portrait gallery that Jonton had no recollection of from the previous night. Finally, they descended an ornately carved staircase, into a marble-floored entrance hall. Jonton blinked at the unexpectedly grand decor as Joenie ran on ahead, shoes clattering on the polished stone. A set of double doors led out into the Berelgan grounds, down a flight of, no less ornately carved, stone steps. They found an open-mouthed Joenie at their foot, staring at the Berelgan grounds stretched out before her.

Jonton took a deep lungful of air, savouring the smell of dew on grass, the rich aromas of greenery from the surrounding fields and even the earthier scent of distant livestock. He joined Joenie at the foot of the steps and surveyed the fields and glasshouses, feeling himself relax for what seemed like the first time in weeks.

"Where are all the Kerm, Dad? There's hardly any trees anywhere."

"They don't have many Kerm here, Joenie." Jonton pointed at the belt of woodland on the horizon. "I think they'll have some with the rest of the trees over there but apart from that, all the crops are looked after by scientists and farmers."

"Why?"

"Because they're trying to work out how the Kerm manage to look after so many different plants. So the scientists try to copy the soil around the Kerm trees and then they compare how well different crops grow in their copied soil compared to the ones growing in proper Kerm soil.

Joenie frowned as she thought it over. "I suppose." She cocked her head on one side. "Where are they learning to grow plants on Duna?"

Beside her, Obrett sucked in her breath. Joenie looked at her in confusion. "Dad told me about it on the train. They are aren't they? Learning to grow plants on Duna I mean."

"They are." Obrett pointed at five domed glasshouses arranged in a cloverleaf pattern and linked by tubular walkways. Each of the domes was built from panels of frosted glass and three of them were tinted in different shades of butterscotch brown. Three sturdier looking domes stood apart from the main complex. "In those glasshouses over there."

"Could I see them?"

Obrett smiled at the enthusiasm in her voice. "I'm sure that could be arranged. I have to take your dad to see Professor Erlin first though."

Joenie nodded sagely. "So that dad can help him become part of his Kerm." She didn't see the wondering expression on Obrett's face.

"That's right. They'll probably have a lot to talk about" Obrett raised her eyebrows at Jonton.

"I expect we will," Jonton agreed. "Especially if Professor Erlin wants to practice Communing."

"I hope so," said Obrett. She turned to face Joenie. "Either way, we should have plenty of time to visit the Project." She walked over to the off-roader, left where Mallas had parked it the night before. "It's quite a long way to Professor Erlin's Grove though, so I think we'd be better off driving there."

Joenie stared wide-eyed around the dimly lit glasshouse. The frosted glass walls grudgingly admitted the bright morning sunlight outside, their yellowish tint diffusing it into a uniform ochre haze which turned her skin a lifeless shade of murky green. Half of the space inside was sectioned off with more glass walls, behind them, white-coated scientists worked at their benches; the brighter light from assorted display screens penetrating the gloom. The rest of the glasshouse was taken up with evenly sized plots of dirt and gravel, dotted with patches of scabrous grey-green growths, and separated by boardwalks and low wooden fences. Joenie sniffed at the air, surprised by the smells of flint and dust rather than damp and mould.

Another pair of scientists looking, she thought, rather ridiculous in short laboratory coats and knee length rubber boots, were hunkered down by one of the plots, scraping samples

into small glass jars. One of them looked up and waved at her. Startled she recognised Mallas's face from the night before.

"Hi Joenie! Welcome to Duna!"

Joenie blinked. "It's very dark," she said doubtfully.

"Well the real Duna is lot further away from Kerbol than Kerbin is, so it gets less daylight." Mallas screwed a lid onto one of his sample jars. "So if you're working out how to grow plants there, the first thing you need to do is get the light right." He smiled. "You get used to it pretty quickly."

Joenie leaned over the nearest plot and studied the vegetation growing on it. She reached out to touch the nearest patch of crusty grey then thought better of it and settled for bending over to study the growth up close. "Why are you growing lichen and not clover?"

Mallas' companion gave her a startled look. Mallas put his jars in his lab coat pocket and came over to join her. "Clover would be better," he agreed, "but lichens are tougher and good at breaking down rocks into useful minerals."

"To feed other plants?"

"Exactly. We won't have Kerm on Duna - not to begin with anyway - so we're trying to work out other ways of turning sand and dirt into something like soil. And without a Kerm to control the whole system we need something as simple as we can get away with." His companion snorted and Mallas held up his hands.

"Okay, okay, simple is maybe the wrong word." He paused, looking at Joenie's expectant expression. "Do you know about evolution?"

Joenie shook her head.

"Well the whole thing is a bit complicated but plants and animals can change over time to fit in better with their environment and help them live longer. Which is a problem for all sorts of reasons but one of those reasons is that the Kerm have been helping us grow crops for so long now that all the insects and worms and other things that live in the soil have got used to having the Kerm around to tell them what to do..."

"Like Jonelle's tapestry." Joenie interrupted. "She's teaching me how to read it but it's complicated too. Probably as complicated as evolution." She saw Mallas's confused expression. "I think the tapestry is how she tells everything in the soil what to do, like you were saying."

Mallas blinked. "Jonelle is a *Kerm*?"

"Uh-huh. She's my best friend. Well - after Adbas anyway," Joenie added dutifully. "Dad thinks I need to spend more time with Adbas and the other kerblets in the village, so I can show Jonelle what they're like."

Mallas rubbed his forehead. "That sounds... right," he said slowly. "But aren't you a little... well young for all of that."

"Dad says I could be the youngest Keeper he's ever met," said Joenie, "maybe the youngest that Elton has ever met too."

The other scientist made a startled noise. "You know Elton?"

"Uh-huh. He's really old. I used to be a bit scared of him but he's okay now that he's got Jonelle. I think maybe he was a bit lonely before she woke up too."

"Joenie is Jonton's daughter," said Obrett, throwing the two scientists a warning look. "I'm showing her around whilst he's talking to Erlyn."

"She'll have plenty of time to see everything then," Mallas said with a grin. "Once the Prof gets talking he's hard to stop."

"That's what Elton says about Dad," said Joenie. "Sometimes he complains that Dad can't say anything without turning it into a long story but I think he's just teasing."

Curiosity burned behind Mallas's eyes, but he contented himself with a rueful shake of his head. "A Kerm with a sense of humour? That'll take some getting used to. Maybe when the Prof's... never mind." He smiled at Joenie, "How would you like to see the lab?"

Joenie nodded eagerly. Mallas disappeared inside and, much to her delight, returned with a white coat which he held out for her. "You'll need a proper lab coat first. Let me help you with the sleeves - there you go. Hmmm - bit big still. He fished a handful of test tube clips out of his pocket and knelt down beside her. "Let's see if we can pin this up a bit. It won't look very elegant but it'll stop you tripping over." Finally, he removed a blue elasticated cap from his pocket. "Better put one of these on too. That's it - tuck your hair up first." He studied her for a moment. "Good enough. Right then Dr Joenie - if you'd like to follow me?"

After an interminable wait in the locker room for the adults to change their shoes and find a lab coat for Obrett, Joenie trotted into the laboratory behind Mallas, oblivious to the smiles from the other scientists. Her nose wrinkled at the unfamiliar smells as she stared in fascination at the row of microscopes on one bench, the strange instruments on another and the racks of test tubes and complicated tubing all laid out in their own glass doored cabinet.

"You can use my bench - up you get." Mallas waited for Joenie to clamber onto his stool before busying himself at the fume cupboard. He returned with a slide, coverslip fixed in place and set it under his stereo microscope. "I've got some soil worms here. They're only tiny but they're really important. Take a look." He guided her hands to the focus controls. "Use this one first until you can see something, then this one to make it clearer."

Joenie peered into the eyepieces, forehead furrowed in concentration as she turned the focus knob. "There they are! Ewww, that one's ugly. And that one's only got a tail. Why is it still wriggling if it's only got a tail?"

Mallas looked puzzled for a moment, before his face cleared. "You can move the slide, Joenie. Rest your hand here by these little wheels - this one moves it up and down and this one moves it from side to side."

"Ohhh. I found it! I found its head! That one's ugly too."

"Is it the same as the first one?"

Joenie spun the stage controls back and forth. "I think so... no - that one's got a pointy head instead of a round one." She looked up, blinking water out of her eyes. "What colour are they?"

Mallas looked puzzled. "I'm not sure what you mean. I added a drop of stain to make them easier to see but apart from that I don't think they really have a colour."

Realisation dawned on Obrett's face. "Not that sort of colour. You're talking about Jonelle's tapestry again aren't you, Joenie?" The lab came to a gradual standstill, scientists abandoning their experiments to listen as Obrett described her long-ago Communion with Jonton and being shown the worm pheromone trails in Joenie's sandpit.

"You can't see the worms," said Joenie, looking up from the microscope again. "Just the yellow beads they leave behind for other worms to chase. Dad told me they were playing," she confided to Mallas. "but I think they wanted to make baby worms."

There was a hastily smothered chuckle from another bench. Mallas did his best to keep a straight face.

"She'll know more about it than you, Mallas," somebody called out.

"With two sapient Kerm to teach her? She probably does," came the good humoured reply. "If you ask her nicely, she might be able persuade them both to teach you dunderheads too."

Obrett saw Joenie's eyes light up. "I think," she said firmly, "that we'll need to speak to Jonton and Professor Erlin first."

Mallas caught her glancing at her watch. "That would seem wise. Tell you what - I'll go find Ambassador Gusemy and take him over to the Grove now, if he's not there already. One of us can bring Jonton back here once he's finished with the Prof, and we can have a quiet word with him then." He smiled at the engrossed kerblet bent over his microscope again. "I don't think you'll have a problem finding something to do whilst you wait."

"Good afternoon, Director."

"And a good afternoon to you also, Bill." Lodan shook the proffered hand. "I presume you've received the news from Foxham?"

"About the test flight? Yes." Bill smiled faintly. "It was the right decision, even if it wasn't quite where we thought our booster would be going. Being able to start construction with the Type Six will save a considerable amount of time." He held the door open for Lodan.

"After you, Director. I believe you know the way."

"Thank you." Lodan waited for Bill to fall in alongside him. "Ademone informs me that the new fairing will be able to accommodate the bridge modules and the redesigned forward shelter module."

Bill nodded. "And the spokes. We've been running extensive tests with the mockup sections and the mission planning team have reviewed Nelton's latest EVA sequencing report. Geneney thinks it looks plausible enough, although, like Nelton, he's not committing anything to the checklist until we've tested the basic sequence in the Pool." Bill checked his watch. "I think we'll start with the PAL if you don't mind, Director. Roncott's team should be ready for us in VAB-2 by half past three."

Lodan crossed the road to the Assembly and Fitting building and looked up at a dark rectangle of fresh paint, standing out against the lighter warehouse walls. "I see you finally dispensed with your sign."

"Yes. Shervin - vice Chair at Stratus Inc - made some pointed comments about it and it turned out that several of our other old contractors were of a similar mind, although they were a little more diplomatic out of deference to Jeb. We haven't decided on a new name yet - Geneney and Bob were in favour of Kerman Aerospace Engineering, although between ourselves, I think it's a little bland." Bill looked at Lodan. "And not especially tactful given how much support we're getting from the Groves."

"No," said Lodan thoughtfully. "I don't think President Obrick would be particularly impressed either. I certainly prefer an aerospace engineering company to a junkyard and spacecraft parts company but for the moment, I believe that something more inclusive would be in order." He stopped at the side entrance to VAB-2 and waited as Bill retrieved a key from round his neck. They stepped through into a narrow, concrete block corridor, Bill locking the door behind them. He led the KSA director past a row of offices and through a heavy fire door into the main assembly area.

"Excuse me a moment, Director." Lodan watched Bill speak briefly to a group of coverall clad engineers. One of them hurried off and returned with a spare laboratory coat and dust cap, handing them both to him with an apologetic look.

"Sorry, sir but..."

Lodan waved off the apology. "I wouldn't expect anything less." Donning his coat and cap, he walked around the large cylindrical spacecraft on its dolly, noting the undersized engine opposite a CORDS-3 docking adaptor mounted on a flared collar, the ring of thruster blocks mounted on one end, and the tangle of exposed plumbing where another ring had yet to be fitted. An open equipment bay occupied most of its upper surface, with a stowed photovoltaic array mounted along each flank. Squatting, Lodan found a third array mounted to its belly.

"We call it the PAL," Bill said, squatting beside him. "For Power, Assembly and Logistics. I'll spare you Jeb's joke about it being every kerbonaut's best friend."

Lodan raised an eyebrow and stood up, being careful not to touch the bundle of cables plugged into the underside of the spacecraft. "I presume you intend to launch it separately? It looks rather too large to fit into a fairing with the forward shelter module."

"We do," Bill confirmed. "The flight plan isn't so very different to a Pioneer flight - and actually, you could think of the PAL as a modified Pioneer service module. Rockomax will launch the station module, we'll launch the PAL, and we'll dock them together on-orbit. Both spacecraft are controlled remotely - we're working on a fully autonomous docking system but we're not quite there yet."

"And once they're docked, the PAL will ferry its module over to the space station?" A thought struck Lodan. "How do you maintain control of the station module before docking?"

"It stays attached to the the booster," said Bill. "The Type Six upper stage is already equipped with the necessary attitude control thrusters. Again, we'll be borrowing from the Pioneer flight profile with the PAL executing the payload extraction manoeuvre rather than the CSM. Once the station module is clear, the booster stage can be safely de-orbited."

Lodan nodded. "And the bridge module is equipped with its own thrusters if I recall correctly."

"Yes." Bill walked over to an equipment cart and checked the cables connecting to the PAL systems. "If you would care to join me at the console, Director, or anywhere behind the yellow line, we can proceed with the demonstration." He waited for Lodan to move back to a safe distance then touched a button.

A bundle of thick tubes, wrapped in what appeared to be white cloth and linked by solid, disc-like hubs emerged from the top of the PAL and unfolded into a mechanical arm, several metres in length. Bill touched a sequence of controls and the arm went through a series of movements, its different sections flexing, twisting and bending about each other.

"Assembly," said Bill. He flipped open a protective cage on the control panel and pressed the button underneath. One of the PAL's photovoltaic array covers sprang open, the hinged panel beneath slowly extending to its full length. "And power. A lot of our work has been focused on defining the range of movements available to the manipulator arm and writing failsafes into its control codes to provide a safety zone around the photovoltaics."

Lodan walked round to the back of the spacecraft and sighted along his upright hand, tipping it back and forth in thought. "I can certainly see where your manipulator would be helpful in docking the spoke modules," he said. "But unless it's a lot more flexible than it seems, I can't see how it would be able to handle more than three of them without repositioning."

Bill nodded. "You're quite right, Director. Allowing for that safety zone I mentioned, it can't handle more than three spokes. We did think about putting the docking adaptor on a rotary joint but never progressed that idea beyond the early design stages. Far simpler and more reliable to simply undock the PAL, rotate it to the desired attitude and re-dock."

"That makes sense." Lodan frowned. "You've put this all together in a remarkably short period of time."

"As I mentioned, Director, the PAL is largely based on the Pioneer service module - you'll recall that it was already fitted with an equipment bay. The SPS was somewhat overpowered for our requirements so we used a lander ascent engine instead. Goliath Products built the arm for us - it was originally commissioned for Munar resource extraction in the post-Pioneer 4 expansion but was put on hold as the Kerm Crisis developed. Goliath were one of the first of our contractors that Jeb approached once Stratus were back on board."

"Excellent. I look forward to seeing it working on-orbit." Lodan glanced at his watch. "I believe you mentioned that your team in VAB-2 would be ready for us by 3:30?"

"They ought to be," Bill took Lodan's lab coat and cap before removing his own protective clothing and handing them over to one of the engineers. "Thank you, Edsen."

On the way over to VAB-2, Bill described the planned PAL operations in more detail, to an attentive Lodan. "We'll be monitoring its systems throughout station assembly, especially the thrusters and propellant tanks. Once - if - Starseed moves into the main production phase, we're hoping to have a number of PALs permanently on-orbit as space tugs for shuttling colony ship modules to their assembly sites. We expect they'll also be used as auxiliary power modules for the ships during assembly, fitting and provisioning. Wernher is designing the LV-Ns as dual mode systems, capable of generating electrical power and thrust as required, but we'd prefer not to be running the reactors with that amount of traffic around them."

Lodan glanced at Bill's serious expression. "No," he agreed, deadpan. "That would seem to be an unnecessary complication."

"My thoughts exactly, Director. After you."

A group of engineers, dressed in the seemingly obligatory coveralls, stood in a loose group around a curious looking device that reminded Lodan of nothing so much as a broad cylindrical stack of folded towels packed between two aluminium discs, one of which was tethered to the floor. A rather larger group of more casually dressed onlookers stood back at a safe distance. One of the engineers stepped forward and glanced at Bill, who gave him a reassuring nod.

"Good, um, afternoon, Director. My name is Roncott Kerman, team leader for the pneumatics group."

Lodan racked his brains for something to say. "A pleasure, Mr Roncott. Would that be Roncott as in Roncott actuator?" He was answered by a delighted look.

"That's me, sir! Although the actuator was an, um, team effort - these things always are." Roncott took a deep breath. "Anyway, you're here for the demonstration, yes? Some background first then - it may help to um... explain why we've taken this approach." He stepped back and clasped his hands behind his back. "We'd been thinking about the spoke

modules for the colony ships - and for your space station, sir - for quite some time. Building them was never going to be a particular problem, although their length did present some, um, interesting challenges compared to other habitation modules that we've launched in the past."

Roncott shook his head. "No, the real problem was always going to be transportation. Each spoke module is mostly empty space you see, which makes them, um, inefficient to launch. We could easily fit a single module into a standard Rockomax fairing but even their, uh, enlarged fairing isn't big enough to hold two. And at two modules per spoke and eight spokes for a wheel, launching enough modules for, um, your space station would take a considerable number of flights, let alone the three wheels worth that the colony ship design requires. So we started thinking about collapsible modules but couldn't think of a way of making them, um, robust enough."

"Until you had an extraordinary idea," said Bill. Roncott flushed dark green.

"I should have thought of it much sooner." He gave Lodan a sheepish look. "I remembered the Pioneer Four launch, Director. One of the entertainments provided for all the kerblets that came to watch, was an, umm, bouncy castle and the more I thought about, the more that castle seemed to have the, um, properties we needed. It packed down flat, it expanded to quite a considerable size and, best of all, that expansion was created by inflating a relatively small number of tubes, rather than the whole structure."

Lodan eyed the folded cylinder as Roncott continued. "Obviously launching a bouncy castle into space wasn't going to work, haha, so I decided to speak to um, Halnie here. She's in charge of the, Portable Systems Division at Stratus, where our EVA suits were developed. I thought she might be able to suggest some better construction materials. Um... over to you, Halnie."

"Good afternoon, Director. As Roncott said, I'm in charge of the Stratus Portable Systems Division and - as you might expect - we have considerable experience in designing, manufacturing and manufacturing with, space-grade fabrics." Halnie gestured at the spoke module behind her. "Naturally, we've prepared a full technical specification for the KSA, together with details of our test protocols and outcomes of those tests. To cut a long story short, Director, we were able to devise suitable laminate materials which combine the requisite air-tightness, tensile strength and impact resilience."

"We fully appreciate that it's not an easy idea to get to grips with." Halnie offered Lodan a faint smile, "even Jeb dismissed it out of hand the first time he heard about it, but we believe that our fabrics offer some significant advantages over conventional spacecraft construction materials. The module is inflated using an onboard compressed air tank - another area in which Stratus have considerable experience."

One of the engineers wheeled an equipment cart over, which held a spherical pressure vessel and its regulator valve, secured within a steel framework. Halnie unreeled a length of hose, attaching one end to the spoke module and the other to the valve. "We use a

relatively low inflation pressure to prevent any damage to the structure during the unpacking process.” She checked that both connections were secure and opened the valve.

With a sustained hissing of compressed air, the module began to expand. Lodan watched in fascination as the uppermost aluminium disc began to rise, lifted on a slowly inflating ring. The ring rose, pulling a dozen protruding tubes out from the stack of folded material, which gradually extended to reveal the fabric panels beneath. Cross-tubing appeared, zig-zagging between the ring and a second ring, emerging from the folds of fabric. The resulting lattice structure reminded him of the pressure hull for Ademone’s partially completed bridge module.

The structure wobbled. Lodan looked sidelong at Hahnle, who looked back at him unperturbed. The last of the rings pulled taut, followed by the last sections of cross-tubing then, with a final quiver from the now fully-extended spoke, the hissing stopped. Hahnle unplugged the hose and rolled the equipment cart to one side before turning to Lodan with a smile. “I’m afraid this is just a proof of concept model, Director - it’s not full-size and the endplates are just simple bulkheads, so there’s no way inside. The next prototype, and the production versions of course, will have an airlock at each end to allow access. Nevertheless...” Hahnle gestured at the fabric tube towering over them all. “I trust you see the potential?”

“Indeed. I look forward to reading your report.” Lodan stepped forward and tapped the module with one outstretched finger, before gingerly leaning against it. “Interesting - it’s sturdier than I’d expect.” He raised an eyebrow. “Although I have to confess to some skepticism about building substantial portions of a space station - let alone an interplanetary spacecraft - out of them.”

“Oh goodness, no,” exclaimed Roncott. “We’d use a truss system to provide tensile strength and structural integrity. Imagine a very big cage with inflatable modules secured to the bars of that cage. It’ll make the assembly a little more complicated but it’ll be worth it!”

One of the engineers nodded. “Splitting out the load-bearing structure from the pressurised volume means we can specialise them both - make a lighter and stronger structure than if we tried to combine both functions into a single set of components.”

“And we can still get away with a significant reduction in launches,” finished Hahnle. “According to the figures Rockomax gave us, we should be able to fit three inflatable sections into their upgraded fairing - or the equivalent number of truss pieces to go with them. So we’ll need at least a third fewer flights than if we were launching conventional modules - and that assumes that the conventional modules are robust enough not to need any trusses of their own.”

Lodan raised an eyebrow. “If your inflatables work as advertised.”

Hahnle nodded. “Naturally. It’s not Stratus’s decision of course, but, if I could make a suggestion, the space station would be an ideal platform for properly testing them. From speaking to Jeb and Geneney about the colony ship design, I think the that you could use

them for the cargo sections too. Even if the KSA would prefer not to use inflatables for the crew compartments, I think the savings would still be worthwhile.”

As he left VAB-2 with Bill, Lodan saw a group of workers gathered around an extensive roped off area behind the Kerbonaut Training Facility. An excavator was parked inside the ropes, stabiliser legs deployed and bucket hidden behind a dip. A yellow-hatted kerbal stood by it's front wheel, talking to the nearest worker and making notes on a clipboard. There was a glint of light as something exchanged hands and the worker walked away, pinning something to his chest pocket.

Bill caught the direction of his gaze. “The Pool,” he said. “For EVA training. Or it will be when it's finished. The idea is to put mockup space station modules in there and have the crews practice assembly operations underwater. They'll be in full EVA suits, weighted for neutral buoyancy. The Endurance crews all seemed to think it would provide a reasonable simulation of zero-G conditions.

“Ingenious,” said Lodan. “Do you intend to weight their equipment for neutral buoyancy as well?”

“One of the Endurance crews did suggest that to Nelton but was told, and I quote, that “picking your tools off the bottom might teach you not to drop them again. If it doesn't, we're not short of backup crews.”

Lodan walked towards the ropes, picking his way over excavator tracks and around various items of debris. Before the KSA director could climb over the rope, Bill glanced at his shoes. “Safety boots only inside the line I'm afraid, Director.”

Lodan stopped. “Of course.” He stared at the construction site taking in the gaping pit surrounded by a second set of safety ropes. Further back from the edge, a pair of temporary cabins rested on concrete blocks, beside racks of shovels and other tools. He frowned. “Shovels?”

Bill shrugged. “We've got more volunteers than machinery and it's a lot easier to get a team of kermol with spades to the bottom of the pit than an excavator.” He smiled. “And I'm not sure that they're any slower either. According to Seelan, one good kerbal was rather forceful about that, telling her that this old kermol might not know one end of a rocketship from the other but, by the Kerm, she knew which end of a spade to hold.”

“She wasn't wrong. Tougher than a Kerm root that one and she keeps the younger lads on their toes too. None of them want to be out-done by someone old enough to be their grandmother. Good afternoon, Director - I won't shake hands if you don't mind.”

Lodan eyed the other's dust caked gloves and weatherbeaten overalls. “Not at all. Although you appear to have the advantage of me?”

“Seelan Kerman. Went up on Prospector One, structural engineer before that.”

“Seelan was our lead engineer for the FLT series of propellant tanks,” Bill added.

"Yep. Might even get to build a couple more of them sometime soon."

"I hope so," said Lodan. He caught sight of the enamel badge pinned to Seelan's chest.

"That's an optimistic badge, kerbonaut Seelan."

"Please, Director - just Seelan." Seelan unpinned her badge and handed it over. "I got my flight - don't imagine I'll be training for another one any time soon."

"Sooner rather than later, if I have any say in the matter," said Lodan. "Although, for now, I fear you may be correct." He studied the badge, noting the stylised image of Kerbin rising over Duna, seen through a spacecraft window. He made to hand it back to Seelan, who shook her head.

"Keep it if you like, Director." She pulled a bag out of her overall pocket. "Got plenty more of them - everyone who takes their first shift in the pit gets one when they're done, and we stick their name in the Book too."

"Lucan's idea," said Bill, seeing Lodan's politely enquiring expression. "We're compiling a list of names of everyone who's volunteered their time for Project Starseed. It doesn't matter whether they're KSA personnel, a White Cross volunteer, or a kermol farmer donating some of their crop to the space program, they go on the list. We're going to have that list printed and properly bound, Director - on very thin paper if need be. After all, we won't have much spare room for books on the first flight out to Duna."

Chapter 91

Laying the Keel

Bill pulled into the sole reserved parking bay in front of the White Cross Company head office and switched off the motor. Lodan retrieved his briefcase from the passenger footwell and climbed out of the car, closing the door behind him. He looked around the modestly sized parking lot, taking in the handful of cars scattered amongst the double row of tik-tiks and sighing inwardly at the collection of kerbonaut plushies perched on handlebars or dangling from rear view mirrors.

Bill locked his car with the click of a button on his key fob and glanced across the road. Lodan followed his gaze, his eyes narrowing as he took in the larger, and conspicuously empty, parking lot. "It's unusually quiet for the time of day."

Bill's voice was level, only the sudden tightness along his jaw giving him away. "We're still on double shifts, Director. It's going to be a quiet meeting too, I'm afraid."

Lodan frowned. "More requisitioning?"

"Yes. It seems we've finally drawn the attention of somebody in the border security forces. Camrie managed to cover for last week's...diversions of our regular deliveries but this week has only been worse. We've been running supplies to emergency barracks and field hospitals. Military only naturally - we must prioritise after all." The veiled anger in Bill's tone told Lodan all he needed to know.

"The relief efforts?"

"Not a bean nor a rotten cabbage, Director." Bill's voice shook. "Our quality control network is quite definite about that. Nothing for the refugee centres - not a single truck." He banged the office door open, gesturing curtly for Lodan to lead the way.

Keeping his features composed with an effort, Lodan crossed the deserted reception area and walked through into the office proper before waiting for Bill to join him. "Perhaps we should do something about that," he offered quietly. Bill shook his head.

"Not if we want to see any hardware in orbit this side of the next Minmus eclipse, Director. That's the worst part."

"Yes, it would be." Lodan sighed. "I presume we're meeting in the end room?"

"We are." Bill stalked past the double row of empty office cubicles and busied himself with the coffee pot standing on its table in one corner of the communal area. Lodan followed him at a discreet distance and took his place at the meeting table. He studied the trophy wall, eyes sliding over the elaborately detailed cardboard cutout depicting the Starseed bridge module and focusing on the neighbouring hub module framework and its attendant cloud of other cardboard components.

A drawn-out, throat-clearing noise broke his reverie. Bill brought the steaming pot over to the table and poured Lodan a cup, just as Camrie entered the room and sat down with a thump. "Good afternoon, Director. Sorry I'm late." She poured herself a coffee and took a long drink. "We're short handed today - Jeb and Gene send their apologies - the Kerbodyne negotiations took longer than they hoped for and they're still on the road. Bob and Ribory are out at Foxham but Seelan agreed to stand in for them."

"Figured my boys could fill up a swimming pool without me watching over them." A dour-faced Seelan sat down opposite Bill.

"I'm sure we can manage," Lodan said calmly. "I'll brief Geneney myself and he can update Jeb." He gestured at the trophy wall and out of the corner of his eye saw Bill add a third sugar to his coffee. "As for Ribory and Bob, their immediate tasks are clear." He bent down and snapped open his briefcase, taking out a legal pad and a pen. "Let's get started. Bill?"

Bill bowed his head then straightened up. "The first bridge module passed all its flight-qualification tests and final checkout and preparations for launch are almost complete. If all goes to schedule, the module will be mated to the booster by the end of this week, with the first launch attempt set for the following week. The hub module redesign has been approved and now includes separate mounting points for the inflatables and their supporting trusses. However, diverting resources to the redesign has meant that construction work on the second bridge module is progressing more slowly than anticipated, although Bob's team and Ribory's team have both been working around the clock to get things back on track."

Lodan made a note on his pad. "How far along is the second bridge module?"

"Welding on the main pressure hull and forward gangway is finished," said Bill. "Work on the primary structures for airlock, docking adaptors, and observation ring is underway."

Seelan frowned. "All hands to the pump just to get the first couple of prototype modules built? We need to speed this up."

"We do," agreed Lodan, "but not by having everyone working around the clock, all the days of the week. As Probodyne found out to their cost, that's a highly efficient way of guaranteeing an accident." He glanced across the table. "As I'm sure Bill will recall."

Camrie rubbed her eyes. "Having Kerbodyne on board should help a lot. Steadler are still being cagey but Gene thinks they're coming round and Jeb's asked Shervin to have a quiet word with their CEO." She saw Lodan's raised eyebrow. "He and Gene persuaded Shervin and Halnie to visit Guardian Elton."

"Ahh." Lodan made another note. "I imagine we can count on Stratus's continued support then. And I concur - any assistance that Kerbodyne can lend will be most helpful, not to mention Steadler. He pinched the bridge of his nose. "I would speak to them myself but Keller can be stubborn under pressure. Under the circumstances, I think Shervin's efforts will be more persuasive." Lodan put his pen down. "In the meantime, what does the White Cross Company need from me?"

"Better communications," Camrie replied instantly. She pointed at a map of Kolus on the wall which was decorated with sunburst arrangements of pins and thread, the centre pin of each sunburst connected to Barkton by thread of a different colour. "Setting up local head offices helped to smooth out and coordinate our efforts across Kolus but now that we're expanding into Wakira and starting to think about expanding into Veiid..." Camrie held up her hands. "I'm used to working on a shoestring, Director. Kerm only knows that I've been with the KIS for long enough. But lending aid to a trans-Regionality network of supply chains is stretching that shoestring dangerously close to snapping. If we could just..." To her surprise, she saw a faint smile cross Lodan's lips.

"Access the KSA Spacecraft Tracking Network? I think that is an eminently sensible suggestion." Camrie opened her mouth, then closed it as Lodan continued. "We have limited assets in Veiid, as I think you know, but excellent links to Wakira due, in no small part, to both the KSA and Rockomax starting their own tracking networks there." A thoughtful look crossed his face, before he shook his head. "Additional kerbosynchronous satellites over Veiid would be helpful but I can't see an immediately obvious way of commissioning them without drawing undue attention from the Finance Committee." Lodan regarded Camrie over the rim of his mug. "I'll see what I can do. In the meantime, I believe that discreet use of the repairs and maintenance budget should be sufficient to cover any minor updates required for you to access the existing network."

Camrie put her mug down. "I'll need a map of all the Wakiran ground station sites. Bill?"

Across the table, Bill nodded, as Camrie began to tick off points on her fingers. "I'll have a word with Sigbin and ask her to get in touch with our Wakiran office. I should speak to Doodlie too once we're up and running - he's got good friends at the local Groves who might be able to help with food donations." She looked at Lodan. "Your Gamma tracking site is away from the worst of the fighting but the mountains won't be any use as a local head office location. Toralba will be close enough though and it was on my list of possible sites anyway. Do you know anyone at Gamma who could find - and run - an office there?"

"Not personally," said Lodan, "but I shall make enquiries." He frowned. "Come to think of it, Fercan might know. She's got good contacts at Beta and Gamma and as our chief telecoms engineer you'll be liaising with her for your communication requirements in any case."

"Ribory knows Fercan better than I do," said Bill, "but we have at least met. I'm happy to be her point of contact at White Cross until the Pool is operational. After that I'm scheduled to be back on full-time flight training with James and Calley."

Lodan's gaze flicked over the trophy wall. "That schedule might be somewhat flexible," he noted, "but for now, I think that sounds like a plan. Camrie?"

"Works for me, Director," Camrie replied. "Thank you, everyone."

The ammonia jet blasts down a hundred metre, aluminium pipe. The pipe and it's surrounding water jacket are sunk into solid rock and designed to cool the ammonia from nearly two and a half thousand degrees, absolute, to a mere eight hundred or so degrees, absolute. At the bottom of the pipe, the jet is split four ways and diverted into a set of industrial-sized vortex separators where any entrained particulates are flung out for collection and analysis. A set of chilled sand filters removes any residual particles before the, now substantially cooler, gas streams are recombined and drawn through a series of cold traps to condense the ammonia. Any remaining gases are removed for analysis and, if necessary, storage. Finally, the recovered liquid is distilled - the baking desert air is especially helpful for this - to save as much as possible for the next test, leaving nothing but a mildly radioactive ammonia brine behind.

"The erosion rates are holding steady and the particle sizes are still consistent with ablation-deposition rather than spallation."

Wernher peered over Hading's shoulder at the orderly set of graphs taped to his desk.

"Looks like the erosion is staying low - and relatively even too, which is reassuring."

"No obvious hotspots or mass flow outliers," agreed Hading. He rolled his eyes at Wernher's muttered reply. "You grumble about the stand instrumentation after every test, you know?"

"As you never fail to remind me. Calculations and inferences are all very well but I'll be a lot happier once we get to take that reactor to bits and have a proper look at it. All the same, that carbonitride coating is looking good."

Hading shrugged. "We're running with ammonia as a coolant. It was the obvious place to start."

"Which is another reason why I'll be happier once we can do a full inspection. If that coating is self-healing then it's going to give everyone a lot more confidence in the flight articles."

Wernher gestured at the graphs. "Now that we've worked out the control drum synching and upped the propellant flow to something acceptable. I think we've got something we could use for Starseed if we absolutely had to. It wouldn't be ideal - the Mark 2 would a lot

better - but we've got enough data from the month-by-month burn tests to put in front of Gene."

"We've got the restarts down cold," Hading agreed. "And the temperature cycling results on the spare fuel modules are looking promising enough that you might even persuade me that the data from the ground tests is telling us something about flight conditions." He leaned back in his chair. "I really want to put the whole thing in a cryochamber though. Take the engine bell off, build a recirculation and cooling loop for the propellant and just put the reactor through it's paces in a cold-soak environment."

"For that," Wernher said dryly, "we're going to need a bigger fridge." He tucked his hands behind his back and stared at the ceiling. "Although if we extend the cooling jacket on the test stand... strip out the spare coolant loop from the air conditioning..."

"And risk a riot from every other kerbal in the team?" Hading shook his head. "We're not upgrading the stand with the equipment we've got on-site or are likely to get in the near future."

"No. So we just keep plugging away at the test fires, until the KNSA decides to do something." Wernher stretched, his back popping loudly in response. "Sorry. It all helps though. We're validating your new neutron transport codes with every test and the more burns we can get out of this thing, the more round trips we can do with a single ship. Speaking of which - we should join the rest of the team. Don't want to be late for the launch."

They emerged from the air-conditioned gloom of the main test bunker into the blast-furnace heat of the morning sun. The KSA radio broadcast had already started and Wernher cocked his head at the sound of Nelton's voice requesting an update from one of her controllers. "Ahhh - excellent. Just enough time to get a drink before lift-off." He donned his sunhat and joined the throng of kerbals clustered around an outsized ice bucket. Grabbing a dripping bottle of water Wernher perched on the end of one of the gnarled cactus logs that served them as outdoor benches. He took a long drink before holding the ice-cold bottle against his forehead. Behind him, the steady call-and-response cadence from the Rockomax Space Centre drifted over the desert sands.

Watch now as the Rockomax Type 6 booster, complete with its outsized payload fairing, soars into the afternoon sky. See it arc out over the Northern Ocean, followed avidly by hundreds of watching eyes, until it disappears out of sight.

Hear the commentary from Mission Control, the controllers doing their best to project an air of detached competence. Just another launch, another day working for the KSA.

Hear the tension beneath their familiar phrases. A momentary stutter here, a report snapped out just a little too promptly there.

Because this is not just another launch. This is a rocket built against all the odds. A rocket built despite war and loved ones lost, despite hunger and rationing, despite supply chains and trade routes almost crippled by fear.

A rocket for all the people of Kerbin.

Young and old.

Engineers and agronomists.

Kerman and kermol.

The quiet heroes across the world who stood with Lodan Kerman and the Kerbal Space Agency in their hour of greatest need.

No. This is not just another launch.

—————

Appropriately, given her duties, the bow lookout aboard the *Shield of Kolus* was the first to spot the unusually shaped cloud. For a split second she froze, fearing an airborne attack, but when the oddity showed no sign of movement she lowered her binoculars and signalled the officer of the deck.

“Unidentified aerial object dead ahead, sir. No movement, no aircraft sighted!”

The officer of the watch felt his commander’s eyes on his back as he picked up the phone. “Tactical. We have a UFO dead ahead high. Are you seeing anything? No? Thank you - please send Hankin up to the bridge.” He squinted at the cloud. “Nothing on radar, ma’am. I’m calling this a tentative AP.”

“It certainly looks like a cloud,” the captain agreed. She turned her head as her meteorology officer hurried onto the bridge, boots ringing on the steel flooring. “Ah, Mister Hankin.” She gestured at the sky. “Your analysis please.”

Hankin studied the cloud, eyes narrowed. Then his face cleared. “Dispersing high altitude hypersonic vapor cone, ma’am. KSA launch out of Foxham I expect.”

The corner of his captain’s eye twitched. “Thank you, Mister Hankin. Radio, please confirm with Fleet Command.”

“By your orders ma’am.”

The officer of the deck’s eyes widened. “How the Kerm did they manage that? And what on Kerbin are they launching? We would have heard about any new assets going up.”

“Indeed. A civilian payload then.” The captain fought to keep her voice level. Hankin frowned.

“Surely all the civilian launches are on hold? The logistics alone with all the seed inspections going on...” His voice trailed away. “Hold that. Didn’t they send up a test flight a few months ago? You don’t think...?”

"I think it takes more than a war to stop our fellow Kolans," said the captain. The steely pride in her voice carried across the bridge. The radio operator broke the sudden silence.

"Fleet confirms launch out of Foxham. Flight path outside of our theatre of operations so we weren't advised. Fleet are not aware of the payload at this time, ma'am."

Well that settles it. "I expect we'll be informed if and when the KSA report an operational spacecraft. Thank you, Radio." The captain turned to her officer of the deck, who took an involuntary step back at the expression on her face. "I have *no* idea how they managed it, Mister Jenfry. But by all the Kerm and the first Grove, it's finally happening!"

See the SK1P engines flame out, the strap-on boosters around the core stage falling away in a perfect cross. Watch the exhaust plume from the colossal main engine, the SK2-M "Mainsail", fanning out in a great golden plume. Hear the crack of explosive bolts as the core stage finally falls away, it's fire spent.

Smell the tension in Mission Control as the second stage engine ignites, the moment of truth fast approaching.

And now, see the sunlight. Watch the halves of the oversized fairing tumble away from the speeding rocket, revealing the spacecraft beneath. A spacecraft which is but one part of a vastly craft, itself a precursor of a still larger vessel to come. A vessel conceived through a melding of ambition and dire need unmatched since the Age of Sail.

Along the horizon the rocket speeds. Following Kerbin's curve, continents and oceans falling away behind it. The engine nozzle flexes, wobbles, suddenly deprived of the fiery torrent keeping it taut.

Silently, the rocket stage is set free. A pause. Then sparkling trails of frozen vapour nudge it end-over-end, before the last of its essence is vented into space. Soon it will meet a glorious end, stretching a trail of shooting stars across the sky.

Leaving the spacecraft it once carried to finally spread its wings.

Nacelles along its flanks split open like cocoons, revealing the butterflies beneath. Hinged panels of wires and shining silicon unfurl, turning slowly to face the sun. Deep within, batteries begin to charge, life-giving energy coursing through a myriad of systems.

Now hear the roar! Hear the thunder of jubilation, blended with no small amount of relief, at the sight of four lines of text on a screen.

> boot up sequence complete
> vehicle designation: Tenacity
> vehicle type: Starseed test module

> system set

Chapter 92

Through the Gate

"What are you *doing*, Nie?" Adbas watched Joenie put her trowel to one side and begin packing sand into the thin, rectangular trench she'd just dug out.

"Making worm traps for Jonelle." Joenie blew her hair out of her eyes, ignoring Adbas's shiver. "So we can help the zeneckologists..." She frowned. "Something like that. Zeneckologists at the Berelgan Institute with their experiments."

"The where?"

Joenie pressed another handful of sand into place. "The Berelgan Institute. It's supposed to be really famous. They wanted Dad to help with one of their Kerm trees, so I had to go too. It's even further away than the Capital so it took ages to get there on the train and it was really boring." Joenie brightened up. "We stopped at the Capital though and got to see the Grand Gardens and all the cactuses that uncle Enely told me about. They were pretty neat."

Adbas shook his head. "You're getting weird, Nie." He sat down by the edge of the worm trap. "How is making a sandpit going to help all them famous zeneckologists?" He frowned. "And how come they want you to help? You're still at school. You en't even a grown-up yet."

"Because I can talk to Jonelle," said Joenie. She scowled. "And it's not a sandpit - it's a worm trap. The sand just goes around the outside, I'm going to swap all the middle bit for clean soil to keep the worms in, so Jonelle can show me what colour they are." She saw the baffled look on Adbas's face. "When I talk to Jonelle, she shows me all the different worms and bugs and stuff in the soil and they're all different colours. Dad said that if I was a Kerm they'd all smell different but kerbals aren't very good at smelling, so Jonelle shows them to me in different colours instead." Joenie rubbed her forehead, leaving streaks of mud behind. "Something like that anyway. Dad tried to explain it better but it was kind of confusing."

Adbas tried gamely to keep up. "And the sand is going to stop the worms escaping?"

"Yeah, probably, but mostly it shows Jonelle where to find them. I guess sand smells different to soil too, if you're a Kerm tree." She saw Adbas flinch and sighed. "Jonelle's not going to hurt you, Ad. She wants to talk to you too - I've been telling her all about you, how you're my best friend and everything."

Blushing, Adbas turned away to hide his face. "She...she really wants to talk to me?" he asked. "She won't spike me like she spiked your dad?"

Joenie shook her head. "Promise."

Adbas stared at the Kerm branches waving in the wind above Joenie's home, torn between curiosity and apprehension. Then his face fell. "Can't. Dad said I wasn't to go near your Kerm...Jonelle," he corrected himself hastily. He threw Joenie a guilty glance. "I'm allowed in your hut but I shouldn't even be going in Jonelle's room unless Mum's there too."

Joenie dropped another trowel load of sand into her trench and began flattening it out. "I'll ask your Mum. I bet he wouldn't mind you talking to her if your Mum was there too."

"He would," said Adbas. "He doesn't say anything but I don't think he really likes Mum being too close to Jonelle either."

"He could come and meet Mallas - he's one of the zeneckologists - when he comes to visit. He could watch Mallas talking to Jonelle - that'll prove she doesn't spike," anger flitted over Joenie's face, "people any more. He'll have to let you talk to her after that!"

"Maybe." Adbas sounded doubtful. "Suppose we can try."

Mallas unfolded himself from the bunk bed and sat up, a slightly dazed expression on his face. "Sweet Ker...Pillars preserve me but that was... he was..." He shook his head. "I see what Joenie meant about a sense of humour."

Jonton chuckled. "You must have made a good impression. He's normally more reserved with kerbals he hasn't Communed with before. But yes, he can be positively droll at times."

"With everything he's seen and experienced?" Mallas didn't attempt to hide his awe. "I guess you laugh or cry." He smiled weakly. "Especially when you've been living side by side with us kerbals for so long. We've done some pretty ridiculous things over the centuries it seems."

"The Age of Sail fashion for hanging-basket hats is my favourite," Jonton agreed.

"I don't think I saw those," said Mallas. He stared at the expanse of Kerm trunk making up one wall of the sleep room. "Does Jonelle share her...father?" He saw the other's reassuring nod. "Father's sense of humour?"

Jonton grinned. "When it comes to that sort of thing, Kerm are more similar to kerbals than they'd like to admit. Most of the time Jonelle is just confused by Elton's jokes and when she's not confused I get the very strong sense that she's just exasperated by them."

Mallas chuckled as he got to his feet. "I guess embarrassing parents are universal amongst sentient species." A thoughtful expression crossed his face. "And I'm not sure if that's reassuring or depressing."

"A bit of both I think." Jonton thumbed a button on his water pedestal and the verandah doors rumbled open. "Anyway - those worm traps we discussed? From Elton or Jonelle's perspective they ought to work but we'd all welcome your advice before we start the experiments."

Mallas sat down on the verandah step and began lacing up his boots. "Provided the soil is reasonably healthy they should be fine. What are you using?"

"One part local clay, two parts clean sand, two parts sterile compost." Jonton adjusted his poncho and bent down to tie his own laces. Mallas frowned.

"Steam treated?"

"Steam treated then vacuum sealed," said Jonton. "Best I could do without storing it in the fridge." He looked up. "I've made a test trap and checked it with Elton. It looks fine - enough microorganisms to support the cultures you wanted but not so many that we won't be able to pick out them against the background tapestry."

"Elton will know what he's doing," said Mallas, shooting Jonton an embarrassed look. "But even so, do you think he'd mind if I ran some plates before we started - just to get an idea of what bacteria you've got?"

"Be our guest. I can't imagine he'd mind and Joenie will probably be interested in the plates too." As Jonton watched Mallas retrieve a handful of stoppered sample tubes from his pocket and set to work, it occurred to him that the scientist probably never left home without them.

"That should do it." Mallas tapped the edge of his final tube, dislodging the last crumbs of soil from its rim, before thumbing the stopper into place. "So what's the plan now?"

"Ferry's joining us for lunch in an hour or so and then he'll be giving us a lift up to Jonelle's Grove." Jonton disappeared inside the lean-to shed abutting the back of his hut and returned with a wheelbarrow full of sand, a pair of trowels and a couple of lumpy looking bags resting on top. "I thought we'd put the rest of the morning to good use and dig out another couple of traps." Jonton gestured at the array of garden canes and string pegged out next to the test trap. "I've marked out the plots already."

Mallas swung his legs over the edge of the verandah and dropped lightly to the ground. "Works for me. How deep do you want them?"

"About half a metre should be fine. It's better if you scrape the soil away in layers rather than digging too far in one go - much easier to spot any Kerm fibres that way." Jonton saw Mallas's apprehensive look. "Don't worry - you can't miss them this close to his trunk. Any actual roots will be much further down, so anything that looks like a root will be a fibre."

We'll start by digging out a trench around the edges, pack that with sand, then make a start on the middle. More sand at the bottom, soil on top."

Mallas nodded, hitched up his poncho and squatted down by the corner of the nearest plot. Then, swallowing hard, he began to scrape gingerly at the soil. Jonton watched him for a moment then, satisfied, knelt down by the opposite corner of the plot and picked up his own trowel.

Kerbol was high in the sky, Elton's leaves casting dappled sunbeams over the ground, when Ferry walked around the side of Jonton's hut to find Mallas and Jonton brushing themselves down, satisfied looks on both their faces. A rectangular stripe of sand marked out a plot of earth, one side of which had been dug out into a shallow trench. As Ferry drew closer he saw that the bottom, and one wall of the trench had also been lined with sand. Jonton picked up his trowel and tossed it into his wheelbarrow, Mallas following suit.

"Excellent timing, Ferry," Jonton called out. "We were just thinking it was time to eat!" He walked up the steps onto the verandah and, with a groan, bent over to take off his boots. He waited for the others to remove their own footwear before padding into his sleep room and through to the kitchen. Crossing over to the fridge, he began pulling out an assortment of plates and bowls. "Take a seat, folks - I'll be right with you. Lunch is nothing fancy I'm afraid, just cheese and salad."

Jonton flipped open the bread bin and took out a cloth-wrapped loaf. "Bread was fresh baked this morning though. It's not a patch on Anlie's but it's not too bad if I say so myself." Piling everything onto a tray, he walked over to the kitchen table and began setting out lunch. Presently, the only noises to be heard were the clink of knife against plate and the quiet munching of hungry kerbals.

"It tastes pretty good to me." Mallas buttered another slice of bread before crumbling cheese over the top and taking a bite.

"Not *quite* as good as Anlie's," said Ferry tipping a hand back and forth. "My wife," he added, seeing Mallas' questioning look. "But you've surely been listening to her." He folded his own laden slice into an impromptu sandwich and chewed on it thoughtfully. "So what do you do at the Berelgan?" he asked Mallas, swallowing the last mouthful.

"I used to work on Kerm microchemistry," answered Mallas. "Trying to figure out how Kerm do what they do on a molecular level. These days though - like nearly everyone else at the Berelgan - I've been drafted into the xeno-ecology team for Project Starseed. He grinned. "Which sounds pretty fancy but basically, we're trying to work out how to recreate a functional Kerban soil from scratch on Duna. Ideally without having to ship too much raw material out there to get things started."

"Ahh," said Ferry. "Which is why you came all the way out here to speak to Elton. Reckon he'll have forgotten more about making proper soil than you'll be able to figure out in a dozen years."

Mallas nodded. "Probably. From what he was kind enough to show me in Communion, I've no doubt that, given time, he could show us exactly how he'd solve our little problem in as much detail as we could ever want. The problem though, is that he can't tell us what we actually need to know. And that's really why I'm here."

"Names," interjected Jonton. "Elton will find it quite difficult anyway to unpick exactly what he does to keep his soil balanced - most of it is so familiar as to be instinctive." He saw the sudden comprehension in Ferry's eyes and smiled. "Exactly. Muscle memory, and centuries of it at that. But even when he does unpick it for us, he only knows the soil biota as bundles of scents. We'll see those scents as different colours of course but that's not much help either."

"No," said Ferry slowly. "I can see that." He gestured at Mallas. "If your xeno-ecologists want to know what's knocking your soil bacteria out of balance, then having Jonton here tell you that it's all down to the little blue worms, isn't going to be that helpful."

"Exactly," agreed Mallas. "We need a concordance. A reference book to cross-reference all the different Kerm colours against species names." The corners of his eyes crinkled in amusement. "Which is going to be interesting to compile given that we don't even know if different kerbals see the same species in the same Kerm colour."

Ferry blinked. "That's... not a problem that I'd have thought of," he said.

"Me neither," confessed Mallas. "But fortunately, Professor Erlin did. If Jonelle is willing, then we'll be able to have her and Elton run the same set of test plots, which'll give us one comparison." An unreadable expression flickered over his face. "In time, Kerm willing, we may have a second... if Erlin's Kerm awakens safely."

Ferry stared at his plate, a troubled look on his face. "How is Professor Erlin?" he asked at last.

"Very well," said Mallas, mopping his plate with a chunk of bread. "Better than that actually - I haven't seen him so animated for months." He blinked, "In a manner of speaking. Not the best choice of words there. Anyhow, he's the same as he always is when he has a new problem to work on - a mix of enthusiasm and frustration, although it's mostly been enthusiasm lately."

Jonton leaned forward, an intent look in his eyes. "How's he finding his Grove management?"

"I think he's finding it a lot easier than he expected from talking to you. I've been speaking to Gusemy and 'sleep on it and it'll be fixed in the morning' is becoming a bit of a standing joke between them." Mallas saw the look on Jonton's face. "Is that a good thing? It sounds like a good thing."

"I think so," Jonton replied. He leaned back in his chair. "The same thing happened to me when I was an-Kerm. Things would get fixed and I couldn't remember fixing them. At the time I assumed I was just getting better at Grove management - that I was starting to get

things done without thinking too much about them. A sign that I was becoming a proper Kerm if you like. But it turned out to be a sign that Elton was taking over my duties.”

Mallas’ eyes widened. “So Erlin’s Kerm... already?”

“It sounds like it. Tell Gusemy to look out for any odd changes in Erlin’s behaviour. It was coffee with me - I went right off the stuff until just before Elton awoke, then suddenly had a craving for it.” Jonton paused. “Tell him to look out - or listen out - for anything unusual during Communion too. Enely described it as a kind of giant shimmering bubble, with something - or someone as it turned out - behind it, calling out for help.”

If anything Mallas’ eyes grew wider. “I will, Keeper. Gusemy and Obrett - they’ll know...know what to do?”

“Obrett is a Keeper and Gusemy knows Erlin better than anyone. They should make good strong anchors.”

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“Mallas!” Joenie hurtled into the kitchen and grabbed the slightly bemused scientist by the hand. “I’ve been making worm traps for the experiments - come and look!”

“Let Dr Mallas have a minute to sit down first,” said Jonton with amused tolerance. “Before we drag him off to look at even more sandpits.” He gave his daughter an innocent look, which Joenie didn’t even bother to roll her eyes at.

“No, no, that’s quite all right,” said Mallas with a grin. He reached into his pocket and handed Joenie a handful of sample tubes. “It’s about time I taught you to take proper soil samples anyway. You can help me prepare the bacteria cultures later if you like?”

Joenie nodded enthusiastically.

“Bacteria cultures? That sounds awfully dangerous to be doing at home.”

Mallas looked up. “Not with the right equipment.” He held out a hand. “Have we met?”

“Meleny Kermol.” Meleny shook the proffered hand. “What equipment would that be - surely you didn’t manage to pack a whole laboratory into your suitcase?”

Mallas laughed. “Just a box of agar plates, the wire loops to go with them, and a pipette. Plus lab coats and disposable gloves of course. Jonton was kind enough to lend me Joenie’s old bottle warmer, which’ll make a fine portable incubator. Apart from that, all we’ll need is boiled water and household bleach for disinfecting everything after use and wiping everything down. We won’t be doing anything fancy.”

“And they’ll be doing the experiments in my hut,” Jonton added. “Not in the kitchen here. You and Adbas would be welcome to join us if you liked?”

“I would be interested too, if another assistant was needed.” Enely got up from the kitchen table. “Enely Kermol. It is good to meet you Dr Mallas. How is Professor Erlin?”

"He's doing very well thank you. In fact, after talking to Jonton over lunch, I think he's doing better than I imagined." Mallas glanced at Joenie who was trying to swing from the back door handle. "But perhaps we should talk about this later."

Enely smiled as he followed the other's gaze. "That might be best," he agreed. "If you give me a minute, I'll come and help finish the trap that we were digging out before you arrived."

"And I'll put the coffee on," said Jonton. "And share the good news with Meleny."

Later that afternoon found Enely helping Meleny with the washing up whilst Jonton and Mallas sprawled on sack chairs watching Joenie rearranging her collection of sample tubes yet again. Adbas was curled up in his own chair, buried in a book, with a mug of rapidly cooling hot chocolate on a table next to him.

Mallas stirred and reached for his own mug of *djeng*, a pensive look on his face. "an-Kerm can still see," he said suddenly. "even if they're effectively in permanent Communion. Or so I understand from talking to Erlin. So I can imagine how he would be able to compare the colours he's 'seeing' through his Kerm senses with the actual colour chart he's seeing through his eyes. But how does that work for everyone else?"

"With difficulty," answered Jonton. "It took Elton and I quite some time to get the hang of it but after a lot of practice we're at the point where we can both share my eyes, and see through them, during Communion. What I haven't quite worked out yet is how to hold both images - the outside world and Elton's mindscape - in my head at the same time, but I'm sure we'll get there." He drained his mug. "I was going to give Joenie her first lesson with Jonelle tonight but that can wait."

Mallas sat up. "Don't feel you have to put them off for me," he said. "I'm quite happy to talk cactuses with Enely for as long as Meleny will let us. To tell the truth, I wouldn't say no to a lesson or two myself but from what you were saying in the car, I think Elton would find it easier to teach a stranger."

Jonton looked at him apologetically. "Jonelle *is* getting a lot better but she's still a bit unsure about Communing with anyone apart from Enely, myself or Joenie. Anyway - lessons are for the morning. We've got a bottle of rather good two-year old prickleberry juice laid down that I've been looking for a reason to open, or a jug of prickleberry cider in the fridge, if you prefer something with a little bit more of a kick. I've got a Tiles set if you play, or we could challenge your lab assistant," Jonton waved a hand at Joenie, "and her friend to a season or two of *River Race*."

"Only if you've got a spare table to leave the board set up on. Can't fit a proper game into anything less than five seasons." Mallas grinned at Jonton's surprised look. "At least one of the student huts at the Berelgan has an almost permanent *River* board set up in the living room. One team got bored and wrote their own expansion rules after deciding that twenty season games were just too short. I've lost track of where they're up to this term."

“Well then,” said Jonton, rubbing his hands together. “Old ‘uns vs young’uns it is. Maybe your experience can beat Adbas’s luck with weather cards!”

Joenie gulped down her glass of milk and stuffed the rest of a sunfruit roll into her mouth before following her father into the sleep room. Quivering with anticipation, she flung herself onto the spare bed and wedged a pillow under her head, barely noticing the faint tickle of leaves against her scalp as the room around her vanished into the bright whiteness of Communion.

Jonton propped a large square of blue cardboard against the foot of Joenie’s bed then knelt by his daughter’s side, checking to make sure it would be visible from where she was lying. Satisfied, he lay down on his own bed, settling into position under Jonelle’s leaf cluster. No sooner had her leaf hairs burrowed beneath his scalp than he sensed Joenie’s excited mental chatter and behind it, a vast confusion. He emerged over Jonelle’s mindscape and immediately felt the confusion shift into relief as the young Kerm focused her attention on him.

<it is early Jonton. Why are you and Joenie here now?>

We have guests staying with us. Jonton sent an image from the previous evening; warm yellow lamp light, Joenie and Adbas with the four adult four adult kerbals, all sitting around the *River Race* board, drinks and snacks close at hand. *I wanted to talk with you before they wake up for breakfast.*

<that is Dr Mallas. Joenie talks a lot about him> Swirls of puzzlement licked at the edges of Jonton’s mind. *<you met Dr Mallas when you went to help other kerbal not be like Gerselle. Why is he here?>*

Jonton noticed the mindscape around him turning grey and, with an effort, pushed his thoughts of Gerselle to one side. *That’s a long... never mind. Elton has spoken to you of travelling to other worlds.*

<yes. Kerbals go there to plant Kerm but only find bad soil. Daddy will tell kerbals how to make better soil.> Jonelle paused *<Joenie says that Daddy will help you name soil creatures. Joenie wants to name soil creatures too but I don’t understand how to help her>*

Has Joenie told you about the worm traps?

<Yes. I have found the empty places near my trunk that Joenie made. It is a wrong name though - more than worms are needed to make good soil.>

I know, Jonton replied gently. *Worm trap is just a kerbal name for them. Dr Mallas will help us put different creatures in each trap, so you can find them and show them to Joenie.* He reached out with an image of a large book, open at a page of numbered squares, each square picked out in a different shade of blue. The page flipped over to reveal a grid of green squares, then again to display a grid of brown squares. *Then you and Joenie will match the creature’s colour to the right square on this chart.*

The mindscape rippled and swirled, lightning flickering in the distance as Jonelle thought things over. *<I can show Joenie the creature colour but I can't show her the squares. How will she know them?>*

That is why we are here now. The colour chart will be on Joenie's bed. She must learn to see the outside world whilst talking to you, Jonelle - and she can't do it by herself.

<I need to help her?>

Yes. Jonton turned to face his daughter. *Joenie - how do you know where I am right now?*

Joenie frowned. *I just do. It's like...like... I don't know - I just do.*

Jonton nodded. *Maybe if I told you what it always feels like to me. If we were sitting at the kitchen table and I asked you which way your feet were pointing, would you need to look at them before telling me?*

No - because they're my feet. I'd just...know. Joenie's face cleared. *That's it. That's just what it's like!*

And how about Jonelle? She's all around you, she can show you all sorts of things about what she's thinking - but how can you tell what she's feeling?

Joenie scrunched up her face in thought. *I don't know.* Jonton sensed the frustration radiating off her. *I just do!*

The mindscape shimmered into a view of an endless riverbank, ripples on the water catching the sun as they rolled slowly by. Jonton sent a flicker of gratitude to Jonelle and received the barest thread of acknowledgement in reply.

That's a good image, Jonelle. When I commune with Elton, my link with him always reminds me of lying on your stomach in a sunbeam. You can feel the warmth and with a bit of practice you can tell where it's shining on you although you can never actually see it. But if somebody could hold a mirror for you and hold it in just the right place, you could look over your shoulder and find it.

Jonton paused. *This next part is really important. Jonelle, I want you to be a mirror for Joenie - and Joenie must never be the mirror for you. You'll see why in a minute. Joenie - I want you to just try and relax. Jonelle - I want you to find your link with Joenie and share it with her in the same way that you'd share your tapestry. Can you do that for me?*

<I do not know. Will try>

Jonton watched Joenie sprawl out on the riverbank, fingers laced behind her head as she stared up at the clouds. Out of her sight, the waters twisted and turned, one moment a mighty river looping across the mindscape in great serpentine coils, the next a foaming brook galloping over a rocky bed, the next a delta of a hundred branching channels winding their way through mud and reeds. Abruptly, they reared up into a fantastical waterfall, an impossible twisted knot between soil and sky. Jonton heard a cry, then, just as abruptly, the

waterfall collapsed back into a expanse of gently rippling water, meandering across the mindscape.

Joenie sat up, rubbing the back of her head. Jonton took her hand and held it for a long moment.

Did you see anything?

Joenie bit her lower lip. *I don't know. I thought I saw a blue square but then it vanished. I thought I heard voices too.* She frowned. *I could definitely smell coffee - and it felt as though I was lying on something soft.*

Jonton smiled. *You are. You're lying on your bed remember? That was excellent both of you - much, much better than I expected. The first time I tried that with Elton, I didn't see or hear a thing.* He bowed towards Jonelle's presence, then turned back to Joenie, a serious expression on his face. *Just for a second there, Jonelle was your mirror, reflecting your Communion link with her - your own senses - back at you. With practice, you'll be able to hold that reflected link for as long as you like and even let Jonelle use it, so that she can see through your eyes too.*

Jonton gripped his daughter's hands. *And that's why you must always, always let Jonelle be the mirror. You have five senses - maybe six depending how you count them. Jonelle has thousands. If you tried to be her mirror, it would be like rolling over to look at the sunbeam on your back and staring right into the sun.*

Joenie blanched and Jonton pulled her into a hug. *I'm sorry sweetheart - I know it's not a nice thought.*

A Kerm tree appeared on the river bank, branches extended to shade the two kerbals *<it is not. I will not let Joenie be burned>*

I know you won't, Jonton replied simply. I trust you, Jonelle.

A wave of pleased surprise, tinged with pride, swept over them *<we will try again?>*

Jonton shook his head. *Tomorrow morning. He raised a finger. It's a surprisingly tiring exercise - a little bit of practice every day to build up your strength is better than keeping on trying for too long and hurting yourselves.* He let go of Joenie and stepped back with a smile. *Besides - coffee and voices? I think it's time we joined everyone else for second breakfast.*

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"Test confirms engine start."

The air hose automatically disconnected from the Starhawk's fuselage and was promptly winched aboard the heavily armoured service vehicle parked alongside it. The crewmember in the back checked that the aircraft tow cable was also safely aboard before thumping on the safety partition separating her from the driver's cab. The driver saw her upraised thumb and peeled away from the gleaming spaceplane poised at the end of its runway. He swung

his vehicle round in a wide circle, past the yellow-and-black striped blast deflector behind the Starhawk, before coming to a halt on the taxiway, engine still running, ready to assist in case of an emergency.

“Test is rolling.”

Val scanned her instruments, hands automatically checking the connections between her pressure suit and the cockpit systems. She worked her shoulders, settling her flight helmet into place, it's built in ear defenders not quite able to muffle the idling J404 turbofans behind her back. A flicker of movement caught her eye and she glanced up to see the Starhawk start down the neighbouring runway, its mirror-polished fuselage reflecting the grey, overcast sky.

“Copy, Test - you're clear for take-off. Chase?”

“Standing by.” Val braced herself against her ejection seat and took a firmer grip on the controls. Ahead, the Starhawk began to accelerate, the watery blue hydrogen flame from its MACE air-breathing rocket engine flickering and blurred by its superheated exhaust. The experimental aircraft lumbered down the runway, its canards and short, knife-edged wings barely able to haul it off the ground before it ran out of asphalt.

“Test is airborne.” The pilot's unruffled voice sounded clearly in her headset.

“Chase is rolling.” Val advanced her throttle to take-off power, the shriek from her own aircraft's engines climbing to a full-throated howl. She released the brakes and the Osprey leapt forward, with a surge of power that pressed her into her seat. The runway whipped past in a blur before falling away effortlessly behind her. “Chase is airborne.”

Val pulled the nose of her aircraft up into a climbing turn, feeling the anti-G system in her flight suit kneading her legs. The landing gear retracted with a thump, as she completed her circle and levelled her wings, eyes already scanning for the Starhawk.

“Test, Chase. I have a visual.” Val reached forward and flipped a switch, a diamond arrangement of four amber lights on her instrument panel lighting up in response. “Camera on.” The four outer lights flicked to green, followed a second later by a fifth centre light. On the radio panel, another row of green lights began to stutter. “Camera tracking and I'm receiving telemetry. Control - how do you read?”

“Five-by-five, Chase. Test - you ready to fly?”

“That's affirmative, Control. Ramjets open - initiating phase two climb-out.” Aboard the Starhawk, valves opened within the MACE, injecting vaporised hydrogen into the rapidly increasing flow of bypass air from the pre-cooler intake. Blue flame erupted from the ring of auxiliary burners around the two main engine bells, hurling the prototype spaceplane skyward.

A warning tone sounded in Val's headset, the uppermost tracking light on her instrument panel turning from green to amber. She eased back on her control stick, pulling the Osprey

into a steeper climb, and slid the throttle up to full rated thrust. Twin contrails burst across the sky as the two advanced aircraft screamed up through eight thousand metres.

For a moment, the ranging bars on her tracking display slowed, then they began to spin past again, the Osprey unable to keep up with the rapidly climbing Starhawk.

“Control, Chase. Opening the gate.” Val pressed her throttle lever forward, feeling it catch against its detent before pushing it down and through the gate into afterburner. Raw jet fuel sprayed into the J404s’ exhausts, blazing, hard-edged flames erupting from their nozzles. The surge of acceleration shoved Val back into her ejection seat, an exultant grin lighting up her face. “Chase confirms two good cooks!”

“Copy. Test?”

“Passing through twelve clicks. Handling is nominal, fuel consumption on the curve, air speed indicator coming up nicely.”

Val checked her own airspeed indicator, glanced at the tracking display and pushed the throttle lever all the way forward. The J404s responded with a will, hurling her aircraft into the darkening sky at over twice the speed of sound, afterburner gulping down fuel at a fearsome rate. Her eyes flicked from altimeter to fuel gauge to tracking display and back again, grin replaced by an intent expression.

“Chase is holding.”

The Osprey broke through twenty kilometres, now beginning to fall behind the speeding Skyhawk. The bright glow of Kerbin’s atmosphere gleamed from the trailing edges of its wings as it tore up through twenty-five kilometres, horizon curving away in all directions beneath its upwardly tilted nose. Then a warning light glowed amber on her instrument panel, accompanied by a two-tone chime in Val’s headset.

“Joker fuel. Throttling back.” Val felt the control stick loosening under her hand, the Osprey’s control surfaces losing purchase on the rarefied air as it coasted up past thirty kilometres. “Chase is on the ceiling. Returning to base.”

“Copy, Chase. Test?”

“Test is Go. RCS stable in roll. Intake pressure dropping to critical.” The pilot paused and Val sensed the wistfulness beneath the clipped reports. “Too bad I’m packing ballast and not LOX.”

“We hear you, Chase. Bring that black box home in one piece and we’ll see what we see.”

Val eased the Osprey into a shallow dive and began a leisurely turn back towards the C7 airfield, keeping half an ear on the running dialogue between the Skyhawk pilot and Control.

“MACE auto-shutdown complete. RCS is stable in pitch and yaw. Orienting for re-entry test.”

“Copy, Test.”

“Descending through thirty clicks. Vehicle attitude is nominal.”

"RCS disengaged, airspeed and intake pressure looking good for MACE restart."

"Go ahead, Test."

For a moment, Val's finger hovered over the push-to-talk button set into her control stick. Then she blew out her cheeks and shifted her hand out of temptation's reach. Adding her own message of good luck would be a gross breach of test protocol, not to mention a possible insult to the other pilot.

"...coolant loop is stable...igniters to auto...restarting fuel pumps..."

"MACE restart complete. Setting throttle for best endurance. See you on the ground, Control."

"I hear that, Test. Fine flying."

Chapter 93

Every Kerbonaut's Friend

The old iron steps rang underfoot as Jeb emerged onto the roof of the Barkton Mission Control centre. For a moment he frowned at the unexpected figure leaning against the railing and then he rolled his eyes. "You can take the kerbal out of Mission Control but you can't take Mission Control out of the kerbal."

Geneney shrugged. "I didn't bring a repeater box up here. What more do you want?"

Jeb joined his friend by the railing. "Well that's something I suppose. Who's borrowing your chair?"

"Lucan."

"Makes sense." Jeb stared at the distant Eve booster on its launchpad. "How long have we got?"

Geneney checked his watch. "Ten minutes, thirty-two seconds, assuming they're not working a hold down there."

"Pad team are clear?" Jeb shook his head. "What am I saying? Feels strange not to be launching a *crew* aboard an Eve booster."

"Tell me about it." Geneney cast a glance at the ladder behind Jeb before shaking his head in exasperation. "Kerm knows what's got into me today. It's not like Lucan hasn't done this before."

Jeb laid a hand on his shoulder. "There's still time - we could always sneak in through the back door." For a moment he saw the temptation in Geneney's eyes before his friend shook his head.

"Lucan wouldn't mind but the rest of his team would be furious - and rightly so." Geneney scratched his ear. "I've been meaning to do this for a while but events...well you know." He

sighed. "Maybe one day there'll be launches enough for a dozen flight teams at a time. Kerm knows there'll need to be eventually."

Jeb squeezed his friend's shoulder. "Eventually yes. When the great and the good." He snorted. "When the idiots that pass for the great and the good decide to stop fighting and start thinking. Until then, we carry on doing what we've always done."

Geneney raised an eyebrow.

"Achieving the impossible, one step at a time, on goodwill and a shoestring budget. Only this time we're bringing everyone with us - Kerm, kerman and kermol. Not to mention the KSA - the rest of the KSA that is - watching our backs." He checked his watch. "Spacecraft should be transferring to internal power about now."

"Should be, yes." Geneney cast another glance at the ladder before turning his back on it and fixing his eyes on the launchpad. "Final team poll, booster to internal, confirm engine status." He gripped the railing. "Then it's all up to the computer."

"Guidance is internal, autosequencer running." Jeb murmured to himself. He looked up. "Do you ever regret taking yourself off the roster, Genie?"

There was a long silence. "Sometimes," Geneney replied at last. "If you'd pulled my name out of the basket for one of the later Moho flights, I think I'd have taken it. Not an Eve or Pioneer flight though - writing the rulebooks and building the flight teams for those was enough of a job."

"And thank the Kerm you decided to take it. You always were our best systems guy."

Despite himself, Geneney smiled. "The only kerbal in the team you trusted to keep everything in one piece once the rocket left the ground." The corner of his mouth quirked upwards "I still haven't forgotten that little pep-talk, Jeb." His eyes took on a faraway expression. "And we've not been short of big days in the bunker either..." Abruptly he raised a hand, fingers outstretched before curling them one by one into a fist.

"Three...two...one..."

Fire blossomed over the launchpad, piercing brightness amidst a roiling cloud of smoke and steam. An instant later, the crackling thunder of three LVT-30 and three LVT-20 engines rocked them back on their heels as the *Eve* booster sprang into the sky, soaring free of the launch tower and tracing a fiery path out across the Great Tranquil Sea, like so many rockets before it. The kerbonaut and the flight director watched it go, both wrapped in their own thoughts.

Jeb blew out his cheeks. "Looked good from here. Lets give it another few minutes, let them get through staging down there, and then I think we can slip in quietly and watch from the back."

Geneney nodded. "That's fair." He paused to choose his words. "I've been thinking about putting myself back on the roster one day. As a colonist rather than a kerbonaut." He smiled faintly at the expression on Jeb's face. "If we ever get there, Duna's going to be a gateway to

the rest of the Kerbol system - and everything that we ever dreamed of doing out there. I'm thinking that Duna space traffic control is going to need its own flight director one day." The smile became a self-deprecating shrug. "And how's that for a crazy Interplanetary Society dream."

Jeb blinked the dampness out of his eyes. "As a certain kerbal once told me - sometimes they're the best ones. Think you could find room for me at one of the consoles?"

Geneney pretended to think it over. "Probably not. I don't think I could face Guardian Elton's disappointment. One of us needs to keep finding new places to show him after all." He gave Jeb a sideways look. "and you could always pick up some new rocks for Bill whilst you're out there?"

Jeb laughed. "He can pick up his own rocks." He drummed his fingers on the railings, his expression turning serious. "Is one step at a time on a shoestring budget going to be enough, Gene?"

Geneney looked at him sombrely. "I don't know. But I do know what they can carve on my sweetblossom pole, whether they plant it back at my Grove or in a dome on Duna." He walked towards the steps, looking over his shoulder at the veteran kerbonaut.

"Tell the world we tried."

"Flight - Payload."

"Go ahead, Payload."

"Fairing jettisoned, Flight. Vehicle is Go."

"Thank you, Payload. Booster?"

"Second stage engine is nominal, Flight."

Jeb saw Geneney's shoulders relax as they made their way quietly to the back of the room. He glanced up at the main screen in passing, eyes automatically going to the altitude and velocity displays although the relaxed tones of the flight controllers told their own story. Lucan flicked them a look, nodded, then turned back to his console.

The altitude display crept upwards whilst the velocity indicator raced ahead. Jeb closed his eyes for a moment, picturing the glowing horizon bisecting his spacecraft window, the rocket stage behind him almost spent.

"Sixty seconds to SECO, Flight."

Jeb's eyes snapped open.

"Thank you, Booster."

The velocity display hurtled upwards, the altitude display beneath it dipping fractionally as the spacecraft eased into orbit. The displays froze amidst a burst of activity from the

Payload console, then the main screen flickered, the dotted orbital track returning as a solid green line.

“Flight, FD. Nominal parking orbit; patching in Tenacity tracking data.”

A second sinusoidal trace appeared on the screen, a stylised Kerm tree marking the position of the *Tenacity* bridge module. *Observation module*, Jeb reminded himself.

“Thank you, FD. Payload?”

“Lateral photovoltaics deployed, Flight. Deploying ventral array and opening manipulator bay doors.”

Jeb glanced to one side, smiling inwardly at Geneney’s silently moving lips as the flight director counted off the seconds. He turned back to the main screen just in time to see the orbital track display blink out and be replaced by a view down the Power, Assembly and Logistics spacecraft hull. Two curved doors, their inner surfaces mostly hidden by perspective, flanked a shadowed recess, a glimpse of curved white just visible inside.

“Manipulator to standby.”

A white, fabric-clad tube emerged from the shadows, pulling a cluster of other tubes with it. A chunky, disc-like hinge swung up and out of view, the tube cluster disappearing from sight behind the main tube as it unfolded towards the camera. Elongate shadows played over the spacecraft hull; they shrank over the lip of the open payload bay and were swallowed by the deeper shadow within.

“Manipulator unstowed, Flight. All set for the shakeout sequence.”

“Copy that, Payload,” Lucan replied. “Let’s get this tugboat up and running - we’re needed at the shipyard.”

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“Okay, Bill. Get the second one done and we’ll call it a day.”

“Understood.” Bill waited for the flow of air across the inside of his helmet to clear the fog in front of his face before checking that his air hose and tether were free from any obstructions. Hand over hand, he worked his way across the hub module, stopping every second hand-hold to reposition his lines. Finally, he pushed away from the hull then, straining against the stiff confines of his spacesuit, he slowly bent at the waist and hooked his feet under a pair of restraining bars.

Ahead, the twin protuberances of spoke adaptor no. 4 jutted sideways from the curving expanse of the hull, with only the sides of adaptors no. 3 and no. 5 visible through his helmet visor. For a moment, Bill let his arms rest, watching as they floated in front of him. The illusion of zero gravity was somewhat spoiled by the sight of a kerbal swimming past, dressed only in shorts and breathing apparatus. Bill sighed, gave the safety diver a thumbs-up and retrieved his power wrench from its holster.

"Undogging petal four." Bill checked his wrench settings then, bracing himself against a nearby handhold, fitted it over the bolt securing petal four in place, and squeezed the trigger. He felt the tool twisting against his hands as the bolt began to turn. Muttering under his breath, he swapped his wrench for a looped cord, one end of which was tethered to his belt. He fumbled the loop over the bolt head then drew it closed. "These were a nice idea, Tomcas, but I'm not sure they're going to be practical on orbit."

"Yeah, James was having trouble with them too." Tomcas sighed, "I'll have a word with Roncott this afternoon - see if he's got any bright ideas. Not that I don't think you space-walkers couldn't deal with the bolts but..."

"Anything to make the job easier," agreed Bill. "I'll give some thought to it myself, Tom. Anyway - this one's tied on and ready." The wrench grumbled in his hand and the bolt came free. Bill tucked it into a pouch. "Petal undogged - moving to pivot point."

Eight triangular frames, or petals, ringed the edge of the hub module, each joined to it by a hinge and all but two of them lying flat against the hull. Bill inspected the hinge of petal no. 4, and, satisfied, worked his way along to the blunt conical latching post at its tip. He took hold of the crossbar welded just behind the latching post and, gritting his teeth, pulled.

The combination of water resistance and working inside a cumbersome spacesuit made rotating the petal a demanding exercise, and Bill was sweating freely by the time he'd heaved it into position. Tomcas could hear the kerbonaut's laboured breathing over the suit radio, followed by the rushing sound of a suit fan being turned up to full.

"You're doing great, Bill. Take it easy for two. At least the manipulator will have you covered for this part, up in space." He received a grunt in reply but exactly two minutes later, the fan noise diminished to normal levels.

"Moving petal to pre-latch." Bill nudged the crossbar home, both eyes fixed firmly on the latching post as its tip slid into a matching recess on the mocked-up bridge module. "That's a good coarse alignment." Another nudge and the green indicator stripe on the latching post hovered on the lip of the recess. "Ready to latch."

One of the safety divers swam up with a camera, careful to keep out of the kerbonaut's field of view. Tomcas studied the image on his screen. "Looking good, Bill. Clear for preload."

Bill gripped the handlebar set into the upper surface of the latching post, twisted it through a half turn and checked the indicator stripe, which had now disappeared. "Fine alignment confirmed." He twisted the handlebar through its remaining half turn. "Latched."

"Good work, Bill. Run me through the tensioning sequence."

"Bolts alpha through delta, clockwise. Six turns on the first go-around, eight on the second, four on the final pass."

"Copy that. Alpha through delta clockwise, six by eight by four."

Bill unclipped his wrench from his belt, fitted it over the first bolt and set to work.

Two hours and two increasingly sore hands later, Bill pushed himself away from the two *Tenacity* trainer modules and floated alongside them for a moment, inspecting his work. The triangular frame making up petal no. 4 was secured to the bridge module by four bolts, the handlebar at its tip back in its unlatched position. On orbit, he knew, the eight petals would reinforce the central, airtight connection made through the CORDS-3 adaptor, and hold the two sections of *Tenacity* fast. And one day, that same arrangement of CORDS-3 and petals would fuse two similar modules into the prow of an interplanetary spacecraft.

Behind the transparent bubble of his spacesuit helmet, Bill's eyes lost their focus. Then he shook his head and, deliberately turning away from the EVA trainer, he signalled one of the safety divers, making two chopping movements with the flat of his hand. The diver swam up and hooked a set of weights onto his belt. Bill drifted slowly to the bottom of the pool, knees bending automatically as he came to rest. He set off in a gliding lope, coasting from foot to foot across the tiled floor to the lift. Settling himself, he thumped the oversized push-plate that was the lift's only control and, moments later, emerged dripping wet from the training pool.

It was, Bill thought, almost like the old days. The Mission Control bunker, filled with the earthy scent of overheated bodies and stuffed with as many kerbals as could fit inside without encroaching too noticeably on the flight controllers at their consoles. He glanced over at Jeb and Geneney standing side by side with Director Lodan and smiled to himself. *Not quite like the old days.*

James and Calley, his crewmates for the first *Tenacity* assembly flight, stood by his side, eyes fixed on the main screen, and its image of the *Tenacity* hub module crawling towards them, continents and clouds drifting past behind it. Puffs of vapour spurted from the sides of the screen and the hub module stopped, then rotated by an almost imperceptible amount. Numbers chattered past on one of the telemetry screens.

"Flight, Guidance. PAL alignment is Go."

"Thank you, Guidance. Payload?"

"Go for final approach, Flight."

"Understood. Take us in."

The hub module began to edge forward again. A shiver ran down Bill's spine at the sight of the eight furled petals around the docking adapter ring, identical from this distance to the mock-ups he'd been training on two days earlier. Vapour puffed out and the hub module slowed to a near standstill, crawling down the screen towards them.

"Soft dock confirmed, Flight..."

The bunker fell deathly silent. The screen juddered and then stilled.

"And we have a hard dock!"

Bill's breath gusted out. He wiped his forehead on his sleeve before looking up to find several of the engineers around him doing exactly the same. An excited buzz of conversation filled the room, not quite loud enough to drown out the status reports from the consoles. Calley flashed him a quick grin, James stood motionless, eyes still on the main screen.

"Flight, Guidance."

"Go ahead, Guidance."

"Guidance mode docked, Flight. Go for RCS checkout sequence."

"Thank you, Guidance. Let's start with the roll thrusters."

Sunlight glinted from the antique brass key in its glass fronted cabinet, the reflection catching Halsy's eye. The Director of the Berelgan Institute looked up from his desk, brow furrowed in concentration. He saw the key on its stand, sighed and turned back to his work. Before him lay a ring binder, open at two grids of yellow squares, each one marked with a reference code and each a different shade to its neighbour. A handful of the squares were annotated with the names of various soil-dwelling species.

Halsy flipped open another ring binder, riffling through its contents until he found the page he was looking for. Running his finger down a list of species names, he found two that had been marked on the yellow grid and crossed them out. Then he turned to an already marked page and ran his finger down it, eyes flicking between list and grid.

By the time the clock on his office wall chimed mid-morning, Halsy was more than ready for a break. He pushed back his chair and got to his feet, tucking both folders under his arm. Locking his office door behind him, he walked down the corridor until he came to a door sporting a temporary cardboard nameplate. Checking his watch, he knocked on the door and waited for a reply.

"Come in." Obrett looked up from the papers arrayed on her desk, most of them headed with the seal of the Accident Investigation Department. "Oh - good morning, Halsy. Is it that time already?"

Halsy nodded. "I thought I'd bring him the latest concordance data to look over."

Obrett smiled. "Mallas is keeping busy I see." She stacked her papers together and put them in her desk drawer. "Has he managed to send any data from Jonelle's - Guardian Jonelle's I should say - Grove yet?"

"Not yet. When I spoke to him last, I understood that she and Joenie hadn't quite mastered the use of Joenie's eyes for long enough at a time." Halsy chuckled, "It wasn't a long chat. Then he was straight down to the lab to pick up more sample cases and equipment and back on the next train to the Capital."

Obrett pulled her office door closed and followed Halsy along the corridor and out of the laboratory building. "It sounds like he's enjoying himself out at Barkton."

"Oh Kerm yes. From what he was saying, he's Communing with Guardian Elton almost every day, the experiments are going well, and I rather think he's enjoying the family time in the evenings. Not to mention his time spent teaching Joenie."

Obrett smiled again. "Yes - they got on well when she came to visit with Jonton. An engaging kerblet - and bright for her age." She shook her head ruefully. "Not to mention caught up in extraordinary circumstances. Thank the Kerm she's young enough to take it in her stride." Obrett gave Halsy a sideways glance. "You should offer her a scholarship once she's finished with compulsory schooling. She'd be an invaluable addition to the xeno-ecology team."

"The thought had crossed my mind. She'd only be a couple of years younger than our first year undergraduates - such things are hardly unprecedented."

"And by then, Jonelle should have grown up enough to let her go."

Halsy climbed into one of the campus minivans and waited for Obrett to get in. "That's a good point. I wouldn't fancy the task of telling a sapient Kerm that her Keeper was going to be away for weeks at a time."

Obrett sighed. "We can only hope she'll be studying in more peaceful times. Having Joenie able to fly home for the weekend would make it much easier for both of them."

The journey out to the former planting site, passed in silence, both kerbals wrapped up in their own thoughts. Halsy parked at a polite distance from the new Grove and retrieved his ring binders from the back seat. The grass was springy underfoot and the air was scented with resin and just a hint of cinnamon, as he and Obrett walked up the path to Erlin's hut and knocked on the door. They heard footsteps and then Gusemy opened the door and beckoned them inside. Halsy took one look at the other's carefully composed features and stopped dead.

"What's happened?"

"I... think. I hope... You'd better come on through."

As they entered the sleep room, Halsy was relieved to see Erlin's kerbal body sitting by his trunk and swathed in leaves and healing vines as normal. "Morning, boss. Brought the latest Project results for you." His voice sounded brittle and forced in his own ears.

"I look forward to talking them over with you," Erlin replied. "But we have some results of our own to go through first."

Halsy felt his heart begin to pound. He turned to Gusemy and was answered by a nod.

"It happened this morning. Just as Enely described it - a soap-bubble membrane and a quiet voice behind it calling for help."

Obrett looked at him solemnly. "How long do we have?"

"A few days yet. They called in a medical team before trying to awaken Elton, remember?"

Halsy cleared his throat. "I'll get back to my office now and let Chief Ambassador Donman know that we have need of that same team again. I've already been advised that they'll be given priority transportation."

"Thank you, Halsy," Erlin replied quietly. He turned to Obrett. "I already know Gus's answer but..."

Obrett's throat constricted. "Of course, Keeper. My answer also remains unchanged."

"Sweet Kerm above..." The voice was almost reverential.

"Easy, Payload. It's going to get a lot bigger than that before we're done."

"And the real thing will be more impressive yet," murmured James. Bill glanced at him in surprise before turning back to the main screen, which was showing the outer ring and recessed hatch of a CORDS-3 docking adaptor, both gleaming in the sunlight.

"Sorry, Flight." Payload entered a command on her keyboard and a sequence of indicator lights lit up on her console. "Confirming capture program loaded. Docking probes extended and ready."

"Thank you. Guidance?"

"Spacecraft alignment is Go. RCS to FINE, auto-reverse loaded."

Lucan's knuckles turned white on the arms of his chair although his voice remained calm.

"Copy, Guidance. Take us in."

"That's affirmative, Flight."

On screen, the aft end of *Tenacity's* observation module crept closer. Bill held his breath as the docking port rim slipped out of sight, the view from the PAL spacecraft camera hidden by the hub module and its array of petals and spoke adaptors.

"Inside the capture zone, Flight. Standing by for contact." A set of red lights on the payload controller's console flipped to amber and Bill blew out his cheeks in relief, accompanied by a stifled grunt from James.

"Contact! Coarse alignment confirmed." The amber lights turned green. "Ready to latch!"

"RCS OFF!" came the call from the Guidance console. "Auto-reverse disengaged."

The image on the main screen barely quivered as the two spacecraft sections touched and then held. A susurrus of murmured comments rippled around the bunker, the tension in the room still palpable despite the, reassuring glow from the latching lights.

"All latches at pre-tension, Flight. Fine alignment confirmed." There was a long pause.

"Initiating hard dock."

Aboard *Tenacity* electric motors hummed into life, extending a ring of solid bolts from one CORDS-3 adaptor into waiting receiver nuts on the other. Successful contact of all sixteen

bolts triggers the final tensioning sequence, pair by pair tightening up step by step in a carefully choreographed sequence. At last, sixteen pressure sensors report a correctly loaded joint and a signal flashes back to Mission Control.

“Flight, Payload.” The voice was studied, with a deliberate calm that fooled nobody, least of all Lucan.

“Go ahead, Payload.”

“We have a hard dock, Flight. Tenacity is...

The pent-up tension broke with a roar of applause that drowned out the end of the controller’s report. Across the room, Bill turned to his crewmates and three green hands clasped in quiet triumph at the sight of two joined *Starseed* modules and one PAL orbital tug, soaring through space, against a glowing, green-and-blue horizon.

Chapter 94

Humilisia Falls

The Lapwing long range search and reconnaissance plane dipped its wing and turned north onto the final leg of its sweep. Its pilot glanced at her chronometer and made a note on her kneepad. She lifted her eyes to the horizon again and a sudden torrent of icy water coursed down her back.

The threat warning receiver shrieking in her ear jolted her back to her senses. Instinctively, she rolled inverted, hauling back on her control stick and sending the Lapwing plummeting towards the sea. Feet dancing over the rudder pedals, she broke left, then sharp right, bracing herself for the juddering clang of cannon fire punching through her fuselage. She rolled upright, pulling the Lapwing out of its crash dive and banked sharply southwest, craning her neck in search of pursuing aircraft.

Nothing. She flicked the Lapwing into an aileron roll, rapid-scanning the skies around her for the enemy, then jammed the throttle lever against its stop, thumbing her microphone toggle as she raced for Humilisia and safety. "Greenfields, Picket One. Reporting hostile contact at waypoint Echo-Three. Multiple surface vessels but no bandits, repeat no bandits."

"Reading you, P-One," came the clipped reply. "Approx number and location?"

"Estimate twelve major vessels, on the horizon, bearing zero-seven-five. No clear escort count. At least one hostile radar contact. Search mode, no-track." The pilot paused. "Didn't stick around long enough to confirm."

"Copy that. Make best speed for home - we're clearing a space for you on Greenfield A."

"Understood. Best speed for Greenfield A. Picket One out."

The bow lookout aboard the *Shield of Kolus* swore as the swathe of dark specks on the horizon resolved themselves into an orderly formation of ships. She dropped her binoculars, shot a glance at the compass by her waist and signalled the officer of the watch.

"Vessels closing! Bearing one-two-seven. Escorts only, estimate two Doreni flotillas."

The officer of the watch swung round to face his commander, just as the phone by his side warbled the high pitched tone that told him what he already knew. Raising his hand in apology, he picked up the handset.

"Yes - we have a visual on one-two-seven. Any flankers? Thank you." The snick of the handset settling into its cradle echoed across the bridge.

"Tactical confirms, Ma'am. Doreni fleet closing off the port bow."

The captain didn't need to consult her navigation officer or her charts. "Radio, please signal Fleet Command. We have a confirmed second Doreni fleet and are moving to engage. *Pride* is on the line with us, *Tenacity* and *Defiance* squadrons to flanking speed, southeast hook."

"By your orders Ma'am."

For a moment, unseen by the rest of her bridge staff, a bleak look flickered across the captain's face. Then her hand slapped down and the mournful honking of the alert klaxon sounded across the ship.

"All hands to battle stations. All hands to battle stations. This is not a drill."

Halsy's nose wrinkled as he watched the medic snip another clump of hair from the side of Erlin's forehead, before dabbing more foul-smelling depilatory onto his exposed scalp. The aseptic reek of rubbing alcohol did little to clear the air, and he saw his former boss's nose twitch in response.

"Can't do much about it I'm afraid, Professor," the medic said. "Just one more to go and we'll be done."

Erlin raised a silent thumb in reply. The scissors snicked shut just above his left ear, a cold dab of cream following them.

"And that's the last one. Can I get you a drink of water?"

The an-Kerm shook his head fractionally, the leaves swathing his head rustling in response. "No - thank you."

The cloying aroma of surgical adhesive added its own note to the overladen air. The medic threaded an electrode pad through a gap in Erlin's leaves and pressed it into place against his scalp. Obrett and Gusemy lay on their beds beside his trunk, elasticated EEG bands already wrapped around their heads, skeins of multicoloured wires emerging from the

napes of their necks and snaking across the floor to an equipment trolley parked by the hut door.

Halsy gave Erlin a reassuring look, not trusting himself to speak. Then he turned his attention to the monitors on the trolley and the second medic watching over them.

One of the screens flickered, the dense array of lines scribbling their way across it fuzzing into spiky noise. The medic reached behind it and reseated one of the cables linking it to the rest of the equipment on the trolley. The screen flickered again and cleared, the EEG display coming into sharper focus. "I've got a clear signal from both bands." The second medic peered over the top of his monitors. "How do they feel?"

"Tight but not too bad," Gusemy replied. Obrett nodded in agreement.

The first medic taped a bundle of multicoloured leads to Erlin's neck before hooking them up to a box attached to the an-Kerm's belt. He retrieved a lead from the floor and plugged it in. "Thank you, Professor." He turned to his colleague. "How's everything looking?"

"Looking fine," his colleague answered. "Nice clear signal and the Professor's traces are very similar to how I remember Jonton's being." He smiled at his three patients. "Which is a good sign I think. Just try to relax and start whenever you're ready."

He watched Obrett and Gusemy both take a deep breath before lifting their heads to the waiting leaf clusters. Their EEG readouts shivered and then flared into white noise.

Aboard the *Shield of Kolus* the officer of the deck flinched as the sky lit up behind the *Pride*, accompanied by the gut-wrenching thunder of enemy gunfire. He clenched his fists in triumph as the Kolan vessel sailed on, seemingly untouched. Then she shuddered and rolled hard to starboard, superstructure disappearing beneath the waves and exposing her keel. Foam swirled around her, flushing out debris and bodies alike.

Gouts of water belched up from the stricken *Pride of Kolus*, driven by the last of the trapped air escaping her hull. Then she slid beneath the waves, leaving the officer of the deck on her sister ship slack-jawed with horror. Swallowing hard, he turned to his captain, the stony expression on her face matching the solid lump in the pit of his stomach. He ran through the numbers in his head, ranges, speeds, enemy dispositions, and waited for his commander to confirm what he already knew.

"We can buy them time." It was a statement not a question. "Punch through the Doreni lines, turn their strength in on itself."

And hope the other poor seffleks escape before their shield breaks. "Yes ma'am." For a fleeting instant, he saw his own resignation mirrored in his commander's eyes. Then she straightened her shoulders and turned to the radio operator.

"Signal *Tenacity* and *Defiance*." Her voice cut effortlessly through the clamour raging across the bridge. "All vessels are to break off the engagement and make best speed for Humilisia."

They are to regroup off North Point and lend what assistance they may to Commander Geroly.”

The captain raised her hands for silence before leaning forward and pushing a prominently domed, button. A drawn-out two tone whistle sounded across the ship, before giving way to the static hiss of an open microphone. She leaned forward, speaking directly into the annunciator grille set above her head.

“Signal Fleet Command, priority zero. Message begins. Second fleet falling back. Tenacity and Defiance regrouping at designated location. Shield executing option kappa.”

A heartfelt, hastily muffled oath sounded across the ship-wide channel followed, mercifully quickly, by the controlled calm of officers issuing orders and sailors running to obey. The captain allowed herself a moment of steely pride in her crew, roiling emotions hidden behind an impassive mask.

“Mister Landorf, you have the bridge.”

Landorf saluted. “I have the bridge, ma’am.” He waited for the captain to step down from the command platform, before assuming her place behind the annunciator grille. “This is Lieutenant Landorf. I have the bridge.” He watched his commander turn and leave before directing his attention to the battle raging outside. “Signal both squadrons. Assume formation kappa, bearing zero-eight-seven, all ahead flank.”

The captain strode through her ship, offering a word of encouragement to a crewmember here, a gesture of thanks to a junior officer there, the expression on her face radiating nothing but complete confidence. Knowing better than to enter the Tactical Operations Centre whilst the ship was under fire, she reached under her collar, withdrew a finely carved Kerm wood charm from around her neck and hung it from the door on its silver chain. Then she left for the foredeck.

Outside, the wind knifed across the deck, enveloping her in salt spray and the stench of expended munitions. The gunfire, a steady thunder from the bridge, crashed against her ears in an unrelenting, deafening barrage. Staggering, she pushed on to the forward observation post, bracing herself momentarily against the rail before standing ramrod straight, shifting her weight in perfect time with the rolling warship. Slowly she turned to face the bridge, dipping her head in silent salute. Then she turned away, both arms thrust skyward, upraised fingers stabbing a gesture of defiance at the Doreni vessels that would be recognisable anywhere across Kerbin.

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Halsy tucked his trembling hands behind his back, staring fixedly at the chaotic patterns sprawling across all three monitor screens. One medic moved from patient to patient checking pulses and noting eye movements before moving on. Two of the three monitors settled into a set of steadier rhythms, punctuated by spiky bursts of activity.

“Okay, here we go.” The second medic’s shoulders lowered slightly as he sat back in his folding chair. On screen, two of the wildly fractal waveforms on Erlin’s screen brightened,

shimmered and shifted, each mirroring a trace on one of the other screens. The medic nodded in satisfaction. "They're in. Rapport time on the long side but that's consistent with Elton's awakening too." He smiled at Halsy. "I'd pull up a seat, sir. This might take a little while."

The *Shield of Kolus* sailed into the teeth of the Doreni forces, her captain seemingly heedless of the murderous barrage shredding the skies around her, the continuous din of the smaller cannons all but drowned out by the soul-splintering crashes from the enemy's main guns. Surrounding the *Shield* in perfect formation, her escorts replied in kind, most of their shots landing wide of the mark, their captains relying on speed and whatever evasive manoeuvring they could afford for defence, rather than any attempt at counter-battery fire.

The Kolans sailed onwards, driving suicidally close to the largest enemy vessels, the geysers of spray fountaining around them abating slightly as the flanking Doreni gunners held fire for fear of hitting their own forces. The *Shield* slowed, her stepped main turrets turning to bear on the enemy, her helmskerb matching speed as best he could with his Doreni counterpart, her For several long minutes, the two warships traded shell for steel-clad shell before the *Shield* broke away, cutting across the stern of the Doreni flagship before swinging hard to starboard for another pass, her escorts fanning out to engage the rapidly closing, smaller enemy vessels.

Gouts of smoke and fire erupted from the *Shield's* main guns as she turned, the broadside punching gaping holes across the Doreni destroyer's flanks and reducing a pair of her smaller guns to twisted, blood-spattered, wreckage. The ferocious answering salvo scythed across the *Shield's* bows, smashing her forward battery and ripping open her superstructure. An explosion blew out her forward deck, launching the captain high into the air. Reaching the top of her arc, she watched her ship begin to turn, bringing her rear turret to bear. There was a confusion of smoke and fire, then she hit the water and everything went black.

"Damage report!"

"Main guns out of action, sir. Rear turret is still there but the turret drives and fire control system are offline. Starboard superstructure guns are gone, portside magazine hoists are shot to Kerm and back."

Landorf nodded grimly. "Down to the last then. Time for everyone to get off this boat." His hand slapped down on the domed button and again, a two tone whistle, followed by a static hiss, sounded across the ship.

"Now hear this, now hear this. All hands abandon ship. Repeat. All hands abandon ship."

Landorf shut off the intercom and crossed over to the helmskerb's post. "Mister Jenvis, I have the wheel."

Down in the Tactical Operations Centre the radar plot officer snorted. "Ditch into that?" He pointed at his display. "I'd sooner take my chances with the Lieutenant." He turned to his watch officer. "Permission to open the small arms locker, sir?"

A rumble of approval swept around the Centre. The watch officer shook his head. "Denied. That's my job." He raised his voice. "Set the security charges. All hands follow me, eyes forward. Anyone following the Lieutenant's orders shall not be impeded in their duty."

From the bridge, Landorf allowed himself a moment of anger as the lines of sailors marched out onto what remained of the foredeck, eyes front, rifles shouldered. He locked the helm before circling the empty bridge, eyes scanning the waves for life rafts.

Not a single orange shape could be seen.

A flicker of mingled relief and shame burned at the back of his mind. *You poor, poor seffleks. What do we do to deserve the likes of you.* He strode over to the helmskerb's station and seized the wheel, glancing at the engine speed indicator which was still reading full ahead. He spun the wheel, nodding in grim satisfaction as the horizon obediently began to slide past. Then, gritting his teeth and taking a tighter hold of the wheel with his other hand, he slid the engine speed director up to flank speed, the increased thrumming under his feet accentuated by a clattering and banging of loose plating and the muffled crashes of equipment breaking free within the bowels of his ship.

Halsy fidgeted in his chair, casting sidelong glances at the EEG screens. "It's been too long," he muttered. "You must be able to tell something from out here."

The second medic summoned up a patient look. "I'm afraid not," he said gently. "At best, we can pick up the general mental state of a kerbal and we simply don't have any reference points for an-Kerm electroencephalography. If it's any comfort, Professor Erlin's traces look very much the same as Jonton's did before Elton awoke - same fractal patterning, same nested waveforms. What those waveforms mean though is anyone's guess." The medic coughed. "And I say that as something of an encephalography specialist."

"Their vital signs are well within normal," the first medic added. "Slightly elevated pulse, no signs of respiratory distress, no tremor or adverse neuromuscular reactions."

Halsy nodded and sat back in his chair, eyes fixed on his friend and his two companions.

"What in the seven smoking hells are they *doing*?" The Doreni captain grabbed a pair of binoculars from his lookout and trained them on the oncoming Kolan vessel. What he saw would fuel his nightmares for the rest of his life.

It wasn't the sight of the ruined Kolan ship still afloat and bearing down on him, despite the utterly ruined superstructure and the fires raging unchecked amidships. That merited no more than a grudging respect for the engineers and shipwrights who'd designed her.

Part of it was the sight of the bloodied and vengeful kerbals lining what remained of the decks, brandishing their weapons and screaming defiance. Even then, a small and detached part of him hoped that he would be doing the same were their situations reversed.

A bigger part was the sure and certain knowledge that *someone* still stood amidst the inferno, giving their ship direction and purpose even at the end.

But most of all, it was the silent few standing motionless amongst their comrades. The ones with the walled-up eyes, rifles raised and ready, seemingly aimed directly at his heart.

“Collision alert! Evasive action!”

His helmskerb needed no such prompting, already spinning her wheel hard to starboard. The Kolan vessel turned with them, shedding loose armour plating into her boiling wake as she heeled over. Then she straightened up, her crew still screaming from the ruins of her decks. Then, with a catastrophic lurch and a rending screech of steel on steel, she struck home, bows ploughing up and over the now-listing Doreni ship. Those Kolan sailors who hadn’t been thrown free by the impact, stormed aboard, weapons at the ready, even as the two mortally wounded ships began to take on water.

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The second medic raised a hand and leaned forward, studying Erlin’s monitor intently. “Thought I saw a blip...” He leaned back, a broad smile breaking across his face, and beckoned Halsy forward. “And there we have it.”

Halsy’s knees threatened to buckle under him. On the screen, the baroque, nested waveforms had disappeared and three perfectly normal sets of EEG traces whisked quietly across the screens in front of him. “Boss... thank the...” A thought struck him. “What about the Kerm?”

“No way of telling for sure.” For the first time since the Awakening had started, Halsy heard a note of tension in the other’s voice. “But it hasn’t been showing any signs of distress. No excess cinnamon or undue branch movement. So it’s probably fine.”

“Or...” Halsy didn’t need to complete the thought. “Although...” He gestured at Erlin’s body sitting by the Kerm trunk, and Obrett and Gusemy lying on their beds. “I can’t imagine any of them would still be in Communion if it was.”

There was a muffled groan from one of the beds and Gusemy sat up, massaging his forehead. He peeled the EEG band off his head and dropped it on his pillow. He accepted a mug of water from the medic and downed it in a single swallow. Then he turned to face Halsy and the other medic and the awestruck expression on his face left no room for doubt.

“His name is Obrinn.”

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The *Tenacity of Kolus* and the *Defiance of Kolus* sailed north, at the head of a ragged flotilla of warships. The captain of the *Tenacity* listened stony-faced, to the tired-sounding voice crackling from his radio.

"You're speaking to him. We lost Commander Geroly during the retreat. Forget about North Point, captain; we're to rendezvous at the port, evacuate as many civilians as we can, and get them to Kolus. Orders from Fleet Commander Gusden's lips to our ears."

Despite himself, the captain's shoulders stiffened. "By his command. We'll see you at the port - *Tenacity* out." He scrubbed his forehead on the back of his uniform sleeve before turning to his bridge officers.

"You all heard the Commodore. We're picking up our people and going home. Now let's get to Humilisia before the *bjedla* Doreni do."

A grey-robed figure stood on the dockside, one arm wrapped around the shorter figure by his side, watching a steady stream of dinghies shuttling kermol villagers out to the waiting warships. Orderly queues stretched along the waterfront, kerbals wearing the clothes they stood up in and not carrying anything that couldn't fit into a poncho pocket. Parents with the youngest kerblets or pouch-bound kerblings were allowed one small pack between them, with most of the kerblets clutching a favourite toy in one hand and holding tightly to their parent's hands with the other. The older children stood around wide-eyed, staring at the heavily armed, steel-grey ships riding at anchor just beyond the harbour, makeshift white flags flapping from their masts.

Sailors kept the lines moving, the suppressed tension in their movements vying with their reassuring words and air of competence. Some of the youngest kerblings, sensing that something was wrong with the strangers, had retreated into their pouches, their thready wailing adding to the general air of quiet desperation.

"It's okay sweetheart. It'll all..."

His partner pressed a finger against his lips. "Don't. Don't say it."

He looked at her helplessly. "I wish I didn't... didn't have to..."

"I do too, my love. But you're the Keeper." She pulled him into a fierce hug. "And I'm so proud of you for it." Her shoulders began to tremble. "So, so proud."

He glared at the approaching soldiers through red-rimmed eyes, cradling his shaking partner in his own trembling arms. The soldiers stopped at a discreet distance, a warning glance from their sergeant enough to close their mouths.

She unwrapped her partner's arms from around her and stepped back, despair held at bay for the moment. "I think they're waiting for you, my love. You'd better get going." She looked him straight in the eyes. "I'll be al... I've got a boat to catch." She leaned forward and kissed him on the cheek. "Go!"

He nodded wordlessly, kissed her back, and walked away. The sergeant saluted him as he drew near, carefully ignoring the other's rumpled, tear-blotched clothing. "Good to have you with us, sir." He passed the Keeper a rifle. "If you'd like to come this way, we'll get you kitted out before we head back to the village."

Chapter 95

Last Flight from Barkton

Every last berth at Foxham harbour was occupied. Tugboats swarmed in droves, shepherding the larger survivors of the Second Fleet – or those too badly damaged for accurate steering – to their moorings. Gunboats patrolled the horizon and contrails crisscrossed the sky, an airborne detachment of the Kolan border security forces maintaining a tight ball-of-yarn patrol over Foxham and the surrounding coastline.

White flags drooped at half-mast as the naval crews ushered a steady stream of shell-shocked civilians ashore, dishevelled, unwashed and dressed in whatever clothing they'd left Humilisia in. The last of them came ashore on stretchers, faces shrouded by the same ship's blankets that hid the rest of them from prying eyes. Two sailors stood watch over the orderly row of stretchers already laid out on the quayside, their crossed spades and the ceremonial sweetblossom staff on the ground in front of them, keeping even the most distressed bystander at arm's reach.

Away from the dockside, marquees sheltered rows of pallets, made up with a motley assortment of donated bedding. Steam rose from a hastily assembled camp kitchen, many of the kerbals preparing vegetables or tending enormous pots of soup, clad in boiler suits marked with a white cross on the chest pocket. Away from the marquees, gangs of kerbals – most of them dressed in kermol ponchos - were putting up temporary moss rooms for the Humilisian refugees.

“To be honest, I’m looking forward to the break. A few quiet days on a train back to Barkton before diving into spoke construction. If the trains aren’t too badly fouled up, I should even get back for Bill’s launch.” Bob opened his car door and slid behind the wheel.

Ribory smiled as she climbed in beside him. “It’s about time. Did they ever settle on a callsign?”

"No. They got no shortage of suggestions but none of them seemed quite right. In the end, the crew settled on plain old Eve 3." Bob reached for the starter button. "I suspect that was largely down to Bill though."

"Bit too understated for Calley and James probably didn't care much either way," Ribory agreed. She stared out of the window as Bob eased out of the car park and turned left onto the main thoroughfare. "A break will do me good too. Mountain air, *greenery*, and time to catch up with Fercan and Corvan."

"Are you going straight back to Alpha then?" Bob raised his eyebrows at the long queue of cars ahead of them.

"Yes. Helping to upgrade the network again after Camrie's latest expansion efforts. Wish the White Cross Company could build us a few dishes at their Veiidan hub offices - Kerm knows we could use the extra tracking sites."

Bob drummed his fingers on his steering wheel. "Shouldn't be a problem if any of those hubs are on the eastern seaboard. I bet the Weiidans would jump at the chance to put up a couple of extra air defence stations." He sighed. "And I wish I was joking."

Ribory snorted. "They'd spend more time getting permission from the Doreni than they would building the stations." She frowned. "What is it with this traffic?"

"I don't know." An olive-green truck appeared around the corner and tore past them, rocking their smaller vehicle on its suspension. Ribory caught a fleeting glimpse of a triangular pennant snapping from its hood, emblazoned with the Kolan flag.

"Kerm!" Reflexively, Bob jammed his foot on the brake. "What in the First Grove was that idiot doing!"

"Bob?" Ribory's eyes were very wide. "That was Border Security."

Another truck shot past. Bob and Ribory exchanged worried looks. Ribory reached down and flicked the radio on, hunting for a news bulletin whilst Bob followed the line of vehicles crawling towards the security gates. Snatches of music, interspersed with voices, filled the inside of the car, most of them adopting a light-hearted tone that sounded distinctly forced to Ribory. Frustrated, she turned the radio off with a snap.

Ahead of them, the main road to Foxham came into sight, an endless convoy of cars and assorted other vehicles streaming out of town, broken by intermittent traffic passing by in the other direction, most of it drab green trucks. Ribory's head jerked round at Bob's startled exclamation. "What?"

"White Cross van. Heading into town. Kerm – there goes another one!" The car jerked to a stop just in time to avoid bumping into the car in front. Bob's voice turned grim. "Are you thinking what I'm thinking?"

"Border security and emergency relief heading towards town, everyone else going the other way? Probably." They moved forward another few car lengths and stopped again. Bob

wound down his window in response to an urgent gesture from a Rockomax security guard, and held out his pass. "What's going on, Jerson?"

"Lockdown," came the terse reply. "Doreni have taken Humilisia and everyone reckons we're next." Jerson glanced at his clipboard. "As of right now, all Rockomax launch and manufacturing facilities are a key strategic asset, assigned defence priority one. Border forces are here for added on-site security, Kerm knows what else is going on." An unreadable expression passed across Jerson's face. "Where were you two going?"

"Train station. Ribory's been recalled to Alpha and I'm going back to Barkton for the launch..." Bob's voice trailed away. "Is there any news from Barkton?" he asked quietly. "If they're locking down Rockomax..."

"Nothing that I've been told, Bob, but your name's on the recall list of personnel ordered back there." Jerson offered him a humourless smile. "Good thing you were planning to go anyway."

"I'm afraid that I *don't* understand." Lodan's voice was icy. "Since the Barkton Space Centre is evidently enough of a national asset to warrant evacuation and asset stripping, I fail to see why it does not merit the same degree of security that you're affording to the Foxham Centre."

"Kindly refrain from being obtuse, Director. Rockomax's solid rocketry division has long since diversified away from purely civilian applications, as you are well aware. Since I know you far too well to presume that you have not read your briefing, you will also be aware of our losses at Humilisia. They can, and will, be replaced but that will take time. For the moment, we simply do not have the naval resources to effectively defend Barkton or its Space Centre. I have therefore *ordered* your site manager to close down the facility and prepare any and all storable rocketry assets for transportation to a designated secure site."

"And what of the scheduled construction flight?"

The telephone went silent in his hand. "Excuse me?"

"I did indeed read your briefing." Unseen Lodan's upper lip peeled away from his teeth. "Evidently you have not offered me the same courtesy in return. If you had, you would know that we have a Starseed flight scheduled in four days' time. You would also know that this is a significant and necessary step to ensure that our efforts of the past two flights are not wasted."

"Indeed. I would speak of those previous flights, Director. Specifically, your ability to resource them."

"Rest assured that your office will find everything quite in order. Thanks, in large part, to the thousands of kerman and kermol who took your own words to heart and who deserve better from their government than to be fobbed off with mealy-mouthed excuses." *As well to be hung for a gronnek as a kaya.* "Who deserve some *leadership* from their government."

Lodan heard a distant click of jaws snapping shut.

"If you are quite finished?"

"Yes, sir." *In more ways than one, I suspect.*

"Your final flight is authorised. You may expect a summons to appear before the Council by the end of the month. You will be speaking for the Kerbin Space Agency, a full and complete briefing to be submitted two weeks before your duly allotted date. And, Mr Lodan?"

"Sir."

"Please be assured in return that we shall *expect* everything to be in order. I trust you are aware of the consequences should they not be."

Jeb ran his thumb over the ornately wrought pillar, testing the edge of one of leaf cluster motifs worked into its surface. Beside him, Geneney stared unseeingly up at the roof of Barkton Central Station. A handful of kerbals dotted the platform, outnumbered by the armed guards stationed at each entrance to the main concourse.

A low thrum caught his ear making him look up. Headlights appeared around a bend in the distance and, moments later, the Cabaralb train was pulling into the station. The carriage doors whooshed open and a gaggle of tired-looking passengers spilled out onto the platform. He nudged Geneney in the ribs, raising a hand in greeting to Bob, as the other spotted them by the pillar and walked over, hefting his luggage in one hand.

"Evening, Bobcat. Good journey?"

"The Capital was in uproar but not too bad apart from that. Had a carriage to myself for most of the journey. Cabaralb was completely deserted." Bob eyed his friends. "We're being closed down, aren't we?" He snorted softly at the startled look on Geneney's face. "It wasn't hard to work out, Gene. They're keeping Rockomax open and the security around Foxham was going crazy." Bob flicked his fingers at the empty station around them. "This place is not going crazy. So, unless you've had a whole lot of troops arrive by road – and I didn't see much sign of that either, coming in – then I don't imagine they're planning to keep us open too."

Jeb shook his head. "No. Bill's going up, then we turn out the lights and head over to Alpha. Most of the gang have already left."

Bob offered him a twisted smile. "Going to be just like the old days then."

"You'd better dig out your pad team hat," Geneney agreed. "We'll be running the launch with a minimum viable team and handing flight control over to Alpha as soon as they hit orbit."

"At least Bill gets his flight in before the end." Bob rubbed his eyes. "And the last couple of flights won't go to waste. I take it we'll be splashing them down east of Foxham?" He looked

at Geneney. "Tell the truth, Gene, there were times on the train when I figured I'd be coming back to an abandoned space centre."

"That was the original plan." There was an edge to Geneney's voice. "Until Lodan persuaded them otherwise. I understand that a couple of the Probodyne team walked into his office for a meeting last week, just as he was walking out with – and I quote – 'a face that could freeze helium.' The next day we got a phone call telling us to go ahead with Bill's flight but that we'd better have everything packed up and ready to go as soon as his rocket left the ground."

"It's going to be a busy few days," Jeb noted. "Welcome home."

The RT5 "Trashcan" solid rocket booster touched down, feather light, into its cradle on the flat-bed trailer. The team of yellow-hatted VAB workers unhooked it from its cables and began lashing it down. Their supervisor, still standing atop the trailer, gave a hand signal to the waiting crane driver and watched the cables slowly rise, hooks barely swinging. As soon as she was satisfied that they were clear, she jumped down to help secure the old-fashioned looking booster in place.

A forklift truck lumbered past carrying a heavy-duty, grease-smeared vacuum pump still attached to its adaptor. Another truck followed it, carrying a partially dismantled extruder, propellant slit plate lashed to one side. A flatbed handcart brought up the rear, pushed by two sweating kerbals and piled high with assembly jig sections and other, less identifiable pieces of metal.

Watching from above, Geneney sighed. "Remember how much trouble we had with that old extruder? How long it took Wernher to come up with a way of getting enough air out of the propellant during casting?" He gestured at the forklift, now trundling through the VAB main doors. "We should be putting it in a museum, not carting it off to Kerm knows where, like so much junk."

Jeb snorted. "If I could remember which junkyard we got the vacuum pump from in the first place, we could see if they wanted to buy it back. They could even fetch a half-decent price for it now that it's actually working." His face turned pensive. "That slit plate though. Glad that Wernher invented that before we tried building the RT-5."

A shadow passed over, Geneney's face. "And I'm glad that you and Wernher were standing on top of the cliffs that day, not down on the beach beside the exploding RT-3."

"An object lesson in degassing your solid propellant." Jeb agreed. "Not to mention an object lesson in losing a significant chunk of goodwill with the Barkton Enclave and city council."

Geneney winced. "Yes." He watched one of the VAB overhead cranes winch another solid rocket booster into the air. "I'd forgotten how many RT-5s we had left over from the heatshield test programs."

"I remember the look on your face when Bob suggested putting one under an Eve capsule and firing it straight down. Which reminds me - are we going to have time to crate up all the Eve tooling?"

Geneney shook his head. "Probably not. Everything to do with the solids goes first - launch escape motors, left over RT-5s, propellant, parts, tooling, blueprints..."

"Anything the Doreni could load onto a trailer and fire back at us." Jeb's voice was suddenly bleak.

"Yes. Engines and avionics go next along with whatever else we can salvage from the Moho and LV-T20 production lines at short notice. The powers that be don't think there's much risk of the Doreni putting together any liquid fuelled missiles from whatever we leave behind, but a Moho is just about small enough that it's a risk they don't want to take."

A shadow passed behind Jeb's eyes and, for a moment, Geneney was reminded of a gloomy, rank-smelling apartment, his friend lying in bed in the midst of empty bottles and an overflowing sink, entangled in a heap of creased and sweat-stained bedding. "The good news - or least bad news - is that we can shutter the Eve core booster lines and just leave them in place."

Jeb gave a short laugh. "An Eve wouldn't be much use to them I suppose. Unless the seffleks want to bomb the Mün as well."

"Speaking of which," Geneney said quietly, "I thought we could pay a last visit to the Museum." He raised a hand. "Not to pack it away. It's hardly a priority and besides... I think we should leave it here anyway. A reminder to anyone stopping by - Kolan or Doreni - of what we invented rocketry for."

The shadow behind Jeb's eyes lifted a fraction. "That's better than nothing anyway. Good thinking, Gene."

"Come on then - lets leave these good kerbals to their work. We'll pick up Bob on the way."

By the time they arrived at the museum, Kerbol was dipping below the horizon, the streak of reflected sunlight on the Great Tranquil Sea brighter than any rocket launch. Geneney unlocked the museum doors and stood quietly to one side. Beams of dusty evening sunlight poured in through the skylights, illuminating the exhibits in the gathering gloom.

A shiver ran down Geneney's back as he gazed at the familiar but still compelling photographs from the Pioneer Program, all set around the now-iconic picture of Jeb and Jondun on the Mün, shaking hands in front of the flag of all Kerbin. Then it came to him. "Lend a kerbal a hand, guys? I think these need a bit of rearranging."

Jeb saw where Geneney was standing and gave a grim smile. Wordlessly, he walked over and took hold of one end of the rightmost signboard.

"That'll do it." Geneney lowered his end of the board. "Let's leave the first one where it is and shift the old Münwalk back a bit."

"We should take down the other two banners too," Bob noted. "They don't make much sense out of sequence."

"Good point. Back in a minute." Geneney left the room, returning with a stepladder under his arm. "I won't bother taking the wires down." He clambered up the ladder and unhooked the first banner, waiting until Jeb had a secure hold before letting go of it. "If you could grab the other end, Bob?"

Some time later, the three friends stood side by side in front of a rearranged exhibit, dominated not by spacecraft and kerbonauts but by images from around the world.

Pictures of kerbals packed into village halls. Winding queues of kerbals waiting patiently outside cinemas. A great ocean of green figures surrounding the Capital building and its seven huge screens. The Council of Twelve Pillars themselves, seated in front of one of the screens, watching two space-suited figures walking against a backdrop of grey. One blurry, pixellated photograph of a group of uniformed soldiers sitting beneath a pair of flags. And a lone banner overhead, positioned so that nobody walking into the museum could miss its message.

We came in peace for Kerm and Kerbal.

Quietly, Jeb walked over to a rack of postcards by the Reception desk and lifted one out, holding it up for the others to see. It showed a view through a window divided by a curved line separating inky blackness from brilliant blue, dusky brown and lush green. Far away in the distance, the familiar battered grey ball of the Mün rose over Kerbin.

"Bill's original is too big to fit in his suit but this'll do nicely." Jeb tucked the postcard into his pocket and turned to leave. Geneney and Bob followed, closing the door behind them.

The next morning, Jeb stood in the corner of the Fitting Room, keeping out of sight of the three kerbonauts reclining in their chairs. He watched Lucan working on Bill's suit glove, checking its fit around his friend's fingers before locking it onto the wrist collar on his orange spacesuit. Beside them, another member of the Pad Team was helping James with his communication headcap, straightening the band around his forehead and making sure the lower band was sitting snugly under the lower ridges of his eye sockets. He flipped the twin microphones into place below the spacecraft commander's chin, murmuring something that Jeb didn't catch, before slipping his hands inside the neck collar of his gleaming white spacesuit.

Calley's attendants lifted her helmet clear of her head and set it to one side. The kerbonaut lifted both her gloved hands, palm outwards, accepting the traditional, double high-four confirming that she was ready to go. Jeb smiled to himself, remembering a long-ago slap of glove on glove over the Mission Control speakers, followed by three ringing voices, pronouncing the crew of *Pioneer 1* to be Go for launch.

You should be here for this too, Wernher old friend. Jeb caught Bob's eye from across the room, the pensive look on his former crewmate's face matching his own thoughts. He

patted the side pouch of his toolbelt, reassuring himself that its contents were still there. He watched Calley clamber to her feet, eyebrows lifting as she saw himself and Bob by the door. "Looks like you're getting the real honour guard this morning, Bill."

James turned his head, now encased in a transparent bubble. He caught sight of Jeb from the corner of his eye and raised a hand in greeting. Bill waited until Lucan had finished adjusting his headcap, before leaning around the side of his chair. He nodded at Bob and turned away, leaning forward in his seat in readiness for his own helmet check.

Jeb and Bob waited until James and Bill had received their own high-fours and all three kerbonauts were on their feet. He stepped forward, a faint grin on his face as he looked at Bill. "It's been a while since I last saw you in a spacesuit."

"And this one wasn't even salvaged from an Institute dumpster," Bill said dryly. "It's good to see you both."

"You too," said Bob. "It's about time the last of us got their flight." *Even if it wasn't the flight we expected.*

Bill looked uncomfortable. "I suppose I helped to build a few," he offered at last. "It is good to be flying one instead." He gestured at James and Calley. "And flying one in good company at that."

"You did remember your camera?"

Bill smiled. "Both of them and a spare."

Jeb coughed. "Speaking of cameras." He reached into the pouch on his belt and pulled out a postcard, tucking it into the chest pocket of Bill's spacesuit. Calley caught a glimpse of blue on black. "The picture that started it all. For luck." He turned to James, holding out a small transparent bag containing what looked to Calley like a chunk of yellowish foam. "A small token from VAB 1."

James laughed. "Did Ribory find my old analyser to go with it?" He held up the chunk of heatshield, noting its colour. "Looks used."

"I cut it off Pioneer 1 yesterday. Gene's idea." Jeb looked at Calley. "We didn't have any personal mementoes for you I'm afraid but a friend of mine wanted somebody to have this. I'm sure he'd be pleased it was going to you." Jeb dipped into his pouch and handed her a miniature Eve capsule on a fine chain, carved from a dark wood and polished to a soft sheen. "He asked if you could leave it aboard Tenacity, in his words, to bring good fortune to all kerbals to follow, who wish to learn to fly to the other worlds."

Puzzled, Calley inspected it closely, holding it gingerly between finger and thumb. "It's beautifully done," she said at last. "Is it...?"

"Kerm wood? Yes." Jeb saw the puzzled look on her face. "Very old Kerm wood. It's not stained," he added.

Calley's eyes widened. "Very old indeed then." She held out the little charm on the palm of her gloved hand. "Please thank your friend and tell him I'll be glad to leave this aboard Tenacity."

Jeb nodded and slipped it into her spacesuit pocket. "I will. It'll mean a lot to him." He glanced at the clock on the wall. "And on that note, we'd better be getting you three kerbonauts to the pad. You've got a rocket waiting for you."

Lucan, and the rest of the Pad Team, formed up in a double line, each of them reaching out to tap the kerbonauts on their shoulders as they left, then falling in behind them as they walked down the corridor leading out of the Astronaut Complex and then outside, where the traditional – and now much-repaired – old truck waited to take them to the launchpad.

"I'm closing the hatch now. Good luck." Jeb unplugged his headset from auxiliary comms port on the capsule instrument panel, flashed Bill a quick thumbs up as he rapped on his visor, then stepped back and swung the hatch closed. He eyed the pressure gauge set beneath its window for a moment, watching it fluctuate as the environmental systems purged the cabin atmosphere, replacing it with a flight-ready oxygen-nitrogen mix. The gauge quivered one final time then held steady.

"Capsule pressure is Go, Flight. Pad team proceeding with boost cover closure."

Bob took hold of the hatch shield and swung it across and closed. He ran his thumb over the hairline seam between the shield and the curved grey surface of the boost protective cover, then slid the latches home and locked them with a twist. "Boost cover locked and ready for flight. Pad Team is moving out."

"Thank you, Pad Team," Geneney's voice sounded as calm as ever over their headsets. "See you back at the Bunker."

"Copy, Flight." Bob looked over at Jeb. "Do you even remember how to drive a console?"

"Most of it. Tomcas managed to beat the rest into me at short notice." Jeb raised his fist, as if about to knock on the boost cover for luck, then thought better of it. "Let's go."

The ride down the launch tower seemed interminable. Jeb stared at the tower of metal sliding past outside the elevator cage, the normal plethora of sponsor's logos adorning the upper stage replaced by the flag of all Kerbin. The nose cone of one of the lateral boosters whisked past, the booster itself adorned with the Kerbin Space Agency's Kerbol-rise logo. The elevator cage slowed and, with a brief squeal of brake pads against cable, came to a stop. The door rattled open and Jeb followed Bob and the rest of the Pad Team over to the kerbonaut truck standing ready to take them back to the launch bunker.

The driver flicked his radio on as they climbed aboard, the familiar stream of controller reports interspersed with callouts from the *Eve 3* crew, breaking the silence.

"...gimbal motors drawing power. Confirm hand controllers to TEST?"

"Controllers to TEST, SAS override ON... yaw gimbal tracking confirmed...pitch tracking is good...roll tracking confirmed."

"Copy, Eve. Holding at T minus thirty and moving gantry systems to standby. FD, Guidance, you're on Loop 2 for a trajectory update. Booster, please give me a fuelling status..."

Bob's expression relaxed as the fuelling report came in. "They're sounding pretty good in there," he offered quietly.

Jeb nodded, eyes fixed on the dwindling rocket, standing alone on the launchpad. "They're on Genie's watch – he'll get them up there in one piece." The truck bumped to a halt. "And we don't want to be holding them up." He folded the tailgate down and dropped to the ground, setting off for the launch bunker at a run, Bob and Lucan alongside him.

Geneney looked up from his console at the sound of the doors thudding closed behind him and toggled his microphone. "Okay, Eve. We've got a full team down here, as of ten seconds ago. Moving gantry systems to launch positions and restarting countdown at T minus thirty."

Jeb slid into his seat, scanning his console readouts as he pulled his headset on. He thumbed a button on his communication panel and waited for the message queue light to turn green. "Booster, Five. On station, board is clear."

"I hear you, Five. Take two for a systems check then give me a tank update on Lat Three."

"Five confirms."

The minutes ticked by unnoticed. Jeb's eyes never wavered from his console, alert to the ebb and flow of conversation between the booster team. Then, with a brief hiss of static, the air-to-ground loop cut in.

"...copy that Gene. Looking forward to the flight and getting to work once we're up there."

"We'll be with you all the way, Eve." Geneney answered. "Flight Team, status report please. FD?"

"We're Go, Flight."

"Guidance?"

"Go, Flight."

Despite himself, Jeb felt the sweat prickling on his forehead. He scanned his console displays, picturing Bill strapped into his couch and watching his own instruments."

"Booster?"

"Ready, Flight."

"Spacecraft?"

"Go, Flight."

Inwardly, Jeb smiled at the sound of Bill's unperturbed voice coming over the speakers. *Message received, James, and thank you.* He glanced across to the flight director's station and saw a faint smile tugging at Geneney's lips before he turned back to his console.

"Booster on internal power. First stage gimbals, Go. Primary and backup controllers, Go. Clear for engine start."

"Sixty seconds. Guidance is internal. Auto-sequencer, Go."

Jeb looked up at the main screen which promptly flicked back from a close-up view of the crew access gantry, *Eve 3* looming large behind it, to a long-distance shot from the bunker. The camera panned down to the base of the rocket, launch clamps and engines just visible.

"Forty seconds, Pioneer. Go for launch."

Jeb wrenched his attention back to his instruments.

"T minus twenty."

"T minus twelve...eleven...ten...nine...eight..."

Ignition sequence starts.

Light flared on the screen above his head, the readouts on his console staying rock steady.

"...ignition and lift-off! All engines running!"

The answering voice from *Eve 3* crackled over the speaker, barely audible over the fury of the rocket engines hurling their capsule skywards.

"Clock started!"

"Tower clear!"

Jeb fought against the prickling in the corners of his eyes, suddenly grateful for instruments to focus on and the edge of a console to grip. Above his head, the main screen showed a ascending plume of rocket fire, at long last propelling Bill Kerman, founder member of the Kerbin Interplanetary Society, into space.

The last of the cars pulled away from the parking lot outside the complex of warehouses, manufactories and other buildings, once known as Jebediah Kerman's Junkyard and Spacecraft Parts Company, leaving two kerbals standing by the closed gates.

"We never did think of a new name for this place."

Geneney glanced at the darker expanse of paint on the warehouse wall masking what had been Jeb's old tilted-rocket banner. "No. Another plan to put on hold." He forced a grin.

"Maybe the mountain air up by Alpha will help. Clear our heads a bit."

“At least we know how to get there this time.” Out of long habit, Jeb turned to lock the gates then paused. “No point leaving these for the Doreni to kick down.” He hung his keys over the gate handle, took a last, long look at the deserted Space Centre then, with an effort of will, turned his back on it.

“Let’s go.”

Chapter 96

Written in Starlight

*Through these fields of destruction; baptisms of fire
I've witnessed your suffering; as the battle raged higher
And though they did hurt us so bad
In the fear and alarm
You did not desert me – my brothers in arms*

The rockets struck home, blowing three of the Kolan skirmishers into flaming wreckage and knocking a fourth onto its side. Chadmore swore as a pair of fighter jets screeched overhead, cannons gouging out a trail of fountaining dirt that missed his madly swerving armoured car by metres. He took one look at the sky and slewed his vehicle to a halt, one wheel bouncing over the edge of a shell hole with enough force to knock his teeth together.

"Go, Go, Go!" Chadmore flung open the driver's door and dived out, tucking his head in and rolling as he hit the ground, before bounding to his feet and sprinting for the treeline. The remains of his platoon followed, one enterprising driver wedging his accelerator pedal down with a spare kitbag and leaping clear as his armoured car careered off across the battlefield. Chadmore glanced at the sky and ran on, screaming for his troops to follow.

"Move it, you kaya-herding seffleks - move it!"

The platoon reached the edge of the copse and kept going, sudden blazes of orange seen from the corners of their eyes and the deafening crump of nearby explosions, marking the end of their vehicles. The distant howl of turbojets at full throttle rapidly built to a nerve-shredding scream as the second pair of Firesvarn ground attack fighters shot past, cannon shells smashing through branches and ripping gouts of splintered wood from the gnarled and spindly trunks overhead. The Kolan soldiers fanned out, hand signals flickering back and forth as they advanced, ducking behind whatever cover presented itself.

The copse was not large and, as soon as Chadmore was satisfied that it wasn't hiding any enemy forces, he ordered his troops back to its centre. They slipped through the sparse undergrowth, every kerbal alert for the sound of breaking twigs or other signs of movement. For his part, Chadmore kept one ear open for the sound of engines. They reached a fallen tree and came to a halt, one soldier unpacking a field radio at a gesture from his platoon leader.

"Get me the Captain."

The radio operator nodded, flipping his equipment to the day's memorised settings before passing Chadmore the handset.

"Delta Command, First platoon."

Gunfire crackled from the radio, followed by the all-too-familiar scream of aircraft engines and the thump of distant explosions. Then a terse voice came over the air. "First, Delta. Sitrep."

"Location alpha zero-four by delta one-three. Under cover, down one section, boots no wheels."

He heard the muffled thud of someone clapping a hand over a mouthpiece, followed by silence. Then, the noticeably less terse voice of his company commander came back on the air. *"Copy that, Chad. Swing round to alpha zero-two by delta zero-niner tonight and find somewhere to hole up. We'll come and find you. Delta out."*

Chadmore passed the handset back to his radio operator and surveyed his troops. "Well the good news is that we'll be getting a lift home. He opened his pack and pulled out his map case. "The bad news is that you good kerbals are going to be using your little legs first." He squatted, laying the map out on the ground. "We're heading southwest to here," Chadmore jabbed a finger at one of the map squares. "Alpha zero-two by delta zero-niner. Then we find someplace for a picnic and wait for Command to come and pick us up. Any questions?"

"Where did you figure on having that picnic, Sarge? Place looks emptier than a Veiidan purse."

"The rest of the walk isn't much better," muttered another trooper. "KKBT all the way."

"Say again, trooper?" Chadmore raised an eyebrow.

"Klicks and clicks of... boring tundra, Sarge. We're gonna stand out like bugs on a window to any *sefflek* coming our way."

"Which is why we're travelling at night – assuming you lot can manage that without tripping over your own feet." Chadmore checked his watch. "Four hours till sundown, so two hours sleep apiece, by the numbers."

Half of his remaining section fanned out through the sparse undergrowth, rifles at the ready. The others shook out bivouac bags from their packs and curled up inside them. One

soldier grumbled under his breath and pulled a stick out from under his back, setting it to one side before rolling over again.

A little over four hours later, the survivors of Chadmore's platoon emerged from the treeline. Spreading out into two loose ranks, almost invisible in their charcoal-grey night gear, they marched across a landscape of shadows, the mountains in the distance silhouetted by a crescent Mün, its thin sliver striking silvery highlights from swathes of churned up mud and puddled shell holes. Elsewhere, the thin light buried the bleak northern landscape in convoluted folds of darkness. Chadmore pulled his kerchief over his mouth, puffs of frozen breath still escaping the woollen cloth. He glanced at the skyline, noting the position of one particularly distinctive mountaintop and nodded to himself. The compass strapped to his wrist told the same story.

They smelled the burned out remains of the armoured car long before it loomed out of the shadows in front of them. Much to everyone's relief, the freezing air and lingering sulphurous stench of charred rubber masked any other smell. One of the soldiers swore as she recognised the shape of the car's boxy wedge-shaped hood.

"One of ours," Chadmore agreed, voice a little harsher than he'd intended. He watched her take a step towards the wreckage, hand reaching for the flashlight strapped to the side of her pack. "It does you credit, soldier but we don't have time to search for tags or gear."

"Ammo will have cooked off in the heat anyway," muttered another voice.

"Probably," Chadmore replied flatly. "As you were. Move out."

"How long till sun-up, Sarge?"

"Time enough, if you quit bellyaching and start walking."

"Yes, Sarge."

The Mün reached its zenith and began to descend, casting subtly elongated shadows over the weary kerbals marching across the tundra. Chadmore retrieved a pressed sunfruit bar from his pack and chewed on it as he went, washing it down with a mouthful of water from his nearly-empty canteen. He checked his compass before staring into the darkness, scowling at the dark shapes on the horizon as he struggled to distinguish landmarks from wishful thinking.

KKBT. KK bjedla T. And how in the seven smoking hells are we're going to find the Captain once we get there? Chadmore rolled his shoulders, shifting his pack into a more comfortable position. Grolnisch to it. We don't find the Captain – we keep right on walking till we hit the forward operating base. There's got to be something to eat in this Kerm-forsaken wilderness, even if we have to eat it raw. He turned his head, surreptitiously checking the soldier to his left for any sign of limping, then quickly looking away. Oblivious to the attention from his sergeant, the soldier marched on, swearing in an undertone as he caught a tussock of grass with his toe.

Imperceptibly at first, the horizon began to lighten, the distant mountains emerging from their midnight veil. The weight on Chadmore's back seemed to lessen, as he looked up and found what he'd been looking for. Far off to his right, a reassuringly familiar W-shaped mountain pass stood silhouetted against the pre-dawn sky.

"Platoon – halt." The murmured command rippled down the skirmish lines, as the Kolan soldiers gathered round their sergeant. Chadmore turned on the spot, taking bearings on the mountain pass and other landmarks long since drilled into him. He spread out his map on a nearby rock and pulled out his flashlight. "Hold this. Everyone else – eyes out." Blinking against the sudden piercing brightness, he, unclipped his compass from its wristband, pulled out a coiled-up length of thin steel tape from its recess underneath and busied himself with his map.

"That'll do it." Chadmore straightened up. "Just like this whole operation, good kerbals, we're going south. Another five or six clicks will take us into the designated sector, at which point we find the nearest lump of grass to hide behind and wait for the pickup. Let's move."

His troops nodded and, moving back into their skirmish lines, resumed their march. At dawn, when Chadmore finally called a halt, they found themselves in the midst of a vast expanse of almost featureless prairie, carpeted in patches of dense, bristly undergrowth that barely reached over their boots. Needing no prompting, they spread out into a loose circle around their sergeant and his radio operator, before dropping to the ground, rifles at the ready.

"Delta Command, First platoon. In designated sector, standing by."

The answering voice was barely audible over the engine noise. *"First, Delta. Copy you at alpha zero-two by delta zero-niner. Sitrep."*

"Last nav stop at approx. five clicks north of current position. Bearings and points are as follows." Chadmore glanced at the pairs of numbers scribbled on the back of his hand and read them off, waiting for his compay commander to verify each pair before continuing. "There's not a lot of cover out here, sir. Would appreciate an evac, soonest."

"Sit tight, Chad. ETA thirty minutes. Delta out."

The minutes dragged by as the sky slowly lightened around them, the crescent Mün fading out behind streaks of cerise tinged cloud. Then, at last, a cluster of dark specks appeared on the horizon and sped towards them. At a shouted order, the Kolan troops crawled into line, weapons braced against their shoulders. In the distance, the oncoming convoy fanned out and slowed to almost walking pace.

"On your feet!" Chadmore sprang up and raised a hand, rifle pointed at the ground, the rest of his troops following his example. They were quickly surrounded by armoured vehicles, the Kolan flag painted across their hoods. Hatches popped open and soldiers poured out, grabbing packs and kitbags from Chadmore's troops and slinging them aboard. Moments later, they shot off across the tundra, racing the rising sun, and leaving nothing behind but shallow dents in the undergrowth.

By the time the convoy arrived, the Kolan forward operating base was abuzz with activity, soldiers hurrying to load the last of their equipment and ammunition into waiting trucks. As Chadmore climbed out of his armoured car, a lone kerbal walked over to the flagpole standing in the middle of the base. With a heavy heart, Chadmore watched the hand painted banners come to half mast and then lower, the flag of all Kerbin and a picture of a stylised rocket streaming fire, collapsing against the pole.

"Permission to speak freely, sir?" He waited for a nod of assent from his commander. "What's going on? Where are the reinforcements? And where in the seven smoking hells was our air cover out there?"

"Denied, denied, and shot down, in that order." His commanding officer clenched his jaw. "After the foul-up at Humilisia, we barely managed to hold the line at Foxham. We're pulling back to Iskenar and awaiting further orders."

Chadmore's jaw dropped. "We're not even *trying* to hold the Northern Reaches?"

"No." The reply was bleak. "We're stretched too damn thin, Chad. We evacuate the civilians as we go and leave everything north of fifty-two for the Firesvarn."

Erlin clenched his calves, gritting his teeth against the tearing sensation from within his midriff. The healing vine twitched, crawling over his internal organs, the combination of pressure and ticklish movement making him queasy. Something slimy trickled over his stomach and he closed his eyes, resisting the temptation to look.

A towel dabbed at the moisture. "You're doing fine, Professor. Another five centimetres unless I my eyes deceive me." Gentle fingers palpated the ridge around his waist. "If you manage to keep this up, the vine will be out in another three days."

"One down, many more to go," said Erlin with a sigh. He tipped his head back, peering at the leaves over his head, the sigh taking on a note of wonder. "Although... abraith af kerbal akhad."

The medic blinked. "Something, something, no kerbal?" He unknotted the bandage wrapped around Erlin's lower torso and began to unwind it. "Could you lift your back for me please?"

"He wouldn't trade places with any kerbal," Gusemy supplied from the corner. "And I'd hope not, given the trouble he put us all to, to get there." He threw a mock scowl at Erlin which didn't quite conceal the concern behind his eyes. The medic looked up disapprovingly at his flippant tone then, seeing his expression, offered him a faint smile.

"No indeed." He turned back to Erlin. "This is going to sting I'm afraid." The dressing pulled away with a ripping noise and a muffled yelp from his patient. "Ahh, very good. Secondary swelling is down and the exit wounds are healing nicely. The medic removed a fresh dressing from his bag and unwrapped it. "Little bit of seepage still, so I'll put another of these on but I think it might be the last one you need." He looked up at the Kerm trunk

behind the bed. "You can tell Obrinn that he's doing an excellent job." He pressed a second dressing into place and began winding a clean bandage around Erlin's middle.

"You should tell him yourself. You've already Communed with Elton after all." Erlin gestured at the leaf cluster over his head ignoring the medic's disbelieving look. "I'm quite serious. Obrinn worries about hurting me with his vines and he'd appreciate a trained kerbal expert telling him that I'm healing well and that everything is alright."

Gusemy's jaw dropped open. "He does what?"

"He worries about me. It's why I've stopped Communing with him whilst he's moving the vines – he senses the pain and it makes him nervous and upset. Which then makes him clumsy." Erlin lifted his hands. "You can see the problem, I think." He sighed. "And yes, Gus – the thought had occurred to me. If we could get the world in here to witness a Kerm getting upset about hurting a kerbal, it might solve a lot of problems."

"I think it would," the medic said soberly. He tied off Erlin's bandage, eyeing Obrinn's branches with a mixture of hopefulness and trepidation. "I could speak to him now, if you're sure he'd want to?"

"I'm certain he'd want to." Erlin clasped his hands to his stomach and cautiously sat up. "Better if I don't join you, so you can talk without my thoughts getting in the way, but let him know that I sent you. He hasn't had a chance to Commune with too many other kerbals yet and I think he gets a bit shy."

"A shy Kerm?" The medic shook his head. "Now I really have heard it all." He lay down on one of the beds left in the hut after Obrinn's awakening, tucked a pillow under his neck and resolutely lifted his head towards the waiting leaf cluster. Erlin and Gusemy watched him stiffen as the leaf hairs slipped under his scalp, and then go limp, an incredulous smile spreading across his face.

"That looks like a good sign."

Erlin glanced up at Obrinn's slowly waving branches. "He doesn't seem too upset, no." He sniffed. "Bit more cinnamon than usual though. Curiosity maybe? Difficult to tell from out here."

"They don't have the easiest body language to read," Gusemy said straight-faced.

Erlin gave him a look before lying back on his bed, wincing slightly as his bandages shifted with the movement. The two kerbals settled into a companionable silence, broken only by the wind chasing through the eaves of Erlin's hut and the rustling of Kerm leaves. Erlin's eyelids began to droop when a blast of cinnamon and an alarming creaking noise jolted him awake.

Gusemy came to with a start, eyes widening at the outstretched branches and splayed open leaf clusters overhead. The clusters snapped shut before opening more slowly, waves of movement rippling across the ceiling, twigs and branches waving with them. There was a groan from the other bed and the medic sat up, rubbing his temples.

"What on Kerbin did you say to him?" Erlin's voice cut across the rustling.

He received a peculiar look in reply, exasperation and laughter, vying with too many other emotions to read. "You've never had kerblets have you, Professor?"

Erlin blinked. "No. Why?"

The medic shook his head, muttering something inaudible. "He's not shy you great... he's *lonely*."

"What?"

"He's lonely. Of course he is - nobody to talk to but old kerbals. Well-meaning kerbals," the medic added hastily. "But kerbals nonetheless. Nobody like him to talk to - no Kerm."

"Elton," said Gusemy suddenly. "You told him about Elton."

"I did." For a moment the medic looked defensive. "He's the only other Kerm I've ever Communed with - it was hard not to." He frowned. "Besides, I got the strong impression that I was only confirming what he already knew. Or thought he knew. It was all a bit vague."

Erlin shivered, feeling the ghostly impact of Kerm shards slicing into his skull as a forlorn figure turned his back on him and faded away. "It would be. I wasn't an-Kerm... I doubt we were linked for long enough for him to get more than a fleeting impression." His gaze turned inward. "And ever since Obrinn awoke, I've been too taken up with him to think much about Elton."

The medic gave him a look but didn't answer. From his corner, Gusemy snorted softly. "Didn't want to think about him you mean. Or Jonelle for that matter. Although I don't blame you. Too many awkward questions to answer."

Erlin jerked his head up, the half-formed protest on his lips wilting at the sight of Gusemy's sympathetic expression. He sighed. "Yes. Far too many."

"It might be easier if all three of you were there to answer some of those questions," the medic offered. "Both of you and Obrett. Obrinn asked me to tell you that he'd very much like to speak to Elton, so it would probably be better if he knew who he - and Jonelle - were first."

Gusemy's jaw dropped open again. "He wants to talk to *Elton*? And how in the name of the Twelve Pillars and all their wonderful ways is he going to do that?"

He received a shrug in reply. "I have no idea - I'm a doctor not a Kerm expert." The medic raised his hands. "But if we can't find somebody at Kerbin's premier Kerm research organisation who can help, then I don't know where else we're going to look."

Erlin's voice was distant as he stared at the corner of his hut. "Actually, Gus... If we could find the right species balance... Long lateral root systems – hmmm, an induced synomonic array might be better for long distance signal transduction. Bryophytes for preference for ease of maintenance." He pinched the bridge of his nose. "Not straightforward by any

means and we'd need to teach all three of the Kerm how to use whatever system we come up with..."

Erlin looked up, a slightly abstracted look on his face. "Could you bring Halsy down with you this afternoon, Gus. I think we need to put a team together."

"Where in the First Grove are they, Sarge? We've been driving around these Kerm-forsaken hills for days now and they ain't getting any prettier with age."

"They're in the same place that your radio discipline's hiding, trooper. Listening and laughing at you." Chadmore waited for the belated apology. "First section – finish your sweep. Second section – you're with me. We'll be taking a trip down the highway, so keep your eyes peeled and don't forget to look up." Chadmore held one gloved hand against the cab heater for a moment, casting a wary look at the leaden sky. "Let's get this done before the snow comes in."

The Kolan armoured section jolted over the tundra, drivers pushing their vehicles as fast as they dared. The wind keened through the radiator grille of Chadmore's car in a discordant wail that set his teeth on edge even over the sound of the engine. They sped up a shallow incline, swinging round to parallel the skyline. Approaching the edge of the hill, Chadmore put his foot down, leaving the rest of his section standing and bracing himself for evasive action as he raced out from cover.

A dark, low-slung shape shot across his path. Instinctively, Chadmore swerved, slewing his vehicle round before straightening out, one tyre slamming back down to earth. He eased off the accelerator, eyes turning skyward to check for enemy aircraft, before settling on the broken grey ribbon that marked the northernmost stretch of the Wakira to Kolus transcontinental highway. "Clear."

The radio crackled with terse replies as the rest of his forces fanned out from behind the hill and followed him onto the road,

"I don't like what I'm not seeing, Sarge."

Chadmore grunted and flipped his radio to the platoon command channel. "Speak to me, Ad."

"On our last leg now, Sarge. Nothing but rocks and scrub so far."

"Rocks and scrub and gronneks," Chadmore agreed. "And snow," he added sourly, watching the first white flakes streaking up his windscreen. "Both sections – return to base. I'll see if the Captain has any news for us." He braked, executed a precise three-point turn and shot off again, one hand reaching for his radio.

"Delta Command, First platoon reporting."

"I hear you, Chad. Sitrep?"

"Not a sign of them, sir. We backtracked to the highway and didn't find so much as a dropped mess kit."

"Acknowledged." There was a heavy silence. *"They faked us but good, Chad. As of two hours ago, a major detachment of Firesvarn armour broke through the Wakiran lines, heading for the Sea of Kolus. Intel since then has been... spotty, but our best guess is that they're driving for Nordham Bay."* The captain gave a quiet cough. *"Hot mike, Chad."*

Chadmore bit down on his first reply. "I'm thinking that sounds like a beachhead, sir."

"As do we, Sergeant."

Chadmore's hands twitched on his steering wheel at the new voice coming over the radio. "General, sir?"

"Firesvarn aerial assets will be operating at range, so the anti-aircraft defences around Nordham Bay should be enough to keep them out. The Wakirans are moving to reinforce but the garrison forces are limited and we don't know how long they can hold out." The general's voice hardened. *"We can not afford to lose that city, Sergeant. If the Firesvarn are allowed to move their air support down to Nordham Bay, it will pose a serious threat to our control of the Wakiran Sea. I trust you understand the implications?"*

Chadmore swallowed hard. "A wedge between ourselves and the Wakirans. Leaving us facing the Doreni alone and them with their djo... the Wakirans between a rock and a hard place, sir."

"I believe your first comment was more accurate, Sergeant. Return to base immediately and prepare for immediate redeployment to Nordham Bay."

"I appreciate that, Gus. We'd just hoped you could spare a few more."

"Our shipyards are working flat out to replace our losses at Humilisia and Foxham." Fleet Commander Gusden massaged his temples. "But the Kerm seed checkpoints are slowing us down, even with security exempted transport and some unofficial civilian help to move the necessary materiel." He looked up. "You'll get me and the Regionality plus supporting vessels and as many anti-aircraft capable ships as we could detach."

"Then between us we shall make that enough."

Gusden nodded. "We shall." He opened his cabin door. "After you, Admiral." He led his Wakiran opposite number up to the Regionality of Kolus's main deck, where an honour guard of Kolan and Wakiran marines awaited them. Around them, resupply operations continued unabated, a steady stream of shells zipping down the highlines from one logistics support vessel and being hauled over to the magazine hoists by a bucket chain of sailors. Portside, a second shift of sailors were rigging the fuel lines from a second support vessel.

One three-tone whistle sounded over the waves followed by a second, differently pitched one, signalling that two more ships in the taskforce were on station and ready to receive

supplies. Out of the corner of one eye, Gusden watched yet another logistics support vessel heave to alongside the nearest Wakiran destroyer and, with a sudden flat boom from its air cannon, launch a guideline towards the combat vessel. Around them, the rest of the task force rode at anchor, by orders of both Gusden and his Wakiran counterpart, both flag officers chafing at the delay but unwilling to risk the additional complications of underway resupply with so many auxiliary vessels.

With a discreet cough, the Wakiran admiral saluted him. "Fair winds and Kerm speed, Gus. For Nordham Bay."

"For Nordham Bay." Gusden returned the salute. "Wisdom of the Kerm, Admiral. And may you have the strength to follow your course."

They drove through a sea of canvas, the few faces that turned to watch them go staring through them rather than at them. Civilians and soldiers alike huddled around their tents, ragged and filthy, ponchos mingling with Kolan and Wakiran uniforms. Elsewhere, figures lay on temporary cots, some whimpering or crying out, others white-faced and dead-eyed, too spent to notice their injuries or watch the silent work crew struggling to erect a marquee over them.

Clouds of black smoke stained the horizon, a backdrop to the distant lines of refugees still fleeing the burning city. A motley assortment of armoured vehicles fled with them, the larger troop transports picking up what few civilians they could, dropping them at the camp before turning around and going back for more.

For an instant, images of an empty hillside and deserted highway dancing mockingly before Chadmore's eyes. *They faked us but good, Chad – and this is the price we paid.* His knuckles turned white against his steering wheel. *All we can do now is try and make a difference. Stop things from getting worse.* His thoughts flicked back to a trampled down swathe of tundra and a young officer with copper-brown eyes. *At least you got out of this mess, Valentina. I wonder what little brother Al has you doing now?*

The second convoy cleared the last of the roadside tents, Chadmore's armoured car in the lead. Turning off the main road, they drove across country, skirting around the outskirts of abandoned Groves and redfruit orchards, the ripening fruit providing an incongruous splash of colour against the sooty skyline. They reached the edge of the airfield, the terminal buildings and air traffic control tower still standing at the far side of the runways. Then, at a terse radioed command, they charged.

The tanks went in first, smashing down sections of chain-link fence, their tracks tearing up the runway and leaving chunks of ripped-up asphalt in their wake. The lighter vehicles poured through the gaps, racing around the perimeter and converging on the airport buildings from all sides.

A salvo of rockets screamed low across the ground, slamming into the lead tank and bursting into flames. Another salvo ripped into the tank behind it, setting off its ammunition

racks and blowing its turret skyward in a deafening explosion. The Wakiran crews returned fire, shelling jet blast deflectors and anything else that offered the slightest bit of cover to the enemy infantry. Heavy machine guns opened up with a roar, laying down a vicious suppressing fire. Soldier after Firesvarn soldier died in a ghastly mist of blood and fragmented bone.

But where one soldier fell, another two rose up in their place. Coordinated salvos gave way to sniping, missiles slamming into the oncoming tanks from too many sides for their gunners to track. One by one, the heavily armoured vehicles went up in flames.

“Ten o’ clock low!” Chadmore wrenched at his steering wheel, the back end of his armoured car skidding out, studded tires squealing in protest. The staccato thumping of autocannon fire sounded over his head, his gunner reducing the Firesvarn machine gun post to a tangle of twisted wreckage and smashed concrete. A fireball to his right marked the abrupt demise of another Firesvarn installation and then they were through, bearing down on the airport buildings. A Kolan vehicle hurtled off the runway, fishtailing wildly as its driver fought to avoid incoming fire from yet another direction. It struck a flat grey object and disappeared in an eruption of burning fuel and detonating ammunition.

“Mines, mines, mines!” Chadmore swerved, another Kolan vehicle exploding behind him. “Stay on the runways – they need those!”

“*Incoming!*” Chadmore recognised the panicked yell of his section leader. “*Firesvarn at our three!*”

“*I got something! Can’t see them through the smoke. Low and... oh Kerm, oh Kerm, oh K...!*” The radio fuzzed out in a roar of static.

“*Tanks! Coming around the main terminal!*”

“*Delta Company – fall back.*” His captain’s voice sounded suddenly weary. “*Keep to the runways until you clear their perimeter and wreck what you can on the way out.*”

Chadmore flipped his radio to the platoon-wide channel. “You heard the Captain! By the numbers – rolling retreat. Any sefflek coming home with ammo left will be answering to me!”

A thunderous detonation from outside cut off any replies from his troops. His vehicle lurched under him, the blast lifting it onto two wheels, fragments of shrapnel and concrete clanging against its armour. He felt something snap and the steering wheel went slack in his hand, the armoured car skidding sideways and flipping onto its roof. Chadmore just had time to register a choked-off scream from beneath his head, before everything went black.

“They can’t do this to you.” His sister-in-law’s voice caught in her throat. “They promised you a month off and you need it.” She looked at her brother in law, his immaculately

pressed uniform unable to hide the slump in his shoulders or the engrained creases at the corners of his eyes. "Gusden wouldn't let you onboard any of his ships, looking like that."

"Gusden should listen to himself. How long has he been at sea now?" The look in the other's eyes told him all he needed to know. "I'm sorry, sis," he said more gently. "That was unkind." He pulled his sister-in-law into a brief hug before bending down to pick up his kitbag. "I just wish that either of us had the choice." He sensed a sudden tension in the air. "What is it?"

"It looks like you're getting escorted back to base."

"First I heard about it." The officer turned to face the living room window and froze, weariness turning to sick despair.

A black car with military plates was parked outside, the pennant of the Kolan Border Security forces flying from its hood. He watched the passenger door open and a uniformed kerbal climb out. Silent hatred convulsed him, hatred for the other's polished black boots, for the medals pinned to his dress sash, for the carefully sympathetic expression settling over his face.

There was a knock, his sister-in-law already in the hallway, waiting by the door for her guest. He heard a murmur of polite greetings followed by the sound of the front door closing and the scraping of chair legs against tiled floor.

"Please sit down, ma'am. I'm afraid I have some bad news."

We can't do this. Not the Doreni and Firesvarn together. The officer stared at himself in the mirror, noting the haunted look in his eyes and bitter twist to his mouth. *Kerm knows I never wanted it to come to this.* He barked a laugh. *And the Kerm are what it comes down to in the end, doesn't it?* His brief bravado crumbled. *So, what in the First Grove are you doing?*

The episode of *Engines and Engineers* ran through his head like a mantra.

...that's a big If, Tom and at the moment I'm not about to promise anything either way. All I can say is that we're looking at all the options for our colony ship designs. Now, I'm happy to answer any questions as best I can but please bear in mind that I'm not a nuclear engineer."

"Thank you, Hanbal." Tom took a sip of water. "Let's start with a question from the front. Yes, you ma'am, with the silver torc."

"Will the exhaust from a nuclear rocket be radioactive. And if it is, how are you going to test it."

"Both good questions. Hanbal?"

"The exhaust will indeed be radioactive but only mildly." The engineer smiled. "But before anyone gets worried about it, it's also far too valuable to throw away. Analysing the exhaust gases will give our scientists a lot of valuable data about the nuclear reactor and how well it

stands up to being treated as a rocket. So, we'll trapping them and storing them somewhere safely underground."

"That's reassuring to hear. A question from the middle next, I think. You, sir, in the dark blue poncho."

"Won't a high-powered reactor be dangerously hot for ages after you've finished with it? Um, I mean hot as in nuclear hot."

Hanbal paused for a moment. "That's a very good question. As best I understand it, the hottest fission products are also the most unstable, so don't stay nuclear hot for very long. A few months maybe, or a couple of years. The reactor is still nuclear warm for many years after that – I wouldn't use it to heat my moss room." A polite chuckle rippled through the audience. "But most of the radioactivity is released in the first few months."

"And that's a good answer too – thank you Hanbal. Now, a question from the back..."

The face in the mirror stared back at him with a stony expression. *A few months. Not permanent but long enough to hold the line until... we can find a better way.* The officer straightened up, running a finger along the top of the mirror before inspecting it for dust. He straightened the blanket on his cot, pulling it taut and tucking it under the mattress. His hand reached for his collar insignia but then he shook his head. Unsnapping his belt holster, he withdrew his sidearm, unloaded it, and laid the ammunition and empty weapon on the centre of his bed. Then he turned on his heel and marched out of the room, not bothering to lock the door behind him.

The mess hall was emptying out as he arrived, the catering logistics personnel sweeping the floor and stacking the chairs. He walked over to the tray rack where a group of junior officers were stacking their dishes. "A moment, if you please, Mister Lenger."

"Sir." Lenger made his apologies before following his commander out of the hall. A shiver of anticipation ran down his spine at the sight of the tension in the other's shoulders. Casually he looked around, increasing his pace until they were walking side by side. "We're ready, sir," he murmured.

"Good. Assemble at the lot at nineteen hundred and secure transportation. We travel under cover of darkness, lay up near the objective then advance at first light. By tomorrow, Mr Lenger, we will end this war."

"Sir!" Lenger saluted and strode off towards the barracks.

Twilight faded into night, as the officer crossed the parking lot, the bright pools from the floodlights throwing the shadows lurking around the edges of the parking lot into stark relief. As expected, he found Lieutenant Lenger and his troops gathered by a logistics support vehicle. They came to attention as he approached.

"At ease," The officer inspected the LSV, water bowser already hitched, its beige-and-tan camouflage paint washed out by the glare overhead. "Mr Lenger, are we ready?"

“Sir.” Lenger pointed at the armoured personnel carrier parked two spaces back from the LSV, driver just visible through the forward slit window. “On your orders, sir.”

“Very well. To victory, good kerbals. To victory.” The officer watched Lieutenant Lenger and his troops climb into the back of the APC before swinging himself up into the LSV cab. Engines grumbling, the two vehicles pulled out of the parking lot and drove towards the compound gates, stopping in front of the armed guards barring their way. One of them, wearing a sergeant’s insignia on his collar and a stony expression on his face, marched towards them, only to snap to attention as he caught sight of the officer.

Gravely, the officer returned his salute before gesturing at the gates with a chopping motion. The sergeant turned and barked an order at her guards, who scrambled to obey. Moments later, the armoured convoy rumbled out of the compound, gates closing behind them, and turned onto the main road. They came to a junction and turned right, following the signpost to Balcabar.

The officer stared into the night as the APC turned onto the Balcabar bypass, the eyes of some unidentified creature gleaming briefly from the side of the road. They drove past Balcabar International Airport, long since commandeered by the Wakiran border security forces, just as an Airhog heavy transport plane came lumbering in, landing lights bright in the darkness.

Then the two Wakiran border security vehicles left the bypass, turning off onto the main desert highway, and heading north for the Kerbin Space Agency’s Site D.

*Now the sun’s gone to hell. The Moon’s riding high
Let me bid you farewell. Every man has to die
But it’s written in the starlight. And every line in your palm
We’re fools to make war on our brothers in arms*

Dire Straits – Brothers in Arms [<https://youtu.be/Dqok5m4lqeE>]

Chapter 97

The Needs of the Many

The meeting room phone rang.

"Hey boss – we're not supposed to be getting a delivery today, are we?"

Hading swallowed his mouthful of iced coffee and wiped the corner of his mouth on the back of his hand. "No. Why?"

"Because we've got a truck at the gates. Big one – water bowser hitched on the back and everything. Hang on – there's another one driving up behind it..."

From across the meeting room table, Wernher saw his friend's shoulders stiffen.

"...armoured, with a gun on the top. Guys at the gate are heading over to check them out..."

Hading shoved his chair back, phone still held to his ear. "Are they carrying any markings? Can you see a flag on their sides?"

"Uhhh, I don't think so. Camera's at the wrong angle."

"Give me two minutes - I'll be right up." Hading gestured at Wernher to follow him but before he could put the phone down there was a scream from the reception desk. Hading surged to his feet. "What happened! What is it?"

"They s-shot him! Oh Kerm, there's more of them – the guards are running for cover. I think one of them's firing... no, please no!" A whimper sounded down the line. "They killed him too, boss. He's just lying there, not moving!"

Hading's voice was unnaturally calm. "Listen to me, Rod. I need you to check the signing-in book and tell me who's missing. He was answered by silence. "Talk to me, Rod. It's going to be okay, but I need you to check the book. Can you do that for me?"

"Ye..yes. I can do it. Need two hands." Hading heard the clunk of a phone being dropped on a desk, followed by a mumbled stream of names. *"Are you there, boss?"*

"I'm right here, Rod."

"O-okay. Calgun's not in yet, nor is Herfel, Jorgun – it's not even nine yet, of course he's not, Derdo..."

"Rod - I don't need all the names – can you just give me a number." Hading's fingers twitched on the edge of the table."

"Eleven... no Elbin isn't in... Twelve. Definitely twelve."

"Good work, Rod. Now I want you to come down to the dining area. Wernher and I will be waiting for you there."

"Okay!" There was a click and the line went dead. Hading flung open the meeting room door. "Wernher – listen to me. We don't have much time. I need you to pick three steady types and send them over to the blockhouses to bring everyone down to the bunker. If they're stopped by soldiers, they're to do exactly as they're told. Gather everyone in the dining area, then get them to the back door and wait for my signal. You'll know it when you hear it. Then get them out of here."

Wernher stared at him. "What...?"

"The spent fuel. I don't know who they are but that's what they're after." His grim expression brought Wernher up short. "It's the only answer that makes sense. And you know what they'll do with it." Hading turned and raced for his office.

Wernher paled. "What are you going to..." He ran after the engineer, skidding into his office just behind him. "What are you going to do?" He was answered by a soft metallic snick, as Hading straightened up from his desk, a snub-nosed pistol in one hand, muzzle pointed at the floor.

"Are you out of your *mind*?!"

"Unfortunately not." Hading couldn't keep the resignation out of his voice. "First KNSA officer in history to be killed in the line of duty for Kerm knows how long is not how I thought I'd go." He racked the slide on his pistol. "Never thought that service oath would come back to bite me but that's the thing about oaths – once you swear them, they're not optional."

Wernher opened his mouth, then closed it again.

"Our lawyers do a real nasty cease-and-desist." Hading attempted a sardonic grin. "But when it comes right down to it, all the legalese is backed up by..." He lifted his pistol fractionally. The grin collapsed. "Go. Get them out of here. Oh – and Wernher?"

Wernher found his voice. "Yes?"

"Make it all worthwhile. Make that bloody engine fly."

Tears prickling the corners of his eyes, Wernher nodded, then ran for the door. Hading slid open a slim compartment set into the top of his desk and extracted a sheet of paper which he dropped into feeder tray of his telecopier. Mechanically, he brought up a preset number and pressed the transmit key, before turning to the alarm box on the wall, hand fumbling at the lanyard around his neck.

The telecopier beeped its confirmation. Hading retrieved a key from under his shirt, slotted it home and turned. Then he turned and sprinted for the stairs, as a red light began to flash behind him.

Wernher drew several startled looks as he rushed into the main laboratory area, chest heaving for breath. He gestured at three of the scientists, before jerking a thumb over his shoulder at the stairs. "Des, Mac, Will – get over to the dorms. Haul everyone out of bed and get them down here, right now!"

Mac looked at him quizzically. "Depriving Jorgun of his beauty sleep, boss?"

"Saving his life! We're under attack!" Wernher bent over to catch his breath as the room erupted. Mac took one look at the chief engineer's face and turned pale.

"Quieten down you all! Will, Des – let's do as the kerb says. It'll do Jorgun good to see the morning sun!" Mac made to slap Wernher on the back then thought better of it. "We've got this, boss. We'll be back."

Wernher straightened up, coughing. "If you see any soldiers out there, do exactly as they say. Exactly. Now go!"

The officer scanned the battlefield, a distant part of him marking the fallen guards, faces fixed in expressions of shock, blood seeping into the thirsty sands. At a barked order from Lieutenant Lenger, two detachments of soldiers ran off around the perimeter fence in opposite directions, weapons at the ready. The lieutenant himself jogged over to his commander, the rest of his troops already fanning out around them.

"Building in the centre, sir? By the crane?"

The officer nodded. "The test sites and waste storage facility are both underground." He pointed at the blocky, white painted outbuildings behind the crane. "Dormitory blocks I expect. We'll take those first." He raised his voice. "Squads of three – sweep the blockhouses and rendezvous at the crane. Capture or neutralise any guards, round up any civilians for hostages!"

"We'll take that barn in the middle. Equipment storage most likely – it'll be too hot to work in." The officer bared his teeth. "But let's not leave anyone hiding inside, hmm?"

"No, sir." Lenger checked his weapon and took a hasty swig of water from his canteen before setting off across the baking sand at a jog.

“Wha’ time is it? Go ‘way.” Jorgun rolled over on his cot, then jerked awake, clawing at the cold, wet bathrobe which had just wrapped itself around his head. “Hey, not funny!”

“It’ll be even less funny if you don’t move it!” A pair of sandals landed on his chest. “We’ve got soldiers at the gates! Boss didn’t say what they wanted but from the look on his face, it’s nothing good.

The bathrobe slithered off Jorgun’s bare chest. “Soldiers. Right – and I’m Chief Ambassador Burvis.”

“For Kerm’s sake, Jorgun! Get your shoes on and move it! You can please yourself about the bathrobe!”

There was a loud crash from outside, followed by the rapid thudding of heavy boots. The sleep room door flew open and two uniformed figures burst in; rifles aimed unerringly at Jorgun’s astonished face. Mac dropped to his knees, arms out in surrender.

“On your feet. Now.” The soldier’s voice was flat. Jorgun stared at him in disbelief, then yelped as a third figure appeared in the doorway. Trembling, he reached for his sodden bathrobe.

“I said, now!”

Jorgun’s sandals slid off the bed and hit the ground with a sudden slap that made him yelp again. He pushed back his bedsheet and swung his legs over the side of his cot. The soldier gestured at the door with his rifle. “Out. Hands on your heads and don’t try anything clever.”

Mac laced his hands behind his head and walked towards the door, the sudden sour reek of cold sweat following him.

The two engineers stumbled out into the pitiless desert sun where they were brought up short by a jab in the ribs. “Over there with your colleagues. Quickly.” Mac looked up to find Will and Des staring at him in resignation. Another door banged open and three more soldiers prodded their captives over to join them.

“Is that all of them?”

“Yessir.”

A short, stocky-looking soldier, wearing three chrome bars on his collar, nodded in satisfaction. “Good work. Take them over to the crane.”

The ragged group of scientists and engineers needed no further prompting. Eyes downcast, they formed up into a line and marched off, hands clasped behind their heads. Their assailants walked alongside them, keeping a wary eye on their surroundings as they went. Mac glanced up and his heart sank still further at the sight of another, much shorter line of captives being marched in from the opposite side of the Site D compound. They assembled at the crane in front of an older, care-worn kerbal, wearing much more elaborate insignia on

his collar. The officer watched them gather, engineers, scientists, and sullen and bleeding guards. Lieutenant Lenger stepped forward and saluted. "Site is secure, sir."

"Very good, Mr Lenger." The officer whirled and pointed at Mac. "You! Where is the entrance to your underground facilities?"

Feeling every eye on his back as he did so, Mac lifted his head. "The bunker behind you," he said. "Sir."

"Excellent, Mr...?"

"Macbus, sir."

"Mr Macbus." The officer's lip quirked upwards. "We assumed as much from a simple process of elimination but it's pleasing to see that you don't intend to tell any tedious lies. May I presume that the interior of that bunker is merely a changing room and storage area?"

"Yes."

The officer made a beckoning gesture with one hand.

"Yes, sir."

A sigh. "Come, Mr Macbus. A little more information if you please. What can we expect to find downstairs? More guards?"

"No, sir. Just the rest of the science team." Do exactly as they say, Mac. Exactly. "Level one is the reception, lounge and catering area. Level two below it is for offices, labs and meeting rooms, level three is the for the main test area and waste storage."

"Very *good*, Mr Macbus!" The officer rubbed his hands together. "You will escort myself and my troops down to level three. Your colleagues will come with us, naturally, as a precautionary measure in case any of your... science team decide to get creative." He winked. "I fear they may not be as trustworthy as you, Mr Macbus." He glanced at Jorgun standing in his underclothes. "Besides – I can hardly leave them all standing in the midday sun. I am not a monster after all."

The officer pointed at three of his soldiers. "Secure the bunker and the top of the stairwell." He waited for their answering salutes before turning back to the hostages. "Mr Macbus, you will lead the way down to level one. Don't worry – I'll be right behind you."

Hading crouched behind the curved reception desk, pistol drawn, eyes fixed on the bank of monitor screens suspended before the receptionist's seat. He watched three black-and-white figures burst into view, rifles sweeping back and forth. One of them darted forward and kicked open the storage room door before leaping to one side, his two companions covering him with their weapons.

Hading watched them inspecting the doorway to the stairwell at length, before turning the handle. They stepped to one side, holding the door ajar with the butts of their rifles, before heaving it open. Hading's eyes flicked across to another monitor just in time to see the first soldier charge through, search the top of the stairwell and retreat. Gritting his teeth as the bunker filled up with soldiers and terrified scientists, he saw Mac being pushed onto the stairs at gunpoint, watched as a uniformed kerbal followed him, the details of his collar insignia blurred by the camera.

The heavy security door blocked out any sound from above. Dry-mouthed, Hading watched the queue of figures shuffling into and then out of camera shot, ears pricked for the sound of a turning door handle. There was a click and a faint creak of hinges. The ringing of boots on steel steps filtered around the edge of the door, then grew abruptly louder. He heard footsteps passing by on his left and risked a glance around the side of his hiding place, heart hammering against his ribs as he saw a pair of sandaled feet go past.

"That will do Mr Macbus."

Hading's head swivelled, tracking the heavier footfalls of the unknown officer across the room. He flicked a last look at the monitor showing the, now empty, top of the stairwell, gathering himself as one set of footsteps after another filtered into the room. Glancing one last time at the black button set into the underside of the reception desk, he surged to his feet, snub-nosed pistol whipping up and round before settling unerringly on the officer's forehead. The blur of movement from the corners of his eyes told him that every other gun in the room, apart from one, was pointed back at himself.

A chuckle broke the sudden silence.

"Ahhh, very *good*, Mr Macbus. Either your acting talent is quite wasted out here in the desert, or that slack-jawed look is entirely genuine." The officer cocked an eyebrow. "To whom do I owe this unfortunate situation?"

"Hading Kerman. Kerbin Nuclear Standards Agency."

The officer raised both eyebrows. "Really? You handle that pistol well for a bureaucrat." He gestured at the soldiers by his side. "But I fear you are rather outmatched. Why don't you put the gun down before somebody gets hurt?"

"After you shot our guards in cold blood?" Hading's voice hardened. "I don't think so."

The officer flinched. "We ordered them to stand down!" he snapped. "In case you hadn't noticed, Hading Kerman, we are at war and those guards were impeding access to vital war materiel. As are you!

"War materiel? High grade nuclear waste is not, and never will be, war materiel." Hading saw the look of surprise on the other's face. "Oh, come on. Why else would you be here? It's hardly rocket science – and believe me, I know rocket scientists."

"To end the war and bring peace for the Regionality I swore to defend." The officer's cheek twitched. "To salt the earth and keep us soldiers apart until wiser heads have time to prevail."

Oh, dear Ker... Hading's expression mingled horror and pity in equal amounts. "It won't work," he said quietly. "Do you think we haven't been thinking about this ever since the war began? I won't insult your intelligence by insisting that you wouldn't get away with it, but the cold truth is that we simply don't have enough nuclear material here to make a difference. I can show you the calculations if you like?"

"Nevertheless." A shadow passed behind the officer's eyes. "This war has taken too much – from me, from everyone. I cannot forego a chance to end it, no matter how small."

"And I cannot stand by and allow you to take that chance." Hading's voice was curiously gentle. "I swore an oath too, you see."

"With respect, Mr Hading, I don't believe you have a lot of choice in the matter." The officer's cheek twitched again. "Come now – under the circumstances, standing down can hardly be regarded as oath-breaking. In fact, I shall advise... whomever you swore that oath too, that you upheld it to the end. You have my word on this as an officer."

Hading shook his head. "My choice was made when I stood to face you." He jerked his chin at his hand clutching the edge of the reception desk, other hand still aiming his pistol squarely between the officer's eyes. "Under this desk, I'm holding a button. If I let it go, it will trigger the emergency lockdown system." A very level pair of eyes stared at the officer. "That system was designed to permanently seal this facility, as a last line of defence in the event of a catastrophic nuclear accident."

A bead of sweat trickled down Hading's cheek and dripped onto the desk. Silently, the officer watched it fall.

"Take your troops and go. I'll shut down this facility in good order and we'll all walk away alive. Please – just go."

"I wonder if it's something in the air, or just the desert sun?" Hading watched in disbelief as the other began to applaud. "Your acting is very nearly as impressive as Mr Macbus's. But I fear I must call your bluff." An edge of steel cut through the whimsy. "Take him down."

Instinctively, Hading's finger tightened around his pistol trigger but the officer was already in motion, diving under his shot. The tight knot of scientists and engineers by the door, clapped their hands over their ears against the deafening report. Hading threw himself to one side, one hand still clamped around the edge of the reception desk, yelling at his stunned colleagues as he fought to bring his weapon to bear.

"Get to the back door! Go – for Kerm's sake – GO!"

Another shot rang out. Hading's face contorted, nails scrabbling on the edge of the desk as he fought to keep his grip. A third shot crashed against his eardrums, punching a white-hot needle through his shoulder.

Suddenly his arm no longer seemed to work.

Crying out in desperation, Hading collapsed to the floor, dragging his nerveless arm behind him. His fingers skated over the black button under the desk, twitched once and let go.

Steel shutters slammed down behind the crowd of researchers milling around the Site D emergency exit, making them jump. Wernher rushed over and zipped his security card through the lock. A baleful red light glowed back at him, accompanied by a harsh, metallic buzzing.

Oh Kerm...

The walls shook to a series of heavy, echoing booms. Cracks spiderwebbed across the ceiling, raining sand and fragments of concrete down on the wide-eyed kerbals below.

Wait for my signal. You'll know it when you hear it.

Wernher's shaking voice broke the stunned silence. "Everybody to the exit. Jorely first – that exit hatch is heavy. Quickly now." He was answered by tremulant nods. Jorely made his way through the huddle and disappeared up the spiral steel staircase in the corner of the room. One by one, the others followed him, leaving Wernher standing alone by the shutters. He zipped his card through the lock again, and again the buzzer sounded harshly in his ears. With shaking fingers, he fumbled his security card back into his pocket and followed his colleagues up the stairs.

The climb seemed interminable, a never-ending spiral into stifling darkness, broken by the panting of his colleagues and the slap-slap-slap of sandals on steel. Trickle of sand fell into his hair and the occasional pebble skittered off the steps and struck him, dislodged by a climber from further up. Wernher glanced down at the circle of dim light far below his feet, clenched his jaw and kept going.

The screech of un-oiled bolts being drawn echoed down the stairs, making him wince. Hot white light spilled in, throwing jagged, moving shadows across the stairwell walls. The last of his colleagues vanished into the sunlight and Wernher followed, heaving himself up a short ladder and over the rim of the emergency exit shaft. Blinking, he climbed to his feet, brushing his hands against his poncho.

The entrance block to the main bunker stood on an island, surrounded by vast subsidence pits. The raw concrete and steel foundations of the crane and surrounding blockhouses stood exposed, revealed by the collapsing sands. Here and there, irregular patches of concrete could be seen at the bottom of the craters, vestiges of the much larger structures beneath.

Wernher sank to his knees amidst the devastation, tears scoured away by the pitiless desert sun.

On the top floor of an unremarkable office building on the outskirts of the Capital, a kerbal sat at his desk, telephone in hand, staring out at the evening sky. He nodded in response to a particularly emphatic comment from the other end of the line and then froze at the sudden buzzing against his leg. Quietly, he stood up and removed the pager from his suit pocket, already turning to the small, and very private, telecopier in the corner of his office. With a soft purr, a sheet of paper emerged from a slot and dropped into the in-tray.

“Would you excuse me please. Madam President. I have an advisory message on line one.” The Director of the Kerbin Nuclear Standards Agency set his phone down on his desk, crossed the room and, steeling himself, picked up his message. It took no more than a handful of seconds to read.

Agent ID: DN38416
Transmitter Location: KSA Site D

Message begins:
Emergency lockdown protocol initiated. Undertaking final duties.

Message ends.

Chapter 98

Remembrance

Bill Kerman sat in his seat, bobbing against the leg straps holding him in place. In front of him, a thousand emerging pinpricks of light traced out cities, continents and Groves as *Tenacity* crossed the terminator, Kerbin spinning into darkness beneath them. Beside him, Calley and James stared out into space, a respectful silence pervading the bridge.

A cough sounded over the radio. "And that's all we know right now. The Twelve Pillars declared a general ceasefire across all six Regionalities in the early hours of this morning and have been cloistered in the Capital building ever since. The KNSA investigation team is in the air on their way to Site D but other than their plane, all military aviation – and what little civilian aviation was still running - is grounded until further notice. Which, we're guessing, will depend on how quickly the KNSA and Wakiran High Command get a handle on things."

Bill cleared his throat. "What about Wernher?"

"Alive." There was a long pause. "He's in the Balcabar medical centre, along with most of his colleagues, under observation for heat stroke, dehydration, and traumatic stress. Jeb's on the train to Balcabar as we speak."

"That's good news." Bill rubbed his thumb along the edge of his armrest. "Jeb will know what to do, especially after his own..."

"Experience," agreed Geneney. "He's already planning to take him to meet Elton at some point – if and when he's ready."

"Even better. I think Guardian Elton is exactly the right... person, to help. And he certainly needs to know about the Site D incident."

James and Calley exchanged puzzled looks. "Excuse me, Gene," Calley broke in. "Who is Guardian Elton?"

"A long story," answered Geneney. "Too long to regale you with on an open mike. Bill can tell you most of it anyway, and if you buy Jeb a coffee when you get back, he'll tell you the rest."

James raised his eyebrows at the deliberately casual tone. "Copy that, Gene. Bill can fill us in. Jeb too – but he can buy his own coffee."

"I'll let him know," Geneney said dryly. "Anyhow, it's time to call it a night here at Alpha. Beta crew are on standby and waiting for your call."

"It's getting late up here too. We'll report in to Corvan before we turn in though. And, Flight?"

"Yes?"

"Thanks for the news bulletin. We were starting to feel a bit out of the loop up here."

"You're welcome, Tenacity. We'll pass on any updates as soon as we get them. Alpha control signing off."

A winding queue of kerbals zigzagged across a field, many of them clutching stones of all colours and sizes. In the distance, in the centre of a ring of Blighted vegetation, stood the blackened ruins of what had once been a kermol village on the outskirts of Foxham. Yawning gaps in the skyline marked the sites of Kerm trees that had been uprooted and left to rot where they fell.

One by one, the mourners walked through into the next field, handed their stone to one of the black-clad villagers by the gate, and were ushered to their places by another sombre villager, dressed in a dark grey poncho. They stood in their hundreds, half-circles of hushed figures around a ring of stripped white poles erected in the exact centre of the field, a lectern set up in front of them. The occasional wails of the youngest kerblets were the only thing to break the silence, those standing by the parents of the distressed children only too glad to take a moment from their own thoughts and help to soothe the young ones.

The last of mourners filtered through the gate, followed by the funeral officiant and a trio of pipers, each clad in traditional Kolan dress but carrying a set of Spierkan pipes, blowsticks raised to their lips. As the officiant made her way to the ring of poles, the pipers struck up the Lament for the Lost Explorer, its mournful notes skirling up the field ahead of her. She reached the ring of poles, paused at the lectern to steady herself, and turned to face the silent crowd.

"Good kerbals. We are gathered here today to celebrate the lives and mourn the passing of all those taken from us by the war. They were kerbal, and as they came forth from their Groves so, in the presence of us all, shall they return." The officiant wetted her lips. "Today, you have brought stones, each inscribed with the name of a loved one lost. We will use those stones to build a wall around these poles, and within those walls we will plant a garden. A garden of remembrance and contemplation. For even when the stones have

crumbled to dust, the flowers will stand for those who fell. And so we shall remember them."

The officiant's gaze swept over the rows of mourners. "But, for today, we shall observe the old ways, with music, stories, seeds and poles. So, I invite you all, good kerbals, to step forward if you wish and to share your memories. We would be honoured to hear your words."

A hand raised. "I would speak." His companion raised his hand too. "And I would speak also." They bent down to embrace the two kerblets standing beside them, before making their way to the front. Bowing to the officiant, they made their way to the lectern and leaned towards the microphones.

"My name is not important. But I am here today to remember the brave sailors of the Second Fleet. Most especially, I am here to remember the captain of the Shield of Kolus, who left me with two fine kerblets whom she'll never be coming home to again."

"And I am here to remember my life partner, whom I left on Humilisia. A wonderful Keeper, who stood with his Grove to the very end." The speaker swallowed, looking out over the crowd through blurred eyes. "G..good kerbals, we give you this song in all their memories. The words have been kindly printed on page twelve of your orders of service and if anyone would wish to join us, we would be honoured in turn." They waited until the rustle of paper faded away, before taking a deep breath, heads lifted high.

*"Our flowers of Kolus - when will we see?
Your likes again.
You fought and died for.
Our homes, our Groves, our friends.
You stood against all. Of Doren's fury.
And sent them homeward.
To think again."*

The crowd was silent. Then, one of the pipers picked up the tune with impeccable timing, the mournful skirl and drone of his pipes echoing across the field. Hesitantly at first, then in growing numbers, the mourners joined in.

*"So, we fought against them - and to our lasting shame.
We sent our brothers. And sisters to watery graves.
They stood against us. But they were kerbal too.
And we'll ne'er see.
Their likes again."*

The other two pipers joined in on the beat, their instruments a melancholy counterpoint to the sudden full-throated song from the crowd, united in grief and determination.

*"Those days have passed now.
And in the past, they must remain.
But we will remember,*

our flowers of Kolus.
Who brought us homeward.
To think again."

The last defiant notes from the pipes faded into silence. The first figure bowed, wiping the back of his hand across his eyes before straightening up. "Thank you. Remember them all. Remember the Shield."

Gusemy knocked on the laboratory door and went inside. He found Halsy at his workbench, bent over a length of open pipe, packed with earth. A collection of similar pipes lay on racks around the room, each closed over with a transparent lid and sprouting a bewildering array of sensors and soil probes from either end, all plugged into an electronics rack via the, seemingly traditional, tangle of multicoloured cables. The rack, in turn, was plugged into the back of Halsy's computer.

Looking more closely at the nearest pipe, Gusemy made out a swathe of bright green through the fogged transparent lid, interspersed with overgrowing patches of darker green. The handwritten label stuck to the side of the pipe sported an extensive set of Old Kerba botanical names, some of which he recognised as mosses and liverworts. He tapped Halsy on the shoulder. "Come on. Time to go, if we're going to catch that train."

Halsy straightened up, glancing at his computer display as he stripped off his gloves. Gusemy saw the resigned look on his face. "Still no luck?"

"No." Halsy sighed. "Give me a minute?" He disappeared into his office, returning minutes later with his hair combed, dressed in loafers and a fresh poncho. "Where were we? Oh, right." He gestured at the racks. "It was a good idea of Erlin's but I'm not convinced it's going to work." He followed Gusemy out of the laboratory, locking the door behind him. "We can get a reliable signal in the lab and Erlin is pretty sure that Obrinn would be able to interface with a field version, but the signal propagation velocities are hopeless. Even if we could run a pipe from here to Barkton, I can't see Obrinn and Elton having any sort of sensible conversation. It'd be like trying to talk to you from Eeloo. Worse probably."

"*That* bad?" Gusemy walked out of the laboratory block and saw Mallas waving at him from the window of his car. "How consistent are those velocities?"

"Not very," admitted Halsy. "And we haven't had time to do any optimising but even if we pull off a hundred-fold improvement – which I don't see us doing – it won't be enough. Hi Mallas."

"Evening, boss. Latest lot of speaking tubes going well, I take it."

"About as well as the rest of them." Halsy got into the back of the car. Gusemy threw Mallas an apologetic look and climbed in after him.

After a subdued start the drive out to Olbinat passed pleasantly, the conversation avoiding work, or the reason for their journey, by unspoken consent. They arrived at the railway

station to find all but a handful of parking spaces taken and, Gusemy was pleased to see, their platform was crowded with passengers, many of them carrying cold boxes or with placards tucked under one arm. The train doors thumped open and they followed the flood of passengers aboard, as a raucous voice from the public address system announced that the express train to the Capital would shortly be departing from platform 2.

By the time they'd made their way past the jostling throng of passengers all looking for their seats, Halsy's temper was beginning to fray. He stepped into their own compartment, staggered as the train lurched into motion, and dropped unceremoniously into the nearest seat. Scowling he watched Olbinat station slide past the window, as Gusemy and Mallas found their own seats, Mallas stowing his own cold box in the luggage rack first.

"It's a bit busy isn't it? Do you think they're all going to the vigil?"

"I hope so," Gusemy replied. "If tonight is big enough, I'm minded to petition the Chief Ambassador to call for a Grand Conclave. Although that will require a quorum of Kolan ambassadors and support from a majority of the other Chief Ambassadors. Each of whom will need quorate support from their ambassadors." He sighed. "So, tonight really needs to be big enough to get the media involved, ideally without the Children of Kerbin or the neo-Kerman stirring things up."

Mallas snorted. "Your average neo-Ker won't have a clue, unless they took a radio to whichever Kerm free patch of wasteland they're holed up in. And if the Children turn up, the whole thing is off anyway so there's no sense worrying about them."

"You know, I can't honestly blame the neo-Kerman, given everything that we've learned – or relearned – about the Kerm." Gusemy's expression darkened. "The Children on the other hand..." He clenched his fists then slowly released them. "Are why we're going to support the ceasefire tonight."

Mallas nodded. He watched the fields rolling past outside the carriage window for a while before speaking up again. "It's a crying shame that Erlin's idea looks like a non-starter. We could have the Kerm talk everything over between themselves and then tell us what they think about all of this. That could've put the Children right back in their place."

Gusemy raised his eyebrows. "And what would be do if it turns out that they agreed with the Children?"

"I can't believe they would but..." Mallas's voice trailed away. "I guess that going neo-Kerman would get a lot more popular. Or we throw a lot more money at Starseed." He lifted his hands. "It's all academic anyway."

"Actually – it might not be."

They turned to see a transfixed Halsy, staring back at them. "Mallas – do you still have those soil injectors lying around?"

"From the chemotaxis work? I didn't throw them out, so they've got to be around somewhere." Mallas saw Gusemy's questioning look. "Back in the early days of the Kerm

crisis, we were trying to find a way of deflecting or blocking Kerm roots – or Kerm fibres. We tried everything we could think of, including injecting plant hormones into the soil to lure them away.” He cocked his head at Halsy. “What are you thinking?”

“I’m thinking that we strap an injector to the side of one of Erlin’s gas samplers and hook them both up to a vacuum pump.”

Mallas frowned, turning the idea over in his head, then sat bolt upright. “Run the pump efflux through a GC to get an output signal and use the input signal to pulse whatever we’re running through the injector?”

“Exactly! No need to use the whole GC either - too slow. Just use the FID; it’s not like we’re separating anything here.”

“True.” Mallas chewed his lip. “Forget about strapping them together though – we’d end up sucking back whatever we put into the soil. Have one effector node as the listening node and put the injector there, have another node as the talking node – which is where the sampler goes.”

Halsy’s eyes lit up. “That would work! I was thinking we could put them both at a single node and split the input and output streams by chemokine type but your way would be easier!”

“No... no we still use multiple chemokines but use them to increase our bandwidth. Two would do to start with...”

“Two? Telegraph code?”

“Yep. We’ll need to teach it to the Kerm first, of course.” Mallas scratched his head. “That’s after we teach them to read.” He grinned. “But I know a young lady and her father who should be up for that.”

Gusemy stared at them both in bemusement. “Say that all again. Slowly.”

“We detect soil chemicals near one Kerm using one instrument. We transmit the output from that instrument, over the telephone network, to a second instrument, which releases the same chemicals into the soil near the second Kerm. Then we teach both Kerm telegraph code using microbursts of one chemical for a dot and microbursts of a second chemical for a dash.”

“And they can send messages to each other.” Gusemy blinked. “That’s... ingenious. But the logistics of setting it all up...”

Mallas glanced at his watch. “Plenty of time till we get to the Capital. Don’t know about you good kerbals, but I’d prefer to spend the time figuring out some of those logistics than talking over the state of the world.”

The others agreed and, by the time the train pulled up at the Capital, had roughed out Halsy’s initial concept into the outlines of a plan that even Gusemy was beginning to be

convinced by. Then they stepped onto the platform and put their nascent plan firmly to the back of their minds.

Kerbals clad in dark ponchos cleared the platform in short order, ushering the passengers into queues, through the station turnstiles, and past long rows of temporary tables where they were patted down and their luggage was checked. Gusemy handed his bag over without comment, noting that everyone around him was willingly submitting to the inspections too. Two uniformed border guards stood watch behind the tables, one of them tensing up at a raised voice from another queue. Mallas turned to see the commotion, only to see the erstwhile complainer receiving a muted, but pointed, dressing down from his companion, who then apologised to the helpers at the table.

Outside the station, a line began to form. Placards were raised, some of them depicting a stylised grouping of sixteen sweetblossom poles. Others were painted with the international nuclear warning symbol behind the cross-and-hexagon signifying prohibition. Still others displayed a simple list of names, with Hading Kerman at the top of the list.

The last of the demonstrators from Olbinat emerged and the procession began to move; up the wide marble steps leading up from the station, before crossing the Boulevard, turning onto City Avenue and marching towards the Capital building.

Mourners and police lined the Avenue to watch the twilight procession pass by and sometimes to join them. The steady tramp of feet was the only sound to break the silence, the words and images emblazoned on the placards more eloquent than any chant or song. The marchers entered the park surrounding the Capital Building, past a squad of Capital Guards at the gates, before spreading out and finding a place in the great ring of figures surrounding the Capital Building.

Across the park, Halsy saw a white banner planted by the nearest Council building, the stark “Doren for the Ceasefire” message across its top visible even in the gathering twilight. The regularity of the long column of script underneath, gave it away as a list of names. Halsy turned his head and saw another banner, its “Kolus for the Ceasefire” message angled away from him but still legible. If anything, its column of text was even longer.

Gusemy retrieved a blanket from his bag and unrolled it over the grass. He, Halsy and Mallas sat down, the crowd a shadowy yet comforting mass around them. The first stars began to appear as twilight faded into night then, at some unseen signal, the pinpricks of light above were matched by a ring of lights around the Capital Building.

The light swept towards them and then past them in a great wave, until the whole park seemed ablaze in candlelight, each flame in the darkness a silent plea to the watching Twelve Pillars.

It's probably obvious but the lyrics in the last chapter were borrowed and adapted from 'Flower of Scotland' by the Corries. Original version with guitar backing here [<https://youtu.be/W7YhtLXry60>], music only, played on the bagpipes here [<https://youtu.be/d6dinV3HMec>].

Chapter 99

A is for Acorn

The bone-dry air and sheer vastness of the surrounding desert seemed to deaden the steady thwack of sledgehammers against steel as two sweating figures drove a pair of anchor plates into the sand, watched by their companions. One of the figures leaned on his hammer for a moment, taking a pull from his water bottle before checking the edge of his plate, where a thin black line was just visible. He flexed his fingers, dealt the plate a last, resounding blow and grunted in satisfaction. "That'll do it. Hand me the line."

One of his companions hurried forward, dragging a clinking bundle of ropes and carabiners behind him. Putting his hammer to one side, he slipped two of the carabiners through their end-rings on the anchor plate and spun them closed. His companion checked his work then straightened up with a nod.

"Second plate ready?"

"Yep."

The figure walked over to a set of climbing gear spread out on a tarpaulin. Donning a hard hat, he stepped into the leg loops of his harness and pulled it up around his waist. By the time he'd tightened the last strap, a Y shaped rope was laid out before him, two ends secured to the anchor plates, the third disappearing over the edge of an enormous crater in the sand. He snapped his harness onto the rope, waited for one of his team to check his gear, then lowered himself into the pit.

Cascades of dislodged sand streamed over his boots and ankles as he descended, checking over his shoulder every few steps. Bending his knees, he lowered himself onto the crater floor, kicked against it to test his footing, then straightened up. Slipping a climbing pole out of its loop on his harness, he made his way across a treacherous scree of sand and shattered concrete, probing the ground in front of him before each step. Even then, the sudden lurch as the pole sank into deeper sand nearly overbalanced him.

He knelt and scooped the sand away with gloved hands, uncovering the buckled edge of a discoloured metal rim. He thrust his pole into the sand beyond, hoping against hope to find a gap or air pocket beneath the surface as he worked it back and forth, but meeting the same gritty resistance in all directions. Wiping the sweat out of his eyes, he set to work digging out the rest of the rim but, no matter which side or angle he tried, his pole met nothing but sand. With a heavy heart, he walked back to the crater's edge, boots crunching over loose concrete as he went. He stowed his gear, took a two-handed grip on the rope and, hand-over-hand, began pulling himself up to the surface.

The look on his face as he heaved himself over the edge of the subsidence crater told the waiting KNSA team all they needed to know.

"No joy. Looks like we're doing this the hard way."

"Thank you for pointing out the obvious yet again, Madame President. As I recall, we've agreed on numerous occasions that security around our nuclear facilities is paramount. But the fact remains that, as we've seen, the KNSA is simply not equipped to defend those facilities against a sufficiently determined force." President Maller unclenched his fists with an effort. "We cannot depend on future attacks being as slipshod or poorly planned and, for all their well-deserved reputation, we would do well not to assume that all KNSA agents will be quite as dedicated as Mr Hading. I trust that President Lanrick will agree."

Lanrick wilted in his chair. "I quite agree, Mr President. Rest assured that Wakira will do everything in its power to ensure that this incident is not repeated." He bowed his head. "This Council will already be aware that Chief Ambassador Burvis and I have tendered our resignations. Until such time as those resignations are accepted... everything in our power."

"Which would be greatly assisted by a more permanent accord with Firesvar," said Burvis acidly.

"No doubt," President Enemone leaned forward in her chair. "But, once again, without more substantial commitments from Wakira, that is impossible." She spread her hands. "I have spoken plainly in this matter - the Firesvarn Ruling Council will have no trust in a military which permits its officers to attack its own civilian facilities."

The Firesvarn Chief Ambassador scowled. "And neither will our Conclave."

Chief Ambassador Aldwell cleared his throat. "This is all very well, good kerbals, but I fear the people may regard our... deliberations, as mere excuses." He made a circular gesture with one hand. "I would remind this Council that we are now into the fourth night of demonstrations against the war. I cannot speak for other Regionalities but I am advised that similar demonstrations took place outside government buildings at a number of our territorial capitals last night.

"I presume your citizens are also demonstrating against the Children of Kerbin?" Burvis leaned back in her chair. "Perhaps if the Confederation had been more assiduous in securing

its own facilities against a home-grown terrorist organisation – or had put more resources into countering those terrorists before they got completely out of hand...”

“This is hardly the time to chew old soup, Madame Ambassador,” said Maller sharply. “And I would remind this Council that of all the Regionalities, only Veiid and the Confederation have avoided outright conflict – and have found common cause against the Children!”

“Only because you’re scared witless of Doren,” somebody muttered. Maller darkened but before he could reply, President Obrick knocked on the table for attention.

“I agree with my honourable counterpart from Veiid. This is not the time to chew on old soup.” He reached into his briefcase and placed a small, battery powered tape recorder on the table in front of him. “And I can assure Chief Ambassador Aldwell that the Kolan people share the same sentiments as those of the Confederation, although they choose to express it in a rather different manner.” He tapped the tape recorder. “With the Council’s indulgence, I have brought a recording of a song from a recent funeral service that I would play to you. I’m told it was originally composed to commemorate the Humilisian conflict but that versions of it have since been played at memorial services across Kolus.”

Chief Ambassador Donman gave his Doreni counterpart an apologetic look. “We also beg the indulgence of our honourable Doreni colleagues. The opening verse is less than diplomatic but please be assured that it does not set the tone for the rest of the piece.”

Chadlin raised an eyebrow. “Are you serious?”

Obrick met his gaze squarely. “Never more so, Mr President.” He glanced around. “If there are no further objections?” The expressions around the table ranged from indifference, to polite curiosity to mild exasperation. Obrick nodded and pressed the playback button on the tape recorder, watching the other’s face as the strains of a tinny but still melodic duet filled the Council chamber. Chadlin’s expression darkened as the opening verse came to a close but, at a gesture from his Chief Ambassador, settled for folding his arms across his chest. The somewhat distorted sound of Spierkan pipes joined the singers, to the visible dismay of several around the table and President Chadwick’s lip quirked in a half smile as Obrick turned the volume down.

Exasperation and indifference were soon replaced by increasingly intent expressions as the second verse segued into the third, the original duet long since submerged beneath a chorus of other singers.

“...our flowers of Kolus. Who brought us homeward. To think again.”

Obrick stopped the tape. “Thank you, good kerbals, for your indulgence.” He looked at Chadlin. “It is far from a formal mandate but I believe it makes the views of the Kolan people abundantly clear. As their President and Chief Ambassador, it is therefore incumbent on us to negotiate for peace on their behalf.” Obrick pushed his chair back and stood up. “And peace must begin with apology.” He walked around the table and up to the lectern at the end of the chamber.

"Be it known before these Twelve Pillars, that the Regionality of Kolus does hereby apologise to the Regionality of Doren and does most earnestly request a cessation of conflict and hostilities. In furtherance of that request, we offer to cede any and all claims to the islands of Humilisia, their airspace and lawful territorial waters, acknowledging the sovereign control thereover, of the Regionality of Doren.

Donman stood up. "We humbly beg that our request be placed on the public record, thereafter to be deemed accurate and inviolable."

Aldwell tapped on the table. "As the senior presiding member and keeper of the minutes for this Council session, I declare the Regionality of Kolus's request to be placed on the public record. As it was spoken, so let it be written. Does the Regionality of Doren wish to place a reply on the record?"

The Doreni exchanged looks. President Chadlin inclined his head. "Doren does not wish to place such a reply at this time. We note that the Regionality of Kolus is making a virtue out of a necessity but, nevertheless, we thank them for their offer and do hereby undertake to consider it in good grace and honest spirit."

"Then let the minutes show that." Aldwell made a note. "As set out in the Bill of Land, Article 25, disputes over territory are to be settled by the involved Regionalities outwith this Council, save only that any new treaties between them are presented here for discussion. By long custom, this Council merely offers itself as a mediator in the event that negotiations should break down." Aldwell steepled his fingers. "By even longer custom, peace treaties have historically fallen within the ambit of Article 25, although without consulting the Archives, I would be hard pressed to inform this Council precisely when that custom was last invoked.

President Lanrick looked thoughtful. "Let the minutes also show that, unless Doren wishes otherwise, Wakira would recuse itself from any mediations. As a wartime ally of Kolus, we would hardly be impartial." There were a number of approving nods from around the table.

"Very good." Aldwell made another note. "Do any further Regionalities wish to follow Kolus's example at this time?" He saw several pensive expressions but nobody else spoke up.

"Then, as it has been spoken by the Twelve Pillars, let it be written by the Twelve Pillars. This session of the Council is hereby adjourned, the next session to begin in two hours."

<Is this possible?>

Professor Erlin seemed to think the equipment would work, Jonton replied. But getting the whole system working will need a lot of help from you, Jonelle and Obrinn.

<yes. We will also need to learn to read> Amusement rippled down the Communion link. *<maybe we'll discover if all kerbals really do tell long stories. This will need thought, my Keeper. Finding two...chemokines>*, the mindscape flickered as Elton's mental voice

stumbled over the unfamiliar word, *<that I can use will be easy, but finding two that all Kerm in all soils can use, will not>*

If understood everything correctly, you won't need to. As long as every Kerm can tell us which chemical they want to use for a dot and which one for a dash, the machine can match everything up. Jonton paused. *Making a different set of probes for every Kerm will be complicated though – perhaps we can find some chemokines that work in most soils, even if it doesn't work in all of them. That might make things easier for the Berelgan team.*

<yes. And that is another matter> Jonton sensed a bare hint of unease. *<how will these probes be placed in the soil?>*

I thought we could use star poppies. Jonton sent an image of a thin red line of flowers marching across the landscape, tracing out a puckered line around Elton's territory. *The way we did before, only we'd need more of them this time.*

Thirty-eight brown circles appeared, each surrounded by a ring of red dots. The rings became ragged, sprouting fern-like patterns of threads in all directions.

<a map of my roots and fibres? It is a good plan but it would be difficult to control the poppies so precisely> Elton's mental voice became faintly chiding *<you were Kerm – have you forgotten the knotweed?>* Patches of red appeared at random, blotting out the delicate threads and then overrunning them entirely.

Hmph. Jonton thought it over. *Perhaps clover would be better.* With a mental wave of one hand, the scarlet puddle vanished, replaced by a carpet of green around the brown dots representing Elton's trunks. Black dots appeared, first in their tens and then their hundreds, running together into filaments and then the same fernlike patterns. *Could you make a map from wilted plants instead?*

<that would be easier. But what is this clover – I do not recognise it>

Surprise rippled across the mindscape, followed by sudden humour. *After your time old friend.* There was a subtle emphasis on the old. *Something that kerbals developed to improve poor soils. Your soil is old and rich enough that we've never had to plant it near you but for Gerselle's...* The mindscape shimmered into grey. *Gerselle used it a lot when Jonelle was a sapling.*

An image of thirty-eight saplings amidst a carpet of green appeared. The greenery wilted and disappeared into the soil, leaving the saplings behind. *Properly done you can get three crops a year. Easier than trucking in so much compost or night waste.*

<then this is good!> Jonton felt a sudden surge of awareness, felt the snap and tingle of distant chains of thought being forged. *<I would learn of this clover and perhaps it will also help turn the desert world Duna into a place for planting new Kerm>*

I think the Berelgan are trying to develop new clover strains for Duna, Jonton agreed.

<then I would learn of those too> Elton's voice turned droll *<is it not fortunate that their machine will let me speak to kerbals as well as Kerm?>*

Ferry looked at the half-empty sack of clover seed and scratched his head. "Will this be enough, Jonton?"

"The stockist is closed and boarded up, so it's going to have to be. Not a surprise with all the seed security checks but I did try." Jonton turned around, arms full of pegs and twine. "I spoke to Patbro too but Tivie didn't have any left over from planting her Grove and he couldn't find anyone else with any spare."

"How much of the Grove will we need to cover?"

"As big a patch as we can around each of Elton's trunks. We can start three or four metres out – any closer than that and we'll be too near to the main nerve ball anyway."

"We'll still have to make every seed count though," Thombal noted. He knelt down before his son. "Sorry, Adbas, I don't think you'll be able to help after all."

"I'm afraid not, Adbas," said Jonton. "And the same goes for you too, Joenie."

Enely raised his hand before Joenie could speak. "And that's just as well. I'll have plenty of spare hands to help me make a proper sathy job of the alphabet cards."

Jonton shot him a grateful look. "Good idea. Adbas can make some white ones for me and Elton and Joenie can make blue ones for herself and Jonelle." He smiled at Joenie. "I know Jonelle will find white cards too bright through your eyes – and I don't think she'll let anyone else except her Keeper teach her to read."

Joenie shook her head.

"Very well then." Jonton rubbed his hands together. "We're just waiting for...morning Fred."

"Mornin'. Got both those spreaders for yeh."

"I can take one of those for you." Thombal took the handle of one of the seed spreaders from Fredlorf's hand.

Jonton dumped the pegs into his pack and dropped the balls of twine in on top. "Seed, twine, markers, scissors and a couple of mallets. Anything else?"

"Got the spare rakes, plenty of water, a bottle of prickleberry juice in the cab, and a bag o' vittles for lunch," said Fredlorf. "Reckon we're set. See yeh later, Enely. You too, Adbas an' Joenie."

"Bye, Mr Fredlorf. C'mon Adbas." The two young kerbals disappeared inside the hut.

"I had better get started too then. I hope there's enough clover seed and I'll see you all at dinner." Enely waved and followed his helpers inside.

"Let's get started then. Tractor's jus' round the front." Fredlorf led the way, the seed spreader squeaking and bumping along behind him. Jonton picked up the sack and followed

him, Thombal bringing up the rear with the second spreader. They heaved everything onto the back of Fredlorf's trailer and set off for the Grove.

Sitting in the back of the trailer as it rumbled along, Jonton's thoughts drifted back to another long-ago tractor ride out to the sunfruit fields which had just been ruined by the fighting between two Kerm. The cinnamon scent of bruised fibres filled his nostrils as he took the gourd from Gerselle and recognised it for what it was. The scene *shifted*, grey-robed Walkers standing around himself and Gerselle, Kerm seed weighing down the cowl of her newly-made – and itchy – woollen robe. Once again, he saw himself scraping out a shallow pit in the gritty soil, Gerselle planting the new Kerm, blessing it with the last drops from her waterskin as Kerbol sank below the horizon.

Jonton stared back at the village, eyes blurred by more than memory. He shook his head at Elton's voice in the back of his mind. *And if you had not, what then? The scientists at the Berelgan would still be toiling in vain to find a way to keep new Kerm away from old. I would merely be one more Kerm cowering in the darkness, lashing out in fear at another whom I did not know or understand, never having dreamt of calling her daughter. And both of you may have been killed or broken by our fighting, like so many other kerbals before you. You carry a heavy burden, first of my Keepers, but in carrying it, you have given our world hope.*

One of Elton's branches tapped on his shoulder. Jonton shook it away, leaning forward away from his trunk.

"My apologies, Keeper. I didn't like to intrude but we're here."

Jonton shook himself awake and found a concerned-looking Thombal standing over him. "Oh...Sorry Tom – years away." He looked over at the treeline. "Shall we make a start?"

"Thought yeh'd never ask," Fredlorf swung himself down from the tractor cab. "Can't believe nobody thought of this before – jus' asking the Kerm what they want could've saved the world a powerful load of grief."

"What's done is done," said Thombal quietly. "Better to put things right now that we can, rather than wasting time looking for someone to blame."

"Yeh in a proper thoughtful mood this mornin', Tom. Reckon you've got the right of it though." Fredlorf opened the lid on one of the seed spreaders and poured clover seed into the hopper before squatting down and tightening a knob on its underside. "Better set these for as light a cast as we can – doesn't look like we'll have much spare seed to work with."

By the time the morning sun had driven the dew from the undergrowth, three of Elton's trunks had been surrounded by a grid of pegs and twine that marked out long strips across the newly cleared Grove floor. Jonton walked back to the tractor to retrieve his sunhat and by the time he returned, Fredlorf and Thombal were plodding back and forth along neighbouring strips, spreaders bumping along in front of them.

"I'll make a start marking out his northwest trunks!" Jonton called. He waited for Thombal's wave of acknowledgement then shouldered his pack, pulled the brim of his hat over his eyes and headed into the woods.

The sound of birdsong in the trees and soothing smell of greenery in his nostrils lulled Jonton into a comfortable sense of oneness with the Grove around him, as he stumped along. Almost automatically, he sorted through the scents surrounding him, the half-buried memories of his time spent an-Kerm providing a constant assurance and reassurance that all was well with the plants and soil around him. A carpet of cornshakes caught his eye, his nose wrinkling at the sickly-sweet odour from the scattering of yellowjacket symbiotes growing between them. On a sudden whim, he turned his head and saw the expected pair of elderly leatherbarks, the clusters of fronds running along their upper branches, swaying in the breeze.

Jonton's eyes lost their focus. For a moment, the woods lit up with ever-shifting myriad-hued threads of light running through the soil, tying everything in it into the mighty living tapestry of which, he knew, his kerm-an senses could only perceive a tiny part. Smiling, he turned off the main trail, cutting through familiar clumps of undergrowth towards the Kerm tree he knew would be waiting for him.

"Reckon we've done all we can today." Fredlorf hefted the sack of clover seed, squinting at the sunset. "We'll not be able to do as much planting around the last four or five trunks as we'd like but it should make a sathy enough space for Elton to draw his map, as Enely might say." He lifted the sack onto the back of the trailer. "Gives a kerbal a thirst all this mapping does – a half litre of 905 would go down a treat about now."

"It would," Jonton agreed, "if there was any left to buy. Meleny managed to pick up a couple of bottles of 1G, the last time she was in Barkton. You'd be welcome to them – they're a little too fruity for me."

"So long as it's got a bit of bite to it." Fredlorf clambered up into the cab of his tractor and started the motor.

They arrived home to the smell of white bean stew on the stove and, much to Fredlorf's satisfaction a cold jug of Jorfurt's finest 1G ruby ale on the kitchen worktop, alongside an pitcher of iced water and a bottle of sapwood cordial.

Joenie and Adbas sat side by side at the kitchen table, each of them putting the finishing touches on the stack of cards in front of them. Jonton watched his daughter cutting a picture of a cluster of yellow clover out of an old cookery book and pasting it onto the last-but-one card on her pile. At the other end of the table, little Katisa scribbled happily on a large sheet of paper, watched over by Meleny and Enely.

Thombal gave his wife a brief hug before squatting down to pick up an abandoned crayon. He offered it to his daughter who grabbed it and gave it an experimental chew before dropping it on the floor again and returning to her scribbling.

"Finished!" Adbas coloured in the final corner of the capital Z on his last card. "Can I have a sapwood please, Mum?"

"Yes, but only one. Would you like one too, Joenie?"

Joenie shook her head. "No thank you. I think I'll have mine after dinner."

Jonton finished drying his hands and poured himself a mug of iced water. "Are you sure? I thought we'd try your cards out after dinner."

For a moment, Joenie looked torn and then she rolled her eyes. "I bet we won't be doing that until you've had coffee. I'll have my sapwood while I'm waiting for you and that way my stew won't taste all weird either."

"And speaking of stew," Meleny declared, "The sooner certain young kerbals lay the table, the sooner we can eat."

Jonton put down his empty coffee mug and looked at Enely and Adbas apologetically. "If you don't mind, I think it'd be best if only Joenie and I Communed tonight. It's going to be an odd experience for us all anyway and I think it'll be easier for Jonelle if there aren't too many others around."

"Of course." Enely cracked himself another sweetnut. "I owe Fred a return match of Tiles anyway." His expression turned faintly wistful. "Perhaps we could all read Jonelle a bedtime story one day soon though?"

"I'd like that," said Jonton softly. He smiled. "I'll have to dig out some of Joenie's old books."

"Still can't believe yeh teaching a Kerm to read," Fredlorf broke in. "Ah'll take you up on that match though, Enely. Honours even tonight – I'm feelin' lucky."

"We'll leave you to it then. Come on, Joenie."

Joenie grabbed both stacks of alphabet cards from the living room table and ran through into the sleep room. Jonton closed the door behind them and turned to see Joenie shove a cushion under one of Jonelle's leaf clusters and place the stack of alphabet cards within easy reach before sitting down against her trunk. Lying down on his bed, he watched the leaves close around his daughter's forehead before lifting his head into his own waiting cluster.

He emerged into Communion to find Elton already waiting, the older Kerm's presence maintaining a discreet distance. Joenie stood still in the middle of the mindscape with her eyes closed. Jonton sensed her link with Jonelle thrumming, then with a sudden twist of focus, he found himself resting against a much smoother, younger Kerm trunk, looking at a stack of blue cards on the floor.

Joenie glanced up at her father lying on his bed and, for a disconcerting second, Jonton had the unnerving feeling of being in two places at once. Clamping down on his momentary nausea, he waited for Joenie to turn her attention back to the cards and pick one up.

Can everyone see?

Perfectly. You and Jonelle have gotten very good at this.

<we have been practicing a lot. Can you see, Daddy?>

<I can see> Jonton received the briefest flicker of amused tolerance which was swiftly overtaken by curiosity. <what is the meaning of that symbol?>

This is the letter A said Joenie importantly. *A is for acorn.* She flipped the card over revealing a picture of an acorn glued to the back, before picking up the next card in the stack. *This is the letter B. B is for breadfruit...*

Jonton felt Elton's presence come forward and took a mental step back to make room. The edges of his awareness flickered with spillover from the Kerm's thoughts; half recognised images of signs and book pages blurring past, letters flaring brightly in time with Joenie's voice. Snatches of other voices chattered past and Jonton could just make out the occasional 'acorn', 'breadfruit', or 'carrot'.

This is the letter D. D is for damsonwire....

Chapter 100

Telegraph Road

Two lines of makeshift, and rather shorter than normal, telegraph poles stretched across the fields in opposite directions. The wires supported by each set of poles ran from a pair of metal pipes standing side-by-side, half-buried in the ground, to the imposing front steps of the Berelgan Institute manor house. A trail of cable clips guided them up the steps, in through the front door and along a hallway to an airy, high-ceilinged office. There, they disappeared into one of the many pieces of electronic equipment piled up on a large equipment cart next to the Berelgan telephone exchange. The unruly collection of breadboard circuits, oscilloscopes, switchboxes and other assorted laboratory equipment made a decided contrast with the brass and carved leatherbark cabinet holding the exchange and the matching desk and chair arranged behind it.

Erlin stood by the door. Neither the need for a walking stick in each hand, nor the tendency of his poncho to ride up on the swathe of bandages around his middle, could dim the enthusiasm in his eyes as he watched Halsy and his research students at work. One of the students plugged what appeared to be a pair of old-fashioned telegraph keys into the largest circuit board and flipped a switch. On an indicator board plugged into the other side of the circuit board, a single green light lit up in response.

“Okay – sending power-on and self-test sequence to BREADFRUIT.” She pressed a button on one of the switchboxes, watching the oscilloscope display flicker into an elaborate train of pulses, collapse to a straight line and then, moments later spike into an answering sequence. A second green light lit up next to the first. “BREADFRUIT is online. Sending sequence to WHITEBEAN.” A pause and then a third light glowed on the indicator board. “And WHITEBEAN is online!”

Halsy made a note in his lab book. “Are they both connected?”

A second student peered around the exchange cabinet. “Yep – hooked up and ready.”

“Good. Let’s start the call from BREADFRUIT.”

The first student consulted a card taped to the equipment cart before tapping out a short sequence on the two telegraph keys. A matching sequence of short and long pulses scrolled across the oscilloscope screen. Erlin heard a clicking noise from the exchange innards and then a second, shorter, pulse sequence scrolled across a second screen. A fourth light glowed on the indicator board next to the other three.

“WHITEBEAN is answering. Switching keys over to chemokine transmission!”

“Very good.” Halsy glanced across at Erlin before turning back to his students. “I think everyone needs to watch this, don’t you?”

“Definitely!” One of the students plugged in a pair of black boxes, one labelled ‘Whitebean’ and the other ‘Breadfruit’. Each box sported two pairs of white and red indicator bulbs, the labels underneath each pair marking them as transmitter or receiver. “Ready!”

The first student tapped one of the telegraph keys, the red ‘transmit’ bulb on BREADFRUIT’s indicator box flashing once in response. There was a brief pause and then the matching ‘receive’ bulb for WHITEBEAN flashed in acknowledgement.

An enormous smile split Erlin’s face as the student tapped the other key, triggering a flash of white light from BREADFRUIT and then from WHITEBEAN. His walking sticks clattered on the parquet floor as he hobbled over to inspect the prototype Kerm telegraph. “Excellent work! Quite excellent!”

“That’s the easy part though,” Halsy said ruefully, gesturing at the heap of equipment on the trolley. “Now we just need to figure out a way of turning all of that into something you can leave in a field for a year.”

Erlin shook his head. “Not yet. Eventually, yes, but for now perfect is the enemy of good enough. Something workable and waterproof is all we need for the field testing. The production version can come later – even if we set out to awaken more Kerm tomorrow, the awakening itself would take several months. Then you can add a couple more months to plant the clover map, teach the newly awakened Kerm to read and then teach him or her to use telegraph code.”

“Speaking of which, how’s Obrinn’s clover doing.”

“Fine. Not quite ready for fibre mapping yet but fine. Obrinn’s enjoying his reading lessons too, although between you and me, I’m glad we’re past the Treebie’s Tricycle stage.”

The eldest student groaned. “Don’t tell me the *Kerm* like that book too? It’s still my youngest’s favourite. So much so that he’s memorised the wretched thing and corrects me every time I try and make a change.”

Erlin chuckled. “According to Jonton, his Joenie was much the same when she was younger.” His face turned thoughtful. “And, if young Kerm and young kerblets can turn out to be so similar? In a curious sort of way that gives me hope for the future.”

Floodlights bathed the great pit in a harsh glare, throwing knife-edged shadows from the ring of temporary gazebos around its perimeter. Plywood formwork lined its walls, anchored at the top by a lattice of cables and bolted to the ragged tops of exposed concrete walls at the bottom. Trickle of sand leaked from the joints in the formwork and cascaded over the rope ladders dangling over the edge.

At the bottom of the pit, a work crew heaved suction hoses into place. Their supervisor checked the copied architectural plans clipped to his board and marked off the hose positions. Satisfied, he stuck a finger in each corner of his mouth and gave a shrill whistle. Above his head, well back from the pit edge, diesel generators clattered into life and sand began disappearing up the hoses with a hissing roar. The work crew, ear defenders pulled over their heads against the noise, walked back and forth, marking out a trench along the edge of the long wall of the pit. Sand tumbled in to fill the trench and was sucked out in turn. A second crew began excavating a similar trench along the other wall, leaving a steadily diminishing hillock between them.

The supervisor watched the sand level creeping downwards, revealing more and more of the concrete wall at the far end of the pit. The head of a door frame came into view, followed by the jambs and the top of the door proper. Beside him, the top of a curved bank of monitors was emerging from the hillock. He gave a sharp double-whistle and the noise from the generators immediately throttling back to a muted rumble. Both work crews gathered around the exposed door frame, pulling off their ear defenders and fitting wand-like extensions over the ends of their hoses, the wands tipped with brushes.

“This end is nearest the emergency exit, so we’ll most likely find a few of them here.”

The workers drew back into a loose semicircle and began skimming away the sand in layers. Then one of them stopped and knelt down, brushing away a circular patch of sand and exposing dark hair. At the sight of his raised hand, the others stepped back to give him room. Not daring to remove any more sand directly, he began clearing a circular trench around the buried head, letting the sand fall away from the distressingly young face, eyes still squeezed tightly closed.

The supervisor flipped over the plans on his clipboard, revealing a sheet of photographs beneath. For a minute he stood in silence, head bowed, before ticking off Desden ‘Des’ Kerman’s name from his list. Then he knelt down with a soft-bristled paintbrush and began clearing the last vestiges of sand from the corners of the scientist’s eyelids.

Dawn was creeping over the horizon as the laden sling emerged from the funeral pit, the crane operator slewing his load around in a slow half circle before depositing it beside the row of closed body bags. The sling fell open and respectful figures lifted the mortal remains of Macbus Kerman onto yet another dark green bag and, after a minute’s silence, zipped it closed. The weary KNSA team retreated beneath one of the gazebos ringing the pit, watching the sling lift into the air, swing round, and descend out of sight.

At the bottom, a grim-faced work crew stood by the reception desk of the now-cleared Site D lobby. Before them a figure lay sprawled on the floor, one out-flung hand still clutching a pistol, the laboratory coat covering the opposite shoulder crusted with a mixture of sand and dried blood. Beside its head a slumped figure sat cross-legged, dressed in the uniform of a major in the Wakiran Border Security Force, the back of its skull a mummified horror of clotted tissue and bone fragments. It too held a pistol, wedged under its jaw.

Gently, almost tenderly, the KNSA workers lifted Hading Kerman's body onto the open sling on the floor, standing to attention as the cables tightened, pulling the canvas closed around their once colleague, and lifting him up into the dawn sky. The click of a camera shutter broke the silence and they turned to find their supervisor stretched out on the floor, photographing the Wakiran officer's corpse. She stood up, shaking her head in acknowledgement of the unspoken question in their eyes. "No, we're not. This coward doesn't deserve to go home to his Grove. Stick a tarpaulin over the *bjedla* and we'll let Wakiran High Command decide what to do with him."

Elton's map wasn't quite what Jonton had been expecting. For all his time spent an-Kerm, at heart he remained a kerbal, with a kerbal's expectation of how things should work. Kerbal maps were tidy affairs of precise lines and easily read symbols that brought order to the landscape they depicted.

This was not a kerbal map.

Irregular splotches of brown spotted the thinly spread carpet of healthy green clover, like raindrops splattered across a sheet of newsprint. For the most part, the splotches had run together into a blobby fern-like pattern but, closer to Elton's trunks, the criss-crossing trails of dead clover had melded into a single expanse, splattered here and there with curiously geometric patches of green left between overlapping circles of muddy brown.

Enely scratched his head. "None of them are as neat as I thought they would be."

"No," said Jonton. "It'll be interesting to hear how they fared at the Berelgan." He shrugged. "I doubt they'll have seen much difference but Obrinn's a much younger Kerm so you never know. Anyway, for older Kerm it looks like you don't need to start the map so close to their trunks."

"Where do you think would be the best places to plant the transmitter and receiver?"

Jonton got to his feet. "As far apart as we can. Elton's managed to find a couple of chemokines that shouldn't have too much effect on the local soil fauna and he thinks he can dampen down any effect they do have, but even so, they're bound to do something. For the sake of signal clarity if nothing else, we think it's probably better to keep the damper zones as far away from each other as we can. That should keep their micro-ecologies, as Mallas would call them, from getting mixed up."

Enely nodded. "That makes sense." He gave Jonton a self-deprecating smile. "Or, at least, I'm happy to trust that a former an-Kerm and one of the oldest Kerm on Kerbin know what

they're doing." He saw a fleeting shadow behind Jonton's eyes. "When it comes to Kerm micro-ecologies," he added.

"Those, we do know about," muttered Jonton. "I wouldn't be so sure about anything else." He closed his eyes for a moment. "Anyway, apart from putting them as far apart as possible, I'd say we're looking for a branch point on one of the main cross-tree fibres." He held up a hand, thumb and fingers outstretched. "According to Mallas, the working end of the prototype sensors that he's bringing next week are about half a span wide with some room for adjustment. So, we can't go too far out from the trunk but we should have some leeway."

Enely paced out a distance from the dead clover around Elton's trunk. "About here then." He studied the greenery around his feet, searching for a fork in one of the wilted brown trails marking out the buried Kerm fibres. "Here?"

"The next one out, maybe? Yes - that looks better. That'll do." Jonton watched Enely retrieve a handful of red-painted garden canes from the bundle slung over his shoulder and drive them into the ground around the branch point, making sure to keep well clear of the fibre trail. Jonton grimaced. "I suppose we should check the fibre width but I'd rather not disturb them any more than we have to. I wish the Berelgan had come up with a way of finding Kerm fibres without digging for them."

"No." Enely said flatly. "We don't disturb the fibres unless we absolutely have to. Even then..." He shivered. "I too hope the Berelgan can find a better way of doing this. Come - we should find somewhere for the second sensor to go."

Practice, Jonton reflected, made most things easier, even reading Kerm maps. Finding a suitable location for the second sensor took much less time than the first and it wasn't long before the last red cane had been driven into the ground.

The journey home was a sombre one with Enely wrapped up in his own thoughts and Jonton maintaining a respectful silence. As they approached Gerselle's hut, Enely stopped. "I suppose he volunteered too in a strange sort of way. I shared my story with him, so he must know the risks. But he's never once mentioned them, or been anything less than supportive of the telegraph project."

"I know," Jonton answered. "We've discussed it and I deliberately mentioned your... story as well. More than once in fact but every time he seemed indifferent." Jonton raised a hand. "Not to your suffering - I sensed *that* very clearly - but more as if there simply wasn't any possibility of the same thing happening to him."

"Let us hope so." Enely opened the front door and went inside. Jonton cocked his head at the sounds coming from the living room. Puzzled, he followed Enely inside to find Meleny's family, along with Ferry and Fredlorf, sitting around the television with Joenie.

The screen showed a double line of black-clad kerbals marching down City Avenue carrying a plain wooden casket on their shoulders. A lone kerbal walking behind them carried a banner bearing the emblem of the Wakiran Border Security Force. Jonton watched two lines

of similarly black-clad figures emerge from the crowds lining the Avenue and fall into perfect lockstep with the marchers. The casket was passed forward from shoulder to shoulder, unburdened kerbals peeling away pair by pair from the back of the lines. Finally, the Wakiran banner was furled, its bearer stepping to one side and another figure, carrying the banner of the Firesvarn Combined Deterrent Forces, taking her place.

Jonton glanced at the news ticker scrolling down the left-hand side of the screen, a look of quiet approval settling over his face. He walked over to stand behind Joenie's chair, hands clasped in front of him.

The casket proceeded down City Avenue to the Capital building, representatives from the armed forces of each of six Regionalities of Kerbin taking their turns as pallbearers. Then, at the gates to Capital Park, it was handed off to a final group of mourners, the banner carried behind them bearing the flag of all Kerbin alongside the crest of the Kerbin Nuclear Standards Agency. They carried the casket through the park to the front of the Capital building itself, and set it down on a stand set up in front of a long table, a thick sheaf of paper stamped with the Seal of the Twelve Pillars, and a single microphone placed at its exact centre.

Behind the table, twelve figures, their hands also clasped respectfully in front of them, watched the KNSA delegation place the casket on its stand and step back before taking their seats with the other pallbearers. President Maller of Veiid stepped forward.

"Good Kerbals, we stand divided."

Maller adjusted his microphone. "Divided both by Regionality and by more ancient loyalties, we wage a bitter and bloody war. A war for which we have all paid dearly, in the lives of loved ones lost fighting for what they believed to be right. And yet the price could have been uncountably higher." Maller glanced at the cameras. "For, in one terrible moment, we faced the spectre of nuclear science on the battlefield. A tool of peace twisted into weapons capable of defiling the very lands, for which so much was sacrificed, with radioactive poisons."

The Veiidan President's gaze swept over the rows of pallbearers. "But we have been given a second chance. Our worst nightmare was averted by the steadfast courage and dedication to duty of one kerbal who, along with too many of his companions and colleagues, paid the ultimate price for that dedication."

"The reasons for the war are many and varied but now is not a time for recriminations, nor for apportioning blame. Now is a time for seizing the gift we have been given and using it wisely for the benefit of all. And so, I speak for all the Twelve Pillars, when I say; this we pledge to do and we pledge to start today." Maller gestured at the sheaf of paper in front of him. "Before you lie the Hading Accords. Drawn up by this Council and named for the kerbal who gave us this second chance, they commit us all to a permanent ceasefire and the renewed search for a peaceful solution to the Kerm crisis."

Maller drew a silver pen from his pocket. Moving the microphone to one side, he signed his name on the first sheet of the sheaf. "For the kerman of Veiid, I Maller, do hereby sign these

Hading Accords." He put the pen down and stepped to one side. Chief Ambassador Obmy was the next to step forward and sign.

"For the kermol of Veiid, I Obmy, do hereby sign these Hading Accords."

One by one, with the eyes of the world upon them, the other ten Pillars signed the Accords. Finally, Maller stepped forward again and affixed a wax seal beneath the twelve signatures.

"As it has been written by these Twelve Pillars, so let it be done. And may you all give us the wisdom to find our course."

Jonton scooped away the last handful of soil, exposing a cluster of nodules on the ancient Kerm fibre. He fitted a U-shaped jig over the cluster and marked the position of its two holes before putting it to one side. Hardly daring to breathe, he drove two mounting pegs into the soil, one on either side of the fibre. "Ready for the emitter."

Mallas lowered the slender tube, with its matching U-shaped tip, into the trench. Jonton fitted the tip lugs over the mounting pegs. "Down a little – and hold it there." He scattered a layer of soil over the fibre. "Bit more... and stop." Jonton shovelled soil back into the trench, packing it around the emitter base. "That should hold it." He stood up, watching as Mallas unfolded three tripod legs from around the tube and locked them into place. The two kerbals set to work backfilling the trench until the only thing marking the excavation site were a ragged patch of bare earth in the midst of the clover, out of which the emitter tube with its hemispherical cap sprouted like a bizarre metal mushroom.

Jonton wiped the sweat out his eyes. "Okay, that's both of them. Time to hook them up and see if they work."

"I suppose so," Mallas dragged his gaze away from the line of telegraph poles marching across the fields from Jonton's Keeper hut to the nearby village. "This part always makes me nervous," he confessed. "As the old saying goes, in theory, there's no difference between practice and theory. In practice, there usually is." He picked up the length of sheathed cable which stretched back to a junction box mounted on the nearest pole and inspected the plug on its end. Satisfied, he knelt down beside the emitter tube and pushed the plug into its socket under the hemispherical cap, before tightening up the threaded tube that secured it in place and sealed it against the elements. "We'll need to cover the cabling but that can wait until everything's working."

"Yes." Jonton handed Mallas a reel of cable from his backpack and watched as he plugged one end into the emitter cap. They lugged the reel over to the second sensor, already emplaced on the other side of Elton's trunk, taking it in turns to carry the reel or pay out the cable. By the time they reached the transmitter tube, Jonton's back was aching from walking doubled over. He arched his shoulders, trying to relieve the knot of tension at the base of his neck, whilst Mallas plugged in the transmitter and tested its connection to the receiver.

"Well everything seems to be working - as far as I can tell. Only one real way to find out though."

Gathering their tools, they walked back to Jonton's hut in silence. Jonton staring at Elton's main trunk emerging from the roof, his mind back at the exposed fibre in the trench, sensor tube descending towards it. He opened his front door and waved Mallas inside, watching as the other made a beeline for the telephone.

"Halsy? It's Mallas here. Yes – we've just finished setting up. How's the installation going at your end? Excellent – we'll be in Communion and waiting for his call." The handset rattled on its cradle as Mallas turned to Jonton, eyes bright. "They're all set. Halsy is on his way over to Erlin's Grove now.

Jonton took a deep breath and willed his voice to remain steady. "In that case we'd better get ready ourselves. He led the way into his sleep room, relieved to find the air no more cinnamon-laden than normal. Mallas lay down on the nearest bunk bed and looked at him questioningly.

"Go ahead. He'll be expecting both of us." Jonton watched Elton's leaves closing around Mallas's head before lying down on his own, slightly musty smelling, bed and propping a second pillow under his neck. He glanced at the ceiling, unable to make out any tension in Elton's branches or unusual changes to his leaf clusters. Unreassured, he clenched his toes and lifted his head towards the waiting leaves.

<good afternoon, Jonton>

Good afternoon, Elton. Good afternoon, Jonelle. Ahh, I see that Enely and Joenie are with us too.

<of course. Where else would they be. Hello, Dr Mallas>

Hello, Jonelle. Mallas's mental voice sounded slightly overwhelmed. Jonton sent him a burst of reassurance before tuning his thoughts to Elton's presence.

Are you all right?

<I am. The sensors are in place?>

Yes. I think Mallas and I set them up correctly but... Jonton sent him a fleeting image of an exposed Kerm fibre lying in the soil, leaking ichor.

<you were afraid of killing me?> Elton's blunt reply jolted through Jonton's mind. *<we spoke of the risks and I accepted them. If either of my fibres get infected beyond my ability to heal you will cut away the infected part and seal the cut ends with fire>* Sensing his Keeper's revulsion, Elton softened his mental tone, pushing his own trepidation firmly to one side. *<Enely's young Kerm had been uprooted and traumatised. I was neither. My fibres have endured for centuries and Professor Erlin's sensors were well designed. I think you would have found it difficult to hurt me with them>*

All the same.

In reply, Elton's presence came forward, surrounding Jonton with warmth and light *<do not fear, First of my Keepers. All is well. All will be well>*

Six presences, four kerbal and two Kerm, floated above Elton and Jonelle's shared mindscape. Undercurrents of tension, which Elton took care to damp, swirled from link to link as they waited for a signal from the Berelgan. Then, amidst a sudden wave of excitement, a string of coloured dots appeared before them. For a moment, Jonton looked at the dots in confusion before realising that one colour represented a dot and the other a dash. Long hours of practice proved their worth as he began to automatically assign letters to groups of dots and then letters to words.

Incoming. Call.

The string of telegraph code faded out, replaced by Elton's reply.

Ready.

There was a long pause and then new clusters of dots appeared in fits and starts.

Hello. Is. anyone. there. This. is. Obrinn.

The answer flared across the mindscape and into history.

Hello. Obrinn. My. name. is. Elton.

*Now a long time ago [Ch. 11] came a man on a track.
Walking thirty miles with a sack on his back.
And he put down his load where he thought it was the best.
Made a home in the wilderness.*

*He built a cabin and a winter store.
And he ploughed up the ground by the cold lake shore.
The other travellers came walking down the track.
And they never went further, no they never went back.*

*Then came the churches. Then came the schools.
Then came the lawyers, then came the rules.
Then came the trains and the trucks with their load.
And that dirty old track... was the Telegraph Road.*

Dire Straits: Telegraph Road

Chapter 101

Coming Home

Bill stuffed the end of his sleeping bag into its carry sack, slid the fastener closed, and pushed it ahead of him into the sanitation cabin. Wedging his feet under a pair of convenient restraints, he hooked it up to the nearest vacuum hose, checked the seal, then flipped a pair of wall-mounted switches. With a loud hiss and a crinkling of foil, the sack collapsed into a dense brick of plastic-wrapped fabric. Bill reset the vacuum lock and disconnected his, much compressed, sleeping bag.

Emerging into the main hub module, Bill took a last look around for any loose items before stowing his sleeping bag in his personal effects bag and zipping it closed. He stared around the hub interior, trying to imagine it rigged as a Starseed crew shelter module, full of acceleration couches and kerbonauts strapped in and waiting for the long burn out of Kerbin orbit. Then he shook his head and pushed off for the bridge module, personal effects bag clutched in one hand.

Bag safely stowed at the bottom of the access way, Bill pulled himself, hand over hand, up the ladder to the bridge, emerging to an upside-down view of Kerbin through the forward windows. He blinked at the sight of Calley's good-luck Eve capsule tethered to the window frame, its polished Kerm wood surface reflecting streaks of blue light from outside. Calley herself was busy unclipping herb tubes from the aft bulkhead and stowing them in her own personal effects bag.

"Hi, Bill."

"Hi, Calley," Bill pulled himself clear of the entry hatch and flipped himself over. "How is everything, James?"

James looked over from his seat by the Systems station. "Just about ready to button this place up and leave. Mission Control is running the final review as we speak."

"And Mission Control confirms a good handover of Tenacity systems. You're clear for capsule ingress and undocking - don't forget to lock the docking port on the way out."

James grinned. "We won't. Thanks, Nelton - Tenacity signing off." He switched off the radio, unbuckled his restraining harness and pushed himself clear of his seat. "Time to get suited up."

Bill drifted over to the nearby equipment locker and retrieved his helmet and gloves. Leaving the gloves floating in front of him, he slipped a finger under the upper band of his communications headcap and scratched his forehead, before settling the cap into a more comfortable position. Then he pulled his bubble helmet over his head and twisted it to the half-lock position on his neck ring. Finally, he wormed his hands into his suit gloves and locked them onto the wrist collars on his suit. Flexing his fingers, he turned to face Calley. "Check me."

Calley nodded, inspecting his suit seals and fittings. "You're good." By the time she'd donned her own helmet and gloves, James was ready to inspect them in turn, before attending to his own suit. Bill leaned forward to inspect his commander's gear, moving cautiously to avoid bumping heads.

"That looks fine, James."

"Thanks. My gear is already stowed so I'll lock up."

Bill nodded before flipping himself head-over-heels and disappearing feet-first into the access way. Calley waited for him to get clear before turning upside down herself and, pausing briefly for one last look at Kerbin from the bridge windows, disappeared after him. James glanced across at the Systems status board and nodded in satisfaction before switching off the bridge lights and following his crew to the main airlock.

Eve 3's docking tunnel felt almost claustrophobic after Tenacity's spacious interior and James was glad to get to his seat without bumping into anything. He strapped in, plugged his suit into the capsule systems and twisted his helmet to full-lock, before flipping on the radio. "Flight, Eve 3."

"Go ahead, Three."

"All crew aboard. Tenacity airlock closed and locked. Capsule docking port closed and locked. All systems nominal."

"That's confirmed, Three." James watched frozen vapour puff from the airlock pressure relief valves. *"Airlock is vented. You're Go for undocking."*

"Copy." James flipped a switch and waited for the rattle of docking latches to subside. A green light blinked off on the instrument panel and he tapped the translation controller, triggering a burst from Eve 3's forward thrusters. "We're clear. Falling back to manoeuvring distance."

"Radar is tracking," Calley added. "Range five metres." She watched the full circumference of Tenacity's docking port swim into view. "Range twenty metres. Out of residual plume range, radar in display mode V."

"Copy." James fired a second, longer, burst from the thrusters, one eye on the velocity readout from the radar, the other on his navball and rate indicators. "And there she goes."

Bill watched *Tenacity* retreat into the distance, the docked PAL spacecraft's robotic arm protruding from behind the larger hub and bridge modules. He glanced at his section of the instrument panel out of ingrained habit before turning his attention back to the view outside, hand twitching towards the camera secured near the capsule window beside him.

"Flight, Eve 3. Undock manoeuvre complete." Calley tapped out an instruction on her keyboard. "Before we get set up for the de-orbit, I'd kinda like a double check on our jettison manoeuvre."

"We concur, Three. Do you have the numbers in front of you?"

"Got them right here." Calley read off a string of digits from her computer display.

"We copy, Calley. Guidance confirms that's a good attitude."

"We like his attitude too. Okay, that's the jettison program entered."

James glanced at the flight clock then at Bill watching Tenacity dwindling into the distance. With a small smile, he toggled his microphone. "We're going to take five up here, Flight and make sure nothing's floating loose before we orient for the deorbit burn."

Bill looked around the scrupulously tidy cabin and frowned. Then his face cleared and, with a nodded thanks at his commander, he turned his attention back to the view outside.

"Understood, James. Once you're squared away, I'll have CapSys on-loop to run through the SPS pre-burn list."

"Copy, Flight."

Calley clicked her microphone over to the private crew channel. "I might take five myself. Could be a while until anyone gets to see this view again. To be honest, I kinda hoped we'd be welcoming the next crew aboard before they brought us home."

James shook his head. "Not with everything else going on. I'm just thankful that we've got some clear water to splash into."

"True." Calley shivered. "Radioactives on the battlefield. That's going to keep me well stocked with nightmares for a good long while."

"You're not the only one. Kerm knows what the Capital is like right now, peace treaty or no peace treaty."

"Everyone rushing around with their..." Ingrained radio discipline made Calley pause. "Their backsides on fire, wondering what to do next." She sighed heavily. "You're right. Best that we're not stuck on Tenacity waiting for them to sort themselves out."

"Especially as they'll probably be taking a hard look at the space program," Bill said quietly. "And the White Cross Company."

James snorted. "If they had any sense, they'd throw Lodan a proper budget line, let him get on with it, and count themselves fortunate."

"I hope so." Bill shook his head. "Anyway, shouldn't we be setting up for deorbit?"

"Yes, we should." James opened the air-to-ground channel. "Flight, Eve 3. We're all squared away up here and orienting for retrofire. Bill is standing by for the SPS checks."

"Copy that, Three."

Kerbin slid out of sight, the view from the cabin windows fading from blue and white to midnight black and back again as James pulled Eve 3 through a stately backward flip which ended with the three kerbonauts facing backwards along their orbital path. Deft bursts of thruster fire rolled them upright to a vista of the oceans and continents of their homeworld unrolling beneath their spacecraft and out of sight.

"Lined up and ready, Flight."

"Copy, Three. Flight Dynamics concurs and CapSys thinks you've got a pretty good engine up there."

"That's good to know. Please thank all the controllers and groundside crews from us – they really got the job done."

"Will do, James. Retrofire at T-plus twenty on my mark. Mark."

As the minutes ticked away, the Eve 3 crew checked and rechecked their spacecraft systems, Bill keeping a watchful eye on the service module engine readouts all the while. James tightened his couch straps, watching Bill and Calley do the same from the corner of his eye. Then the familiar blue light glowed on the instrument panel.

"Go at sixty." Calley pushed the PROCEED button, handing control over to the flight computer. A series of jolts pushed the crew into their seats, a burst from the service module thrusters followed, precisely on schedule, by a short burn from the main engine. The thrusters fired again, then everything went quiet.

"Residuals nulled, periapsis on the nose. Orienting to jettison attitude."

Bill's hands moved across the instrument panel. "Re-entry batteries online. External life-support and power OFF, SPS valves closed, SM gimbals locked." He flicked a pair of switches. "Decoupler armed, backup pyros armed."

"This is going to kick," James noted. "Whenever you're ready, Bill."

Bill nodded and flipped back the guard from the SM-JETT button. "Jettisoning."

The command module rocked and then steadied amidst a clatter of solenoids from the reaction control system. James nudged his hand controllers, yawing Eve 3 back onto a retrograde orientation. Freed from the bulky service module, the capsule's movements

were quick and precise. Calley turned to her side window, craning her neck as she searched for the service module. "Got it! Good separation."

James toggled his microphone. "Flight, Three. Clean burn, service module clear."

"We concur, Three. Punch a hole in the sky for us."

The sky outside Calley's window suddenly brightened as the computer rolled Eve 3 into a face-down attitude for re-entry. Far below, she caught glimpses of blue and green through the clouds, Kerbin expanding to fill her side window as the capsule curved out of orbit. Then the g-meter chimed in her ear and the view outside began to take on a hazy, luminescent glow. Beside her, Bill and James stared calmly at the instrument panel as the g-forces climbed and the sky outside shifted to yellow and then a fiery orange, shot through with streaks of flame.

I guess this is a walk in the park compared to coming home from the Mün or flying a tin-can capsule strapped to a set of home-made solid boosters. She forced herself to concentrate on her breathing as the weight on her chest steadily increased. Incandescent flecks shot past the window and the capsule began to vibrate as it ploughed through ever-thickening air. Calley closed her eyes and held on.

At last, the crushing forces began to recede, the fires outside fading to a dull red and then replaced by clear blue sky. Calley checked the altimeter and braced herself. With a loud crack from outside, the plummeting capsule began to slow. A second crack marked the departure of the drogues, followed moments later by a heavy thump as the main parachutes shot off their rails. She glanced to one side and was surprised to see a look of relief on Bill's face. He caught her look and gave a half smile.

"Just like I remembered. Waiting for the mains to open is the worst part."

"It always is," James added. He toggled his microphone. "Flight, Eve 3. Mains deployed, passing through three clicks."

"You're coming straight down the line, Three," Nelton answered. *"Welcome home."*

The traditional splashdown celebrations were long over and Rockomax Mission Control was quiet apart from the air conditioning fans and the electronic hum of the few consoles still switched on. A handful of controllers sat behind them, filling out their mission logs and keeping a watchful eye on the telemetry feeds from Tenacity. Nelton sat behind the flight director's console typing up her own report, when a muted jangle broke her concentration. She tapped the SAVE key on her keyboard and picked up the phone. "Ademone. How's the journey going?"

"Quietly, although I imagine the train into the Capital will be busier tomorrow. The hotel is giving me the five-star treatment but I suspect that's more to do with the complete absence of other guests than anything else."

"No requests for autographs from the famous businesskerb?" Nelton asked lightly.

"I leave those for Jebediah. Are the crew down safely?"

"They are. None too steady on their feet but no worse than any of the Endurance crews."

"Good. Anyway, I should go – I need to get this interview preparation finished for tomorrow."

Nelton nodded. "I need to finish up the paperwork here too. Good luck and give my best to everyone if you get a chance to talk to them afterwards."

"I will. Thank you, Nelton."

"Anytime." Nelton put down the receiver and turned back to her report.

President Obrick stared impassively over his desk at the four kerbals seated opposite him. His aide, Corsen sat off to one side, pen hovering over his stenography pad.

"Before we start, I would remind all present that anything they say will be placed on the public record, thereafter to be deemed accurate and inviolable. Any false statements, whether purposeful or inadvertent, shall constitute a betrayal of this Council of Twelve Pillars; punishable, consecutively, to the fullest possible extent by law, in each of the six Regionalities of Kerbin. Is this clearly understood by all present?"

Corsen made a brief notation on his pad, watching and listening as each of the four indicated their assent, then looked up at the President. "I, Corsen Kerman, aide to the Presidency of Kolus, do hereby confirm the understanding of all present."

"Very well," Obrick folded his hands in front of him. "Kolus thanks Lodan Kerman, director of the Kerbin Space Agency; Ademone Kerman, company manager, Rockomax Corporation, and Geneney Kerman, Flight Director, Kerbin Space Agency, for their written reports. Kolus recognises the attendance, as ordered, of Jebediah Kerman, non-executive director of the White Cross Company, former owner and company manager of the Jebediah Kerman Junkyard and Spacecraft Parts Company."

"Good kerbals, the business before this Council concerns a potential abuse of executive authority in the management and oversight of recent Kerbin Space Agency activities. The Council has formed a preliminary opinion on this matter based on the aforementioned written reports. You have each been separately summoned to these chambers to provide a verbal testimony of the events surrounding the suspected abuse, which testimony shall be added to those reports." Obrick turned to face Corsen. "If you would bring them in, please."

"Of course, Mr President." Corsen set down his pad and crossed the office, shutting the door to the anteroom behind him with a quiet but definite sounding click. He returned with four soberly dressed office staffers, each of whom remained carefully expressionless at the sight of the four figures sitting in front of Obrick's desk.

"If you would follow me please, sir." The first staffer led Lodan out of the room. The others looked straight ahead, past their President.

“Ma’am?”

Ademone stood up and followed her staffer out of the room.

“This way please, sir.”

Geneney pushed back his chair without comment. Jeb watched him go.

“Follow me please, Mr Jebediah.”

The other nodded wordlessly, not bothering to ask the staffer to call him Jeb. He followed the staffer out of President Obrick’s office and along a corridor to a plainly furnished meeting room. A jug of water and three glasses, along with a tape recorder, rested on a nondescript laminate table next to a tape recorder. Another kerbal sat at the far end, pen and stenography pad at the ready. Jeb eyed the minimalist office chairs with resignation.

“Take a seat please, Mr Jebediah. Can I offer you a coffee or a *djeng* before we start?”

“A *djeng* please,” Jeb answered. He turned his head a fraction, half expecting the interview clerk to be making a note on his pad. The other favoured him with a professionally neutral look before setting his pen to one side. Jeb sighed inwardly and stared at the tape recorder; hands folded on his knees. The frosty silence was broken by the return of Obrick’s staffer with two mugs of steaming *djeng*. She set one mug down in front of the clerk and the other in front of Jeb, who sipped it cautiously. His eyebrows rose and he took a longer drink, before setting the mug aside and sitting up straighter.

His interviewer reached under the table for her briefcase and pulled out a slim sheaf of papers, stapled together at one corner. She glanced at the topmost sheet before slotting a cassette into the recorder. After introducing herself, Jeb and the clerk for the record, she sat back in her chair and stared at the veteran kerbonaut for a second.

“Let’s start at the beginning,” she said at last. “When were you first made aware of Director Lodan’s intentions?”

Jeb thought for a moment before reeling off a date. “It was the day after Geneney and I communed with Guardian Elton.” He saw a flicker of something cross his interviewer’s face. “Are you...?”

“Yes. We’re aware of who – and what – Guardian Elton is. Please continue, Mr Jebediah.”

Jeb nodded. “We were summoned to an urgent meeting at the Kerbin Space Agency’s Alpha site. Director Lodan asked me to summarise our Communion with Elton and then presented his plan – although by his own admission it was more of an idea at that stage...”

“...and did Director Lodan indicate whether there was any legal basis for his plan?”

Geneney took a sip of coffee. “He did. He advised us that Special Orders 41 and 42 were still in force. Everyone at the meeting was aware of those Special Orders from a previous meeting with the Director, so we knew what they implied.”

“And how did Director Lodan know that the Special Orders hadn’t been rescinded?”

“He mentioned a contact in President Obrick’s office although he never told us the name of his contact...”

“Why didn’t he tell us?” Ademone looked at her interviewer levelly. “In case we ever found ourselves in this very situation, I expect. Director Lodan was very clear that the responsibility for his actions was his alone and he did not want them to jeopardise the Kerbin Space Agency in any way.”

“But if he was acting under two lawful Special Orders then surely acting on those orders would not jeopardise anything?”

“No,” Ademone agreed. “However, Director Lodan advised us that, as a practical matter, his authority to execute them was extremely limited, particularly on the scale required to restart Project Starseed...”

“...Very well.” Geneney looked uncomfortable. “To the best of my recollection, his exact words were: “If anyone chose to dispute it, I strongly suspect that both Special Orders would be annulled and the KSA Director would find himself behind bars for the rest of his natural life.””

“And did this concern you?”

“Of course it did.”

“Then why did you choose to continue working with Director Lodan?”

“Because it was clear that he was well aware of the legal risks and intended to do his utmost to keep the KSA on the right side of the law...”

Jeb gave his interviewer an incredulous look. “I don’t believe that Director Lodan has ever been reckless in his entire life.”

“You said that he was risking spending the rest of his life behind bars? One might characterise that as recklessness.”

“He was taking a risk, yes. He wasn’t being reckless.” Jeb paused. “If you’ll excuse the obvious analogy from a former kerbonaut, spaceflight is a risk but we don’t do it recklessly. We train, we plan ahead, we try and limit the risks as far as we can.” His face clouded over. “Although we don’t always see them before it’s too late...”

“...no, he certainly wasn’t reckless. He never is.” Ademone’s face was impassive. “I’m not a legalist but I believe that Director Lodan knew he would be acting within the letter of the

law but was concerned that he may not be seen to be acting within the spirit of the law. That was a risk he wanted to avoid if all possible.”

“Why?”

“Because I don’t think he wanted anything to stand in the way of Project Starseed.”

The interviewer turned over a page of his notes. “So, he started a grassroots campaign?”

“A volunteer movement inspired by the original Kerbin Interplanetary Society.” Ademone steepled her fingers in front of her.

“Didn’t that seem a rather far-fetched plan?”

“Nelton – my head of flight operations – certainly thought so. But, as Director Lodan pointed out, the Kerbin Interplanetary Society managed to parlay one successful suborbital flight into an audacious enterprise which managed to put the first kerbals into orbit. That enterprise only worked because it was able to attract considerable numbers of skilled volunteers for little more than food, lodgings and the chance to fly into space...”

“...we all build them; we all fly them. It was our old motto.”

“But in this case, food was the key element of Director Lodan’s plan?”

Geneney nodded. “Yes. It was a simple proposition at heart. The Kerm crisis had left most of the KSA’s subcontractors with spare capacity. We offered to help them get back to full production by ensuring that their workers were fed and helping to smooth out their logistics. In return, they would set aside some of that new – and otherwise un-needed – capacity to help restart Project Starseed.”

“And were you aware that your larger subcontractors were also engaged on government contracts?”

“We suspected that they were from the additional security on their premises but we understood that they wouldn’t be able to confirm or deny anything.”

“And you didn’t foresee that your plan might create a conflict of interest for your subcontractors?”

Geneney sipped his coffee. “We didn’t want to interfere in any ongoing contracts, which is why we only asked that they set aside un-needed capacity...”

“...that’s correct. It was obvious that they were contracting for the government but naturally they couldn’t say anything about it, so we didn’t press them. However, it was just as obvious that they had a lot of spare capacity – when I asked, I was told they were only fully operational for three days a week.

“What would you have done if they had been at full production?”

Jeb spread his hands on the table. "I honestly don't know. Stratus were a key link to the rest of our supply chains. We would have found a way eventually I hope, but it would be been a lot harder and a lot slower."

"I see." The interviewer made a note. "Let's move on to the White Cross Company..."

"...not involved directly but yes, it was set up by Director Lodan, Jebediah and a number of his former Interplanetary Society colleagues, to provide an independent seed checking service for farmers and agricultural companies."

"As a volunteer only service?"

"Yes."

"It grew very fast for a volunteer service."

"They were providing a valuable service for free." Ademone kept her expression carefully neutral. "I understand that they also managed to tap into popular sentiment amongst the kermol, many of whom were only too glad to be helping with Project Starseed..."

"...and so, you've started building a new space station?"

Geneney rubbed his eyes. "That's correct. It's constructed entirely from test modules for Starseed and is providing an invaluable testbed for the orbital construction techniques that we'll need to build the real colony ships."

"I see." The interviewer stacked his notes together and glanced over at the stenographer before turning back to Geneney. "Thank you for your testimony, Mr Geneney. Before we conclude, do you have any further comments you wish to add to the public record?"

"I do." Geneney leaned forward. "I mentioned that Jebediah and I had communed with Guardian Elton. He made a personal pledge to us that when kerbals make the voyage to Duna, we will take with us the knowledge of turning desert to soil fit for growing Kerm." The veteran flight director took a deep breath. "I do not wish to second-guess Elton but it was clear to me that he is a firm supporter of Starseed. Maybe we should try and find out whether any other Kerm feel the same way..."

"I do." Ademone's face lost its carefully neutral cast. "The KSA, led by Director Lodan, has managed not only to alleviate a considerable amount of hardship caused by the war but to unite kerman and kermol behind Project Starseed. If we are ever to get to Duna, we will need all the unity we can get..."

"I do." Jeb looked his interviewer in the eye. "Director Lodan and I have had our differences in the past but I can say right now that if he was a kerbonaut, I would be glad to fly with him."

If he ever became a flight director, I would trust him as far as I trust Geneney and for the same reasons. If we're to find a way out of the Kerm crisis, we will need such beacons of the kerbal spirit as Lodan Kerman."

"I believe you're the last one to arrive, sir." Corsen held the door open. "Please take a seat."

Jeb nodded and followed him into the anteroom. Morning sunlight poured in through the windows, illuminating three figures sitting in a row. Lodan looked up, gave him a brief nod before returning to his contemplation of the far wall. Jeb noted the KSA director's clean-shaven chin and freshly pressed suit and felt himself relax fractionally. Beside him, Ademone looked tired but unruffled, hands folded in her lap. Only Geneney showed any signs of strain; the bags under his eyes and the dishevelled hair at his temples, telling their tale of a sleepless night.

The clock on the wall chimed and the door to Obrick's office opened, the Kolan President framed in the doorway. "Good morning. Please come through." He waited for everyone to settle into their seats before taking his place behind his desk. "Your testimonies have been reviewed and considered in short Council by the Pillars of Kulus, Wakira and Doren. We found them consistent with the written submissions of Director Lodan Kerman, Ademone Kerman and Geneney Kerman. It was noted that the testimonies of Ademone Kerman, Geneney Kerman and Jebediah Kerman were found to be broadly consistent although there was disagreement over some precise details. The short Council deemed the discrepancies to be minor and indicative of independent recollections of the same events."

Obrick surveyed the impassive figures in front of him. "The Council finds the detailed KSA accounts provided by Director Lodan Kerman to be scrupulous and thorough. The Council also finds that Director Lodan's actions pursuant to Special Orders 41 and 42 to be proportionate and reasonable. The Council therefore voted unanimously that neither Special Order shall be rescinded at this time, subject to the continued good judgement and transparent reporting of Director Lodan Kerman, who is hereby cleared of any allegations of executive misconduct or abuse of authority."

"Thank you, Mr President." The KSA director's imperturbable expression was given away by the suddenly relaxed set of his shoulders. "On behalf of the Kerbin Space Agency, I would be grateful if you could convey my appreciation to Council for their prompt review of our case."

"Consider it done." Only a long career in political negotiations kept Obrick from smiling at the looks of naked relief from Jeb and Geneney. "As you will be aware, the Wakiran Pillars have tendered their resignations following the Site D incident. Until such time as their replacements can be elected or appointed, the Council will be unable to take a definitive decision regarding Project Starseed. However, the Pillars of Doren, Wakira and Kulus consider the ongoing construction of Space Station Tenacity to be prudent and reasonable. This office will be in contact with Director Lodan's office to discuss budgetary matters and other considerations."

Obrick regarded them over the rims of his spectacles before standing up. "We look forward to seeing further progress on Tenacity. Until then, good day to you, good kerbals. Corsen will be able to assist with travel arrangements for your return journeys."

Jeb jerked awake and peered blearily through the windscreen of Geneney's car, the stress of their Twelve Pillars hearing and nearly a week of travel, finally catching up with him. He retrieved a flask from the footwell, unscrewed its cap and grunted at the trickle of lukewarm coffee that dribbled into his cup. Outside, the outskirts of Barkton were just coming into view. "We should give Elton the news when we get a minute."

Geneney signalled left and pulled off onto the exit ramp. "We should. After the thousand and one other things on the list."

"Yep." Jeb yawned hugely. "Kerm. The first thing on that list needs to be a good two nights of sleep." He downed the tepid coffee with a grimace and glanced at the sleeping bags and box of supplies on the back seat. "Hope it doesn't come down to camping in the VAB – that's one piece of nostalgia I could do without right now."

"I'm just glad to be going home. The rest of it hasn't really sunk in yet."

Jeb glanced at his friend. "No," he agreed. "Me neither." He squirmed in his seat, trying to find a comfortable position, as Geneney drove them through the old KIS suburbs, past the rows of slightly worn looking wood-and-brick housing, their gardens now unkempt and overrun with weeds, and through to the squarer, industrial buildings that marked the beginnings of the Space Centre proper. He yawned again as they pulled up outside the gates, blinking in surprise at the sight of his keys still hanging from the handles. Then his eyes suddenly narrowed. "Looks like we've got company."

Geneney eyed the brightly lit museum windows. "Yes," he said tightly. "Kerm, I could really do without this tonight." He opened the car door and climbed out, Jeb following closely behind. Shoving the gates open, he stalked down the path to the museum.

"H-hold it right there!"

Geneney froze at the sight of the rifle barrel swinging towards him.

"T-this is KIS property. You'd better leave now before we call the authorities."

He heard a snort beside him and Jeb stepped out of the shadows. "Yes, it is – and I should know. Who in the name of the...?"

"Jeb?" The voice sounded startled. "Pillars preserve me it is! Put the gun down you fool – they're back!" The museum door crashed open and figures piled out. "Geneney too! Great Kerm above – they are back!"

"Hold it, hold it!" Jeb raised his hands for silence. "First things first – who on Kerbin are you good people and what in the name of my mother's Grove are you doing here?"

A burly, heavysset kerbal stepped forward, rifle pointed out the ground. "Eldrin Kerman at your service." He gestured at the group standing around him. "And we're the rocket-spotters – or what's left of us, with the war and everything."

Jeb looked at him. "Eldrin... Eldrin. You used to be a regular down at Jorfurt's, yes?" He snapped his fingers. "You were waiting outside the medical centre after Pioneer 4."

Despite himself, Eldrin beamed. "I surely was and I've still got the signed poster in the den." The smile disappeared. "We spotted your keys on the gate not long after you left. Thought we'd just keep an eye on the place for you but then we found your museum and... well you'd better come inside."

"Sure. Lead on." Jeb followed Eldrin, Geneney and the rest of the rocket-spotters close behind them. He glanced at the displays still arranged just as they'd left them, and then he stopped dead in his tracks, seeing the spotlessly clean signboards and exhibits for the first time. The glass fronted display cabinets with their collections of spacesuits and other equipment gleaming in the light. The floor had been swept and even the walls looked freshly scrubbed.

"We don't get many folks stopping by," Eldrin noted. "But we try to keep the place in good shape for those that do." He ducked his head, flushing slightly. "Keeping the faith, you could say."

Jeb blinked, for once, lost for words. "I...I don't know what to say."

"I do." Geneney stepped forward. "Was anyone here ever a member of the KIS?"

Eldrin shook his head. "No, sir. Most of us aren't that technically minded – never thought we could offer much."

"Things have changed a bit since the KIS days." Geneney's gaze swept across the assembled rocket-spotters. "I can't tell you the work will be glamorous - I can't even promise you that you'll get anywhere near a rocket – but right now we need all the help we can get." He swept his arms out, flicking his fingers at the meticulously clean museum around them. "And it's plain that nobody here is afraid of hard work."

"We can promise you one thing though," Jeb added. "We're keeping a book of everyone who helps us out. Doesn't matter whether they're trucking beans, mopping floors and making coffee, or bending metal for Starseed modules – everyone's name goes in. And that book will be on the first flight out to Duna, if we ever get that far." He snapped his fingers again. "I'll be right back."

Geneney stood back by the door, letting the rocket-spotters talk things over amongst themselves without being overheard. Then Jeb rushed in, clutching a sheet of yellowing paper. "Looks like these good folks stopped anyone from looting the offices." He walked over to the *Eve 1* exhibit and smoothed out the paper over the capsule hull. With a shock, Geneney saw his name and seven others scribbled at the top of the sheet: Jeb, Gene, Bob, Bill, Wernher, Lucan, Richlin and Ornie.

“I’ve got the sign-up sheet right here, good kerbals. If any of you want to join us, you’d be more than welcome because we’ve got a lot of work to do.”

Chapter 102

Shoulders to the Wheel

“Great Kerm above – where did this lot come from?”

Joemy peered around his companion’s shoulder, his nose wrinkling at the smell of new paint. Judging from the rows of filled-in holes in the wall, the room had been full of shelving at some point but was now occupied by a row of bunks, each fitted with an olive-green footlocker and made up with brown woollen blankets. Opposite the bunks, sack chairs were arranged around a low table and a bookshelf sporting a collection of paperbacks and a Tiles set, stood in one corner.

“Fridge, cooker, coffee pot...actual coffee, *djeng*, sapwood bars, bread. Hey – they’ve even stocked the fridge some.” The White Cross shift leader, emerged from the kitchen area.

“This’ll do. Beats the Blight out of a camp bed, and sandwiches with day-old coffee from a flask for breakfast. Stick a lamp on the shelf there and I might even call it cosy, even if the blankets look a bit military surplus.”

“They probably are.” Joemy sat down on one of the beds. “They’ll be warm enough though. He emptied his pockets out into the footlocker beside him. “Might as well leave these here.” He inspected the key, noting the number stamped on it and the matching number painted on the locker. “Better than having them rattling around my pockets all day.”

“Good plan.” The shift leader chose a bed and began unloading her possessions into her locker. Reaching around her neck, she undid her torc and carefully put it away. “Hang on.” She disappeared into the kitchen area and returned with a handful of sapwood bars which she dropped into her poncho pocket. “Bit of a treat for the crew.”

“We can make them some decent coffee for their coffee break too,” Joemy agreed. He checked his watch. “And speaking of which, we’d better get the tables set up for the first shift.”

The high-pitched yowl of a masonry drill greeted them, as they left the bunkhouse to find a pair of yellow-hatted workers fixing a metal framework to the wall next to the door. A public telephone, less its coinbox, lay on a nearby cart. Joemy winced and waited for the noise to subside.

"That'll be handy for phoning ahead whenever a truck goes out."

"It'll be nice in the evening too," the shift leader answered. "I miss my little Samely – and his father too."

Joemy gave her an embarrassed look. "I should have thought of that. Anyone with a family gets to use the phone first of course." He eyed the line of trucks already queuing up to get into the inspection post, searching for a white van amongst them. "Ah – looks like first shift are on time. C'mon – we'd really had better get set up."

Lucan helped himself to a bottle of smoky sapwood and took it and a glass back to his place at the table. Nodding politely to the various operations managers already in their seats, he popped the top off his bottle and studied his copy of the agenda. The boardroom doors opened and Halnie and Shervin walked in, talking quietly. They each poured themselves a coffee and took their places at opposite ends of the table. Shervin took a slim folder out of his briefcase and cleared his throat for attention.

"Let's make a start. Sig, what have you got for us?"

Lucan listened as Sig and then the other operations managers summarised their teams' work for the month. Over half of them finished with a washup report on their particular project and Lucan frowned slightly, mentally adding up the freed-up production lines and workers. Shervin saw his frown and inclined his head briefly.

"Thank you, Sean. Lucan?"

"Transport links to Foxham and the northwest have opened up considerably in the last few weeks mostly due to faster turnaround times at the major inspection posts and improved communications between posts. However, we are starting to see our trusted trader network taking root which we expect to lead to substantial further improvements." Lucan took a sip of his drink. "For those that aren't aware, under the trusted trader scheme, a White Cross employee travels with his or her shipment of goods and verifies its clean seed status at any other inspection post on the network, without the need for a second inspection. It's taking time for individual posts to buy into the idea so it's fair to say that the network is rather patchy at the moment but we are seeing signs of progress."

Lucan glanced around the table. "We're also starting to roll out a tiered inspection service. Foodstuffs, essentials, war relief supplies and, naturally, Starseed shipments are still inspected for free, but we're starting to charge a fee for any luxury or non-essential goods. As you can imagine, we're being fairly cautious with our pricing and any revenues are being ploughed straight back into our inspection facilities, for example, setting up dedicated

sleeping and catering areas at the inspection post for White Cross personnel.” He paused at the sight of one operations manager’s upraised finger. “Yes, Sean?”

“Where were they sleeping before?”

Lucan looked at him. “Mostly on camp beds or air mattresses wherever they could find space. Some of them chose to stay at home and drive in every day but it’s hardly a fun commute.”

“No, I can imagine. Thank you.” Sean scribbled a note on his pad.

“Last but not least,” Lucan continued, “We’re seeing quite a sizeable uptick in government spending on civilian inspection infrastructure which is having a useful knock-on effect on our catering logistics here.”

“Excellent. Thank you, Lucan.” Shervin stood up. “What Lucan has been good enough not to tell you, is that we’re also seeing a sizeable uptick in new government orders for Stratus hardware.” He offered his managers a faint smile. “Which is why I’m pleased to hear quite so many washup reports this afternoon. I’ve prepared a summary of those orders, if you good kerbals could pass them around.”

Even knowing what to expect, Lucan sucked in his breath at the length of the order sheets. He clenched his fist under the table, listening to the sudden commotion around him. A loud knock from the other end of the table interrupted the hubbub.

“Correct me if I’m wrong, Shervin, but these look a lot like spacecraft parts to me?”

“They should do,” Shervin agreed.

“In fact, they look a lot like some of the space station parts we built for Jeb’s outfit.”

“I believe that’s the general idea, yes.”

“And the government is paying for them?”

“That’s what the purchase orders say.”

The manager’s face split open in a sudden grin. “Well, finally!”

He was answered by a half grin from his vice-chairman. “Indeed. Halnie?”

Halnie got to her feet. “Thank you, Shervin.” She waited until everyone was paying attention. “The Portable Systems Division has also received a substantial order for our new construction fabrics and a heads-of-terms from Director Lodan’s office for a manufacturing and technology transfer contract. We’re still reviewing those terms but, essentially, the KSA are requesting a full-size demonstration article for our inflatable spoke concept, with a flight test article to follow. Assuming that all goes to plan, Director Lodan suggested that an additional sixteen flight articles would be required.”

Shervin walked over to the corner of the boardroom and returned with a roll of laminated paper and a set of carved geode paperweights. “If you wouldn’t mind, Lucan?”

"Not at all." Lucan helped to unroll the laminate and weigh it down at the corners, revealing a cutaway diagram of *Tenacity*. He looked at Shervin, who inclined his head. "Okay, this is the Tenacity space station – or what it will look like when its finished. As you'll know, we have two modules on orbit, the Bridge module here," Lucan jabbed a finger at the diagram, "docked to the Hub module here."

Everyone huddled together to get a better look as Lucan continued. "Each of these spoke modules consists of two lattice girders section linked by a knuckle module in the middle and capped with an outer knuckle here. The midpoint knuckles provide windows and attachment points for Halnie's inflatable modules here and here, and two of them will have auxiliary docking points to help with construction. The endcap knuckles will anchor the spokes to the rim sections. Eight spokes at two inflatable modules a pop equals sixteen in total."

"And more along the octagon edges?" one of the managers asked.

Lucan shook his head. "No. They will be for Starseed but Tenacity will just have more girder sections which will serve as testbeds for experimenting with different cargo modules and how best to attach them." He pointed at the Hub module. "As you've already noticed, most of the parts we're ordering from Stratus are duplicates of previous KSA orders. We'll be using them to finish outfitting the second Bridge module which will attach to the Hub here for extra living space and for balance."

"Balance?"

Lucan grinned. "Balance. It's a long way to Duna and a long time to spend in zero-g and still be fully functional when you get there. So, we're going to be running some artificial gravity experiments aboard Tenacity." He pointed at the cutaway diagram. "These parts here, here, here, and here are basically scaled up versions of our standard reaction control thrusters, complete with the same monoprop tanks that we've been ordering from you since the start of the space program. All four of them together should be plenty to set Tenacity into a nice, controlled spin."

"At least we're not starting from scratch this time around." Jeb leaned back in his chair. "Some new faces for sure but far more old faces than I was expecting too."

Geneney put down his mug. "Not to mention the fully tooled-up production line under the dust sheets. The LV-T20 line should be up and running by the end of the week, we'll be started on a set of laterals by the end of next week."

"What about the capsule? Bill?"

"As James would say, that's the long pole right now." Bill scratched his head. "We pulled the pressure hull for Pioneer 8 out of storage, so we're not quite starting from the beginning, but most of the subsystem components are still sitting in a warehouse somewhere, the location of which is presumably a closely guarded secret." Bill couldn't quite conceal the curl of his lip. "I spoke to Lodan about it and he's doing what he can."

Jeb nodded. "Did you manage to give any more thought to the expanded seating arrangements?"

"It should be reasonably straightforward although I'd like to run through the calculations again with Ribory." Bill inspected his glass of iced *djeng*. "If we strip out the sanitation facilities and cut the storage lockers down to a minimum, we shouldn't have any problems fitting in a fourth couch. We *might*," Bill wagged his hand from side to side, "be able to fit in a fifth but it would be tight and I'm not too happy about what it would do to the centre of mass." He raised an eyebrow at Geneney. "I'd prefer not to touch the entry and descent code if I can possibly avoid it."

"Good point," Geneney agreed. "Can we put together a crash team to look at this before Eve 4?"

Bill winced. "I never did like that expression. If we can, we should, given that we're starting from a bare pressure hull anyway."

"Bob is going to be too busy training," Jeb noted, ticking the names off on his fingers. "Lowise is overseeing the tankage line recommissioning, Ribory is filling in for Bob back at Foxham." He thought for a moment. "Seanan?"

"Just the kerb for the job." Geneney jotted down Seanan's name on his notepad, drew a circle round it and added 'Capsule 2.5' underneath." He looked up at Jeb, throat constricting around his next words. "I don't suppose...Wernher?"

Jeb shook his head. "Not yet."

"How is he?" Bill asked quietly.

"Physically, he's fine. Mentally – he's about where I was, I think." Jeb leaned forward. "I haven't forgotten about taking him to meet Elton and I still think that's a good idea - goodness knows it was for me. But not quite yet."

"If he wants to talk about anything...?" The question hung in the air.

Jeb smiled. "He already knows. Maybe we'll take an evening out and do what we used to do back in the old KIS days. Find some tyres to sit on, grab some cans from the fridge," Jeb jerked a thumb at his desk, "and swap crazy ideas whilst the sun goes down."

Toralba International Airport, Camrie thought, was almost as misleading a name as Balcabar International Airport, given their size and the minimal facilities at either. Minimal civilian facilities she corrected herself; for all the months since the ceasefire, there had still been a disconcerting number of fighter aircraft and military transports at Balcabar.

She tapped her foot, waiting for her travel case to drop into the collection rack. Around her, the handful of passengers who'd braved the flight stood waiting for their luggage, some concealing their impatience better than others. A tan leather suitcase dropped into the rack to her left with a thump and an elderly, balding kerbal stepped forward to collect it, a sober-

looking business suit visible under his fur trimmed overcoat. Camrie gave him a curious glance before a thump from the rack in front of her caught her attention. She retrieved her case and headed for Arrivals.

After having her papers checked by two of the Wakiran Border Security soldiers at the security gate, Camrie emerged into a small, and slightly worn around the edges, arrivals lounge and stopped to get her bearings. The placard bearing her name under the White Cross Company logo was the first thing to catch her eye, closely followed by the cheerful looking kerbal holding it in one hand and waving to her with the other.

“Camrie! You made it!” Sigbin dropped the placard and hugged her. “How was the flight?”

“Tiring but I got here in the end.” Camrie looked around the lounge. “Are we in a hurry?”

“Not at all. I’m parked in short stay rather than pickup.”

“In that case, if you’ll excuse me for a moment, I could do with freshening up.” Camrie disappeared in the direction of the moss room and emerged damp around the collar but looking noticeably less rumpled

“I suppose a coffee would be a stretch?”

“Looks like it. This place could definitely do with freshening up too.” Sigbin wrinkled her nose. “We’ll get you one back at the office.” She propped the placard over one shoulder. “Let me take that bag.”

Traffic around the airport and seed inspection post was light and it wasn’t long before Sigbin’s runabout was purring along the main lakeside road towards Toralba, with the rugged Lorelan mountains providing a spectacular backdrop against the afternoon sky. Toralba itself nestled between two great lakes; the two waters, from which it took its name. As they approached the outskirts of town, billboards began to appear along the sides of the road, emblazoned with political slogans and the names and faces of the three Wakiran presidential candidates. Camrie was unsurprised, but still disappointed, to see that few of the slogans had anything to say about Project Starseed.

The traffic began to get heavier and Sigbin clucked her tongue in annoyance. “Kerm – I’d forgotten all about the rally. We’d be better off taking the side-roads I think.”

Camrie eyed the ‘Wilbeth for Wakira’ pennants flapping from the cars in front. “A candidate Wilbeth rally I take it?”

“Unfortunately.” Sigbin veered off up a slip road before turning right at the next junction. “Pompous windbag makes all the right noises but doesn’t have an original thought in her perfectly coiffured head. Luckily her opponents are more progressive.”

Camrie stared at the clumps of placards adorning the roadside and the posters in the windows as they drove through a residential area. “That doesn’t seem to be putting many people off.”

“No.” Sigbin made a face. “Feels like this campaign has been going on forever. I know we didn’t have much choice but, Kerm there’s a lot of time and energy being spent on electioneering that could be put to better uses. Still, only another two months and a bit to go.” She turned off into a modern looking office park and pulled up in front of a modestly sized building. “And here we are. Afternoon shifts aren’t due back for another half an hour, so we’ll have time for a coffee first.” She led Camrie in through the main entrance and up a flight of stairs into an open-plan office.

Camrie glanced over the wall maps and scattered whiteboards with lists of names and schedules scribbled on them, before coming up short at a large signboard sporting a handful of cardboard cut-out spacecraft components. Sigbin nodded to herself and went over to join her. “Those ones were sitting in a warehouse throughout the war – it was only last month that freight restrictions to Kolus eased up enough that they could get shipped out to Foxham.” She straightened one cut-out and stepped back from the wall. “But just you wait. We’ve got plenty more cards cut out and ready to put up once we get confirmation from Rockomax. The real deals will be going up on the next rocket.”

The payload mounting frame, its cargo of *Tenacity* spoke module sections already secured in place, stood in the centre of the factory floor between the two halves of its payload fairing. Joebal Kerman, Rockomax’s head of electrical and environmental systems, stepped back to survey his team’s work and nodded in satisfaction.

“That’ll do it. We’d better fence them off though in case the President wants to go poking around. Mr Lanrick would have known better but I don’t know what this new fellow will be like. Especially after he’s spent today down at Barkton getting the hands-on VIP tour from Jeb and his crew.”

His assistant nodded agreement. “I’ll have some signboards made up; ‘actual flight hardware’ or something similar. I’ll put the latest shipment of parts from Wakira out on display too. I’m not sure how much they’ll mean to him but they should look impressive and Ademone is keen to emphasise Wakira’s contribution to the programme.”

“That makes sense. If we get a move on, we can have that ready by the time she gets back from the test stand.”

Heart in her mouth, Ademone watched the crane lower the massive thrust assembly into place, the oversized bell nozzles of the five SK2-M Mainsail engines pointing squarely into an equally oversized flame trench and water suppression system. Hanbal’s team went to work securing the assembly to its test stand and disconnecting it from the crane, whilst the head of propulsion systems himself looked on. She shivered, picturing the rest of the colossal booster assembled on top: five Skipper engines in the second stage with a single, comparatively puny SK1-G ‘Poodle’ engine for the final boost to orbit and on-orbit manoeuvring of the vast quantity of construction materials the Type 7 was designed to launch.

Danfen, her head of structural engineering saw the shiver and nodded. “If she gets off the pad, she’ll be quite the sight.”

Hanbal snorted. “If we manage to light off all five of those beasts together on the stand, it’ll be quite the sight too.” He turned to face Ademone. “Which isn’t going to happen by tomorrow, new Wakiran President or not.”

Ademone gestured at the test stand. “I’m sure that will be quite impressive enough, especially if we show President Dunlock the pad side footage of a Type 6 launch for comparison.” She raised an eyebrow at Hanbal. “And I quite agree that we should keep the initial test-fires private in case anything untoward happens.”

Danfen chuckled. “You’ll have quite a job keeping those tests private. Five Mainsails at full throttle – they’ll be able to hear that from Barkton.”

Chapter 103

Knuckling Down

Looking back, Jeb would remember the Barkton Space Centre refurbishment, or KIS 2 as some of the newer volunteers called it amongst themselves, as one of the more productive times of his life. There was indeed plenty of work to go around but the combined decades of experience from the older hands, an established network of contractors, and not having to build everything from scratch from creatively salvaged equipment, went a long way.

After quiet words from Geneney and Bob, the rocket-spotters began to get over their initial awe and tendency to become tongue-tied if spoken to by one of the kerbonauts, and set to work; their unfailing good cheer and willingness to do anything and everything to help, lifting spirits around the site. After a chance conversation with Malmy, where he admitted to 'doing a bit of diving but only as a hobby really,' Eldrin was transferred to the kerbonaut training team, much to the unspoken envy of his friends. After helping to upgrade the training Pool, he spent long hours as a safety diver, helping the *Eve 4* crew practice for their upcoming spacewalks.

Crew selection for *Eve 4* caused a brief undercurrent of resentment amongst a number of the older volunteers who remembered the original 'we all build them – we all fly them' KIS management philosophy. As the senior flight director, Geneney was careful to make time for everyone to air their views, whilst remaining adamant that he needed an experienced crew for the first real *Tenacity* assembly flight. Barrie, he noted out, had flown with both Wilford and Kerke, all of the crew apart from Bob had flown at least twice, whilst Bob himself was the senior liaison engineer with Rockomax and one of the last Munar kerbonauts aboard *Pioneer 6*. The fact that Bob was also a founding member of the KIS and one of the Original Three kerbonauts who'd flown on *Kerbal 1*, never needed to be mentioned. Besides, as Geneney pointed out, there would be plenty of *Tenacity* flights to go around, especially once both Bridge modules were on-orbit and the growing station could accommodate a crew of eight.

Sensitive to the developing mood, Jeb and Geneney quietly moved some of the most capable dissenters into the flight control or mission planning teams in the hope that training for their more demanding roles would give them less free time to complain as well as putting them closer to the flight line. Barrie and Kerke, both well used to working within the more stratified Rockomax management structure, proved to be adept at smoothing ruffled egos and pulling the support teams together around the crew.

Somewhat to Bill's surprise, progress on the four-seat, Mark 2.5 capsule turned out to be comparatively smooth although, as anticipated, fitting in a fifth acceleration couch did prove to be unfeasible without completely reworking the entry, descent, and landing profile for the new capsule. The mission planning and flight test teams unanimously voted to put such a radical overhaul on hold although the more optimistic engineers did point out that a five-seater capsule would be useful for future Starseed flights.

In complete contrast to the capsule work, refurbishing the launchpad turned out to be a seemingly never-ending list of repairs and replacements. One week it would be residual hypergolics corroding a hastily decommissioned fuel line. The next week it would be a seized rotator in the crew access gantry. The week after that it would be a cracked propellant storage tank followed by stuck valves in the core stage propellant feed. After one particularly frustrating day, Geneney declared that evening to be a 'good old-fashioned KIS beach party' and despite a distinct shortage of food and drink, a rousing game of shepherdball followed by a bonfire and a rendition of the *Ballad of Kerbal 1* plus assorted other pop favourites from Bob, did much to lift the Pad Team's black mood.

And then the preparations were finished. Everyone at the Barkton Space Centre, from the flight control team to the janitors, lined the road from the Vehicle Assembly Building to the launchpad to watch *Eve 4's* rollout. To nobody's surprise, the rocket-spotters were right at the front, waving flags and sporting faded red hats emblazoned with the original tilted rocket logo from Jebediah Kerman's Junkyard and Spacecraft Parts Company.

Neither was anyone surprised when a faulty Go/No Go signal caused the pad autosequencer to abort the first launch attempt. After replacing a microswitch in Decoupler A and three more days of exhaustive testing, *Eve 4* was rolled back out to the launchpad. This time the countdown proceeded flawlessly and, right at the appointed moment, the booster thundered off the pad, sending Bob, Barrie, Wilfred and Kerke on their way to a rendezvous with *Tenacity*.

"It looks like you're pointing straight out but it's really hard to tell from here," Bob reported. He pulled himself over to the edge of the window and craned his head, trying to get a better view of the PAL assembly arm. "Can just see past the first elbow if I squint. Yep that looks straight."

Further around *Tenacity's* bridge from the rear-view windows, Barrie sat in front of a row of monitors, a pair of hand controllers and a bank of toggle switches within easy reach. "Not a problem, Bob – the system was never designed to be driven by eye." She flipped a switch.

"Okay, Flight – bringing up third section. She eased back one of the controllers watching as the next part of the assembly arm unfolded. "And the next one." A red light lit up above the main monitor, accompanied by a low buzzing noise. Barrie immediately let go of her controls and glanced at the indicator panel. "Huh – current draw warning on number three elbow joint."

There was a pause from Mission Control. *"We think you're getting some stiction on the bearing, Barrie. Try working it a little – no more than five-degree excursions either way."*

"Will do. Switching to diagnostics." Barrie touched a control and the view on one monitor flicked out, replaced by a telemetry display. "Rotation to FINE." The red light flickered off then lit up again. Barrie frowned and nudged her controller in the opposite direction. For a minute she thought the problem was fixed, then the buzzer sounded again and the warning light flickered erratically. "No joy, Flight."

"Understood. Can you give us a close up please?"

"Coming right up." Barrie pulled out a smaller control panel from under her console, touched a button and ran her thumb over a trackwheel. The view on another of her monitors zoomed in on the malfunctioning joint and she studied it for a long moment. "Nothing obviously wrong with it from this angle. I'm going to try rotating the wrist joint."

"Go ahead."

The rest of the *Tenacity* crew floated over to Barrie's console, watching over her shoulder as her largest monitor showed a view of a section of the manipulator arm turning slowly through space. Barrie kept one eye on her indicator panel, which remained resolutely free of warning lights.

"Not getting any problems with the wrist joint, Flight, and I'm still not seeing anything wrong with the elbow joint from the outside."

"We concur, Barrie. I'll get the team on it down here and let you know once they've got anything to report."

Bob checked the hose locks on Kerke and Wilfred's EVA suits one last time, studied the readouts on their chest units and gave his crewmates a thumbs up. He wormed his way past the fourth acceleration couch now installed in the lower equipment bay and pulled himself up the docking tunnel, through the hatch and into *Tenacity's* far roomier airlock. Double-checking that the airlock door was sealed and locked, he manoeuvred through the forward gangway before climbing along the access way to the Bridge.

"All set." Bob floated over to the forward windows, listening to Wilfred and Kerke running through the capsule egress checklist as he went. He watched *Eve 4's* crew hatch open and a mirrored helmet emerge, followed by the shoulders and upper torso of Kerke's spacesuit. After fumbling with the hatch rim for a moment, Kerke pulled himself up and out into open space, the stiff, fabric-wrapped cord of his safety tether flapping behind him. He swung his

legs back until they were parallel with the service module hull, tucked his boots into the nearest foot restraints and stood up and waved. Bob grinned and waved back, before drifting over to Barrie's console.

They watched Wilfred emerge from the capsule and secure his tether, before he and Kerke began making their methodical way over the Bridge module and across the hub, reporting each tether change and significant manoeuvre to Mission Control as they went.

Aboard *Tenacity*, Barrie switched from camera to camera to keep the spacewalkers in view.

"Flight, EVA-1. We're at the work site and the joint is in easy reach. Nice positioning there by Barrie." Kerke paused. "The lubrication port looks clean, no visual contamination or leakages." Bob watched him operate his helmet visors. "Nothing unusual through the crossed polarisers either. I think we're good."

"Copy EVA-1. You're clear to proceed with the interface test."

Bob watched Kerke set himself by the now re-folded assembly arm, the cylindrical bulk of a lubricant dispenser tethered to his waist. At the bottom of his screen, the edge of Wilford's shadow could just be seen. Kerke unhooked the grease gun and lifted it into position, lining its nozzle up with the receiver port on the arm joint, the dark grey coating applied to its oversized bayonet fitting, a stark contrast to its gleaming barrel. He moved the nozzle tip up to the port, rotated it slightly and then slid it home.

"Okay, Flight. We've got a good interface. I'm locking the dispenser now." There was a long pause. "Dispenser locked. Felt pretty smooth."

"Good to hear, EVA-1. Okay, we want you to take a one-quarter turn and check for leakage."

"Understood." Kerke shifted his grip on the dispenser and twisted its base, feeling it click into place even through his heavy suit gloves. "Good tactile feedback. No obvious back pressure." He leaned forward to inspect the bayonet seal. "No leakage."

"Copy. Take it another quarter-turn and we'll work the joint."

"Understood." Kerke twisted the dispenser base through another click before disconnecting it from the assembly arm and joining Wilford atop the hub. They watched the arm pivot away from them before slowly rotating about the newly lubricated elbow joint.

"Flight, Tenacity. Still getting a current draw warning."

"Okay, Tenacity. EVA-2, you're up. Another half-turn of grease and we'll try this again. Barrie, please go ahead and move the arm back into range."

"Will do."

Another turn and a half later, Kerke and Wilford stood atop the Hub, both with arms floating free and the fingers of their gloves splayed open, listening to the running dialogue between Barrie and the flight control team.

"It's the only thing that makes sense, Flight. I just don't think that joint was properly packed."

"We concur, Barrie. We'll pass the word along to the PAL team to requalify their filler. In the meantime, we'll take a look at that telemetry - best guess is that we'll need to take a second pass at this before clearing the assembly arm for construction. Right now, though, it's time to call it a day. EVA-1 and EVA-2, please ingress at the capsule."

The grainy, slightly earthy smell of reconstituted natas filled *Tenacity's* hub module. Wilford disconnected his ration pouch from the hot water spigot and kneaded it before joining it to a second pouch and squeezing its contents onto his natas. He discarded the second pouch, snipped the top off the first and enthusiastically dug into his breakfast, amidst the sudden sharp aroma of pureed pickle.

Kerke looked at him askance. "Why so complicated? Couldn't you just package... whatever that stuff is, in the same pouch as your oatmeal?"

Wilford swallowed his mouthful. "This way you get properly cold pickle on hot natas. Package them up in the same pouch and you'd end up with hot pickle too." Wilford looked around the Hub in mock despair. "I can't believe we're flying with a kerbal who's seriously suggesting hot pickle for breakfast." He paused. "Besides, the vinegar would soak into the dry natas and that would taste vile."

Kerke just shook his head before hunting in the breakfast locker and emerging with a pouch of scrambled egg with creva and a foil package. Wilford looked up with interest. "What've you got there?"

"Crumb free flatbread, supposedly." Kerke tore open the foil and pulled out a flaccid white pancake. He bit off one corner and chewed it thoughtfully. "Not bad. Bit rubbery but tastes alright." He left the flatbread floating by a window and busied himself with his eggs and creva. "Pity you can't make a proper breakfast roll in zero-G."

"Have a word with Derny when we get home," Bob said cheerfully. "He likes a challenge. Bet your roll would be improved by some good old fashioned Kolan breakfast pickle too." Kerke gave him a look.

Barrie opened her mouth to speak, when the radio crackled to life. *"Morning all. Welcome to another fine day in space!"*

Bob raised his eyebrows. "Morning, Jeb. Gene having a lie-in, is he?"

"He's earned it. He, Lodan and Camrie were up till all hours last night organising the last of the move, finishing up the paperwork and generally making sure you'll be coming home to a fully recommissioned Space Centre."

"Fantastic!" Wilford swallowed a mouthful of natas. "So, what's on the task list for today, Flight?"

"Got some good news there as well. The hard-working folks at Foxham will be rolling your shipment of parts out to the pad today, to be sent up through the next window. So, we're

bumping the PAL systems checkout up the schedule and making a start on that once we're finished with the filters."

"Excellent." Kerke drifted across the Hub, a squeeze bulb of coffee in one hand. "Any changes to the PAL flight plan?"

"No. Gene talked it over with Nelton and they both agreed that it would be better to get more experience with the autonomous systems now, before we add too many more parts to your home away from home. Crew rotations for supervising the docking manoeuvres haven't changed either."

"And the power-down checklist?"

"No changes. We'll do a last dry run as planned, once the PAL systems are confirmed Go for free flight."

"Copy that, Flight."

"Better grab yourself a coffee too, Flight," Bob added. "It's going to be another long day."

"All non-essential systems powered down. Eve CSM re-entry batteries charged. Requesting telemetry check."

"Copy that, Bob. You're looking good from here."

Bob flipped a switch, Kerke watching over his shoulder. "Isolating PAL from power grid." He scanned his instruments, before flipping another switch. "Connecting service module arrays. Confirming predicted draw through bus A." A row of lights flickered from amber to green. "Storage batteries charging. Grid configuration set."

"Copy. PAL status?"

"Tank pressures are green, propellant line heaters drawing power," Wilford reported from the next station. "Gimbal drives are Go. Starting TVC checks." He studied a set of tell-tales. "Clear excursions in pitch...and clear excursions in yaw. Bringing up the RCS."

"Thank you, Wilford."

Green lights lit up across a schematic of the PAL propulsion and guidance systems. Wilford nodded in satisfaction. "Quads one through four online. Manipulator stowed; docking port sealed and locked. Bob?"

"That's confirmed. Clear for PAL undocking on your mark, Flight."

"Whenever you're ready."

Bob reached up and flipped the protective cage back from a prominently labelled red button. "Undocking now." The button slid home with a faint click. Wilford cocked his head to one side, half-expecting to hear the familiar rattle of docking latches disengaging. The

shifting lights on his instrument panel pulled his attention back to his controls. "Confirming PAL undock complete. She's all yours, Flight."

"We copy, Tenacity. We have the vehicle. Falling back to manoeuvring distance."

Wilford unclipped his harness and eased himself out from behind his instrument panel before drifting over to join Bob and Kerke behind Barrie's station. On her largest monitor the PAL slid slowly astern, its three photovoltaic arrays glinting in the sunlight, the interior of its docking port cloaked by shadow. The four kerbonauts watched it go, listening to the running commentary of status reports from Mission Control.

"Excuse me." Wilford eased his way past Kerke and pushed off for his station. On Barrie's screen, four pulses of flame, seemingly aimed directly at the zoomed-in camera, hastened the PAL's stately departure. As Barrie adjusted her field of view, two more bursts of flame set it into a slow spin, one of the photovoltaic arrays suddenly brightening as it caught the sunlight.

"Okay, Tenacity. All systems check out so we'll just get our space tug clear of your orbit before heading over to pick up your parts. Afraid they're travelling economy class, so they'll take a couple of days to get to you."

"Not a problem, Flight," Kerke replied. "No offence to the trajectory team but we're as happy for them not to be aiming the payload straight into grapple range."

"We hear that, Tenacity." Geneney paused. "Looks like we're ahead of the clock here, so let's take ten before handing you over to Foxham for the next EVA."

"Understood, Flight."

Several days later, the Power, Assembly, and Logistics spacecraft crept towards *Tenacity* on its final approach, an ungainly looking cargo pallet of parts and equipment docked to its nose. The far end of the pallet tapered into a second docking adaptor, designed to match the CORDS-3 ports used to connect the space station modules. Onboard *Tenacity*, the crew huddled around Barrie's station, watching the approach through the station's camera system. On the ground, engineers, at both the KSA's main Mission Control centres, kept a watchful eye on the spacecraft systems whilst the flight control teams monitored its trajectory and distance from the station.

Geneney sat behind his console, eyes flicking from the main screen to his communications panel and back, listening with half an ear to the murmured conversations around the consoles.

"Flight, FD."

"Go ahead, FD."

"Vehicle is at the approach point, Flight."

"Thank you, FD. Guidance?"

"Alignment is green with a good return from all sensors. RCS to FINE; auto-reverse loaded."

Geneney switched his headset back to an outside line. "Foxham, Barkton. How are we doing, Nelton?"

"Not seeing any problems here, Gene. Ready when you are."

"Thanks." Geneney cut in the all-consoles loop. "OK, team – we're looking good from Foxham. Take us in, Guidance."

"Copy, Flight."

On screen, *Tenacity's* hub module began to drift closer, the triangular petals securing it to the bridge module, clearly visible. Dead ahead, one of the eight CORDS-3 docking ports arrayed around the hub gleamed in the sunlight, slowly swelling to fill the view on the main screen as the PAL drew closer.

"Inside the capture zone, Flight. Standing by for contact." A set of red lights on the payload controller's console flickered to amber. "Contact. Coarse alignment confirmed." The amber lights turned green. "Ready to latch. RCS OFF, auto-reverse disengaged."

Geneney could sense Nelton's tension coming down the phone line.

"All latches at pre-tension, Flight. Fine alignment confirmed." There was a long pause. "And we have a hard dock."

A muted ripple of applause ran around the room. Geneney leaned forward. "Good work. Systems – PAL status please."

"All Go, Flight."

"Very good. Go ahead, Guidance." Geneney crossed his fingers under his console, listening to the guidance and systems teams going through their checklists. Then, spots of flame flickered around the edges of the main screen. A hairline crack appeared between the PAL and the cargo pallet, slowly widening as the space tug pulled away. More puffs of flame and the interior of the pallet docking adaptor edged into sight, the view of *Tenacity* behind it beginning to recede. Unseen, Geneney clenched his fist under his console as a second, much louder, buzz of applause and conversation filled the room.

"Excellent work, everyone. Let's take it back to manoeuvring distance and get set up for the repositioning."

Wilford sighed with contentment as the globule of warm coffee splashed against the roof of his mouth. "It sure is good to have our main power module back. Cold meals were good for the Moho nostalgia but I'm definitely looking forward to some proper hot food tonight."

Barrie shrugged, catching the edge of her seat with one hand before the movement could put her into a tumble. "I don't know. Those flatbreads are growing on me." She slipped behind her console and strapped herself in, before adjusting her headcap and keying her

microphone. "Flight, Tenacity. Ready to start unloading." She checked her monitor, watching the two spacesuited figures working at the cargo pallet. "Everything set, Kerke?"

"All set. We'll head back to the Bridge and give you space to work."

"Appreciated." Barrie watched her crewmates retreat off-screen, switching to a second camera to check their progress.

"EVA-1, EVA-2, tethered and secure, Flight."

"Copy, EVA-1."

Barrie turned all her attention to her controls. Switching back to her aft camera, she touched a series of buttons. "Manipulator arm unlocked and powered up. Unfolding all sections."

Outside, a bundle of thick, fabric-wrapped tubes, linked by solid, disc-like hubs emerged from the top of the PAL and unfolded into a straight line. Then, one section at a time, the manipulator arm twisted about itself, lining up its grapple tip with the cargo pallet docked to *Tenacity's* hub module.

"Switching camera." Barrie's eyes were locked on her monitor screen, now showing a view straight down the manipulator arm towards the waiting girder section. She wiped her hands on her jumpsuit, before touching a button on her keyboard and taking hold of the hand controllers. "Translation mode armed." She eased one of the controllers forward, watching the girder swim towards her. "Rate to FINE. Standing by to grapple." The arm tip crept forward and slipped into a matching socket on the girder, before clamping shut.

"Arm locked on. Extracting spoke segment." Barrie took a deep breath and pulled back on her controller. The indicator lights above her screen flickered amber as the girder tugged free of its restraining clamps and then winked out. Barrie blew out her cheeks with relief. "Segment extracted, Flight. Translation rate to SLOW"

"We see it, Barrie. Outstanding!"

Over the next two hours, with Kerke and Bob offering constant encouragement from their vantage point atop the bridge module, Barrie painstakingly grappled the spoke segment into position, acutely aware of the added mass she was steering. She let go of her controls for a moment, rolling her shoulders to relieve their stiffness and smiled as Wilford handed her an icy cold squeeze bulb of water, before heading over to his own station.

"Thanks, Wilford." She took a long drink, before attaching the bulb to the side of her console and flexing her fingers. "OK, Flight. Moving to soft capture."

"You've got two roomfuls of people keeping their fingers crossed for you."

"Tell them thanks from all of us, Flight. Here we go."

A single amber light lit up on Wilford's instrument panel. A second one flickered and went out. "Hold it, Barrie. Almost there – try backing up and taking it one notch clockwise."

Clenching her jaw, Barrie worked her controls, making the minute adjustment before winding the manipulator arm towards *Tenacity's* hull.

"Four lights! Flight, we have a soft capture!"

Barrie flipped a switch on her hand controller. "Unlocking arm."

"Engaging retractors." The four amber lights turned green and blinked off. Wilford cleared his throat. "Flight, *Tenacity*. Confirming hard capture on spoke segment one."

The noisy applause over the radio link told the two kerbonauts all they needed to know, Kerke and Bob adding their congratulations from outside. Barrie quietly pulled up the aft camera view on her screen, leaning back in her seat to take in the blues and greens of Kerbin shining through the new girder section attached to *Tenacity's* hub.

One down, another fifteen to go. We can do this. By all the Kerm, we can do this.

Chapter 104

The Sage of Barkton

<of course not. Why would I mind you speaking the truth?>

Because, Jonton chose his words carefully, not everyone believes that Kerm seeds should be frozen but if they hear that an actual Kerm doesn't object to it, then they might begin to change their mind.

<That would seem reasonable> Elton sent a fleeting image of a row of glass desiccators, each holding a fragment of matted fibre. <although I presume you do not intend to talk about the Berelgan experiments>

Jonton sighed. Not in so many words. The whole point of this interview is that we're as open as possible and that we give honest reasons for anything that we do need to hide. So, I will need to talk about the experiments but I don't intend to say where they happened. Hopefully everyone will understand why. He thought for a moment before sending an image of a kerbal guarding a Kerm sapling. So, I thought I should ask before dragging you into this.

The sapling bloomed into a fully-grown tree, it's branches bending to wrap themselves around the kerbal. A hint of amusement rippled down Elton's mental link followed by a startled pause. Ghostly afterimages of sparks swirled around the tree; their patterns of movement aggressive. The tree shrank, cowering in the sudden darkness as the sparks began to take on a far more solid cast

<I had thought to say that many centuries have passed since I needed kerbal protection> Elton's mental tone turned sombre <but that is not true.> The image of Kerm, kerbal and sparks swirled down to a point and vanished. <Tell what you need of our story, first of my Keepers - but I thank you for asking>

Meleny scowled at the luggage piled up by the front door. "I still think it's all a Blighted nuisance."

"It is and I'm sorry." Jonton rubbed his eyes. "Especially after all you've done for Joenie and me, but..."

"That's why we'd make good hostages," Meleny finished bitterly.

Jonton nodded. "Where the Sage of Barkton lives is no secret - it would be too easy to find you. To be honest, I'd be happier sending you all further away but Patbro's Grove will have to do. If nothing else it's further from the coast."

Despite herself, Meleny shivered. "Do you really think it'll come to that."

"I don't know. I don't even know if the Children survived the war. But they're not the only ones with strong opinions about freezing Kerm seeds."

The door to Joenie's sleep room opened and Joenie bounded out, travel bag in hand. The happy smile vanished from her face as she sensed the tension between the two adults. She put her bag down and disappeared back into her room, emerging with an armful of books. Meleny saw her and summoned up a smile. "Pillars preserve me, Joenie - they could last you for months." Jonton saw the worn copy of *Advanced Microbiology* on top of Joenie's pile, with what looked like a Twelve Riders bookmark poking out from its pages, and felt a sudden surge of pride.

"It's a long way to the Berelgan and back," Joenie replied. "And I don't know which books I'll want to read. I wish we could take an aeroplane."

"I do too," Jonton agreed, "but I don't think they're being allowed to fly yet." Neither he nor Meleny mentioned the real reason for not putting the Sage of Barkton on a civilian airliner. "Will Jonelle be alright while we're gone?"

A tolerant but loving expression crossed Joenie's face that, Meleny thought, wouldn't be out of place on someone twice her age. "She'll be fine. She's spending half her time sending telegraph messages to Obrinn anyway and if I ask Professor Erlin nicely he might let me Commune with Obrinn and ask him to send a message back to her for me."

Jonton blinked. "I suppose that would work." He gave Meleny a rueful look. "It's always the way with new things isn't it?"

"It always was with Adbas." Meleny's lip quirked upwards. "And on that note, I suppose we'd better get going. Come on - we can move all this outside before Ferry arrives."

Jonton clipped the microphone to his lapel, sweating slightly under the studio lights. The sound technician gave him an encouraging smile. "A quick word if you wouldn't mind, sir, just to check that everything is working."

Feeling more than a little foolish, Jonton cleared his throat. "Uh, what do you want me to say?" He dabbed his forehead with his handkerchief. "It's hot up here...umm..."

"Well you are sitting in the hot seat," the technician said, straight-faced. "That's fine, sir." He offered Jonton his hand. "Good luck."

Jonton shook the proffered hand. "Thank you." He looked round at the stony-faced security detail standing by each stage entrance. "Although I'm sure we'll be fine with those good kerbals keeping an eye on things."

The technician blinked but decided not to comment. He checked his watch, muttering to himself, just as one of the doors swung open and a familiar figure hurried onto the stage. "Mr Jonton? All set then? Good, good – no don't get up." The presenter adjusted his own microphone. "The doors aren't due to open for another five minutes and our VIP guests have only just arrived. Is that enough of a sound check?" he added, turning to the technician.

"Absolutely, Tom. Your checks are always plenty loud enough." The two shared a well-rehearsed groan at, what to Jonton, was plainly a well-worn joke. Tom took his seat across the table from Jonton.

"I know how it is the first time," he said. "Don't worry – you won't notice the lights or the audience once we get started. And don't worry about our VIPs either – from what I gather, they need you far more than you need them."

Jonton decided not to mention that he knew both VIPs by name, settling for a polite smile at the presenter's well-intentioned efforts at putting him at his ease. Tom glanced at him and nodded to himself. "Ingenious piece of kit your Kerm telegraph," he said. "I used to work in telecoms myself before I started in television, and what's left of the engineer in me did like the combination of high-tech sensing and old-fashioned dot-dash code. How are the Kerm finding it to use?"

"It took them a while to get used to it," Jonton answered. "Focusing on one small, specific task doesn't come easily to Kerm – they're used to working with all of their Grove at once, keeping everything in balance by instinct." He pinched the bridge of his nose. "Although that's not quite right. How best to explain?" Tom raised his eyebrows.

"I suppose it must be a bit like being a musical conductor," Jonton said at last. "Listening to all the musicians at once, keeping them in harmony but at the same time knowing how the sounds from all the different instruments fit together to make one piece of music, and how to steer that music to make the piece *yours*. I'm not very musical myself but I can't imagine that a conductor has time to consciously think about what they're doing – they just listen and *know*." He offered Tom a faint grin. "That was the mistake I kept making to begin with – thinking too much. The more I tried to plan everything out logically, the more of a mess I got into."

Jonton shook his head. "Anyway – once they learned how to use it reliably, they certainly took to it. Jonelle – my daughter's Kerm," he added, "spends a lot of time on it, talking to Professor Erlin's Obrinn."

"And isn't that always the way with new technology?" Tom agreed. He tapped his earpiece. "Ahh, it appears that our guests are ready. Shall we make a start?"

Jonton was surprised to notice a definite rumble of voices from behind the stage curtains. Composing himself, he turned to face the cameras and the hidden crowd beyond, as Tom flashed a hand signal at the broadcast director standing in the wings.

"Going live in four...three..." Tom raised two fingers, then lowered them one by one. The curtains swept back, the noise from the crowd becoming suddenly louder from the darkness behind the lights. Tom leaned forward in his chair and discreetly cleared his throat as the *Engines and Engineers* theme music swept out from the speakers overhead. Large screens around the side of the stage lit up, showing himself and Jonton sitting at the table

"Good afternoon, and welcome to a special one off – and I think the most unusual episode of *Engines and Engineers* that I've ever had the pleasure to present. With me in the studio is Jonton Kermol, known to many of you as the Sage of Barkton. It is also my distinct honour and solemn privilege to welcome two guests of the highest importance, neither of whom will need any introduction from me. Good kerbals, please be upstanding for the President of the Regionality of Doren, Dr Chadlin Kerman and the Chief Ambassador of the Forseti-Spierkan Confederacy, Mr Aldwell Kermol."

The two leaders walked on-stage to a standing ovation and more than a few astonished comments from various members of the audience to their neighbours. At the back of the studio, two banners descended from the ceiling, bearing the flags of both Regionalities. President Chadlin shook hands with Chief Ambassador Kermol although, from his vantage point behind the table, Jonton couldn't help noticing that their expressions were polite rather than effusive. The rather obvious political statement of bringing a decidedly pro-Kerm Chief Ambassador and a pragmatic President around the same table, did not escape him either.

Followed by Jonton, Tom walked out onto the stage, a quiver in his step. "Mr President. Honoured Chief Ambassador. Welcome to the show and thank you, on behalf of everyone here today, for making time for us."

Chadlin stepped forward to shake hands with the presenter and the former an-Kerm. "It's good to be here. "And, on behalf of the Council of Twelve Pillars, we would like to thank Mr Jonton for *his* time and the *Engines and Engineers* team for all their recent assistance at short notice."

"And we welcome the opportunity to participate in this public forum," Aldwell said formally.

"Then, please, let us all be seated," said Tom. He waited for the two Pillars to take their seats and for Jonton to sit down again, before going to join them at the table. "I think," he began, "it's fair to say that last week was a very big week for the Council." The expected ripple of laughter ran through the audience and Tom waited for it to subside before continuing. "Culminating, of course, with the Joint Declaration and its hope of an end to the Kerm Crisis." Tom took a sip of water from the glass in front of him. "So, I expect that there are many kerbals in the audience who are wondering quite why you're here today?"

"If you'll forgive the political cliché, Tom, we're here for you, the people. We understand that there will be public scepticism about the Declaration and so, to borrow the words of my esteemed colleague," Chadlin bowed to Aldwell, "we are here in this public forum to try and address that scepticism and to answer any questions – about the Declaration, I should say," he added to another ripple of polite laughter."

Tom turned to the camera. "As I mentioned, we are also privileged to have Mr Jonton Kermol, known to many of us as the Sage of Barkton, here with us today. For those that don't know him, Jonton brings with him a unique, and very personal, perspective on the Kerm crisis and, as you will hear, his experiences form the bedrock of the plan set out in the Declaration. But let's start by casting our minds back to the heady days of the first Munar Landing and to the words of President Obrick."

The stage screens turned black. The *Engines and Engineers* logo appeared for a moment before being replaced by an image of three kerbonauts strapped into a space capsule. Then, as it had for countless kerbals so long ago, a familiar commanding voice rolled out from the speakers:

"For we have also tasked our greatest scientists with a mission of peace. To understand why the Kerm are led to fight amongst themselves and learn whether we kerbals can help them to live together without conflict or Blight. Our very survival as a species depends on their success and for that we must buy them time. Which is why we now call upon the six Regionalities of Kerbin to unite behind this Council of Twelve Pillars..."

President Obrick's voice faded out and the screens switched back to the view from the stage. The sudden silence was broken by a cough from the audience.

"Stirring words," said Chadlin, "but we did not follow them. Why the Kerm are led to fight amongst themselves remains a mystery. And we, the Council of Twelve Pillars, failed to unite the Regionalities behind us. However, a way of helping them live together without conflict or Blight has been discovered due, in no small part, to the deeds of the kernal sitting before you today." He dipped his head to Jonton."

"Those deeds are many, and some of them you will find shocking," said Aldwell. "But they hold the keys to our future and so they should be known by all." He turned to Tom who cleared his throat.

"Thank you, Chief Ambassador. And on that note, please now hear the words of the Sage of Barkton – Mr Jonton Kermol."

Jonton bowed to the two Pillars. "Thank you, Mr President, thank you, honoured Chief Ambassador. Thank you, Tom. As a good friend of mine would be sure to point out, this is a long story although I will try my best to keep this telling of it as short as possible." He paused, a mix of emotions chasing their way across his face. "It all begins with a Kerm seed."

Jonton described Gerselle's discovery, the traditional one-day journey to find a place to plant the new Kerm, and his fateful decision not to bury the seed on stony ground but to plant it closer to his own Grove. Behind the stage lights, several kermol in the audience

wincing whilst others scowled and muttered to their neighbours. Those few shook their heads at Jonton's clipped description of his Kerm's battles with the new sapling, his and Gerselle's realisation that those battles were the cause of the then recently discovered Blight, and finally his desperate reasoning that if a thirty-seven tree Kerm wasn't intelligent enough to help stop the Blight, then maybe a thirty-eight tree Kerm would be.

"And so, I decided to plant a new cutting in my Grove."

When the uproar showed no signs of subsiding after five minutes, Tom jumped to his feet to plead unsuccessfully for calm. Only the sight of President Chadwick getting to his feet, began to quieten the incredulous clamour from the audience. Kerbals sat with folded arms, glaring at Jonton as he described his struggle to preserve and eventual surrender to, the melting shards of his Kerm's mind. By the time he'd recounted his experiences as an an-Kerm, leading on to his promise to stop the Blight still afflicting his Grove, the anger in the audience had begun to fade, replaced by fascination and, from a few, by sympathy. Still others leaned forward in their seats, eyes brightening with a dawning comprehension.

"Fighting against several hundred years of instinct was hard. Not to mention painful. But I was able to pull back my borders and give Gerselle's Kerm space to grow in peace. From there, it seemed obvious – if enough Keepers could go an-Kerm, then we could make space to plant all the new seeds without causing Blight or conflict. But by then, the first shots were being fired in what would eventually turn into the Kerm Conflict. Gerselle and I took in a Wakiran refugee called Enely..."

To mounting awe from the audience, Jonton talked them through Elton's awakening. Awe rapidly turned to sympathy and more than a few fiercely blown noses and jaws clenched against the onset of tears, as he described the disastrous attempt to Awaken Gerselle's Kerm.

"Enely managed to save her Jonelle - her Kerm – although I still don't know how. Gerselle is still in a coma." Jonton swallowed hard. "And we discovered that Jonelle was extremely protective of our daughter Joenie. I made the mistake of trying to intervene and got badly Kerm-stung for it. But eventually we made peace with Jonelle and, more importantly, helped to broker a peace between her and Elton."

Jonton took a long drink of water. Tom quietly re-filled his glass.

"By then of course," Jonton said heavily, "the Kerm Conflict had escalated into all-out war." He paused. "And, another Kerm was about to Awaken – after we had learned many hard lessons from Jonelle's Awakening." He looked down at the table before staring out at the hidden audience. "This is the last part of the story and it started with a request from Elton." The cameras zoomed in on his sombre expression. "I know this will be difficult for many of you but please, please remember that it started with a request from a Kerm."

The audience fell silent as Jonton finished his summary of Obrinn's origins as a frozen seed with a brief description of the Berelgan's Kerm telegraph. Around the table, Chief

Ambassador Aldwell's expression was unreadable. He glanced at Chadwick before shaking his head and turning back to Jonton.

"Thank you for a most illuminating – and admirably brief – summary, Mr Jonton." Aldwell steepled his fingers and stared directly at the cameras positioned just off-stage. "My views on the cold storage of Kerm seeds have always been quite clear and I have made no efforts to hide them, as my fellow Pillars will be more than aware. On my own, I would not have authorised the course of action which led to Guardian Obrinn being planted." Aldwell laced his fingers together. "However, I am kerbal, and as such, I would have found it extremely difficult to gainsay a direct request from Guardian Elton. I would encourage all those who hold similar views to myself to reflect on that."

"Indeed." President Chadwick took a sip of water. "And be assured that it was only after a great deal of personal reflection and considerable debate in Council that the decision was made to entrust the final decision on the cold storage of Kerm seeds, to the Kerm themselves. Including Guardian Elton, twenty Kerm in each Regionality will be Awakened. The Kerm telegraph will be extended to link each and every one of the Awakened Kerm. We shall present all sides of the argument to them, and then we shall act on their verdict."

"We can also hope," Aldwell stated, "but cannot presume to insist, that they will follow Jonton and Guardian Elton's example by deliberately restricting their territories for the sake of all the Kerm yet unplanted. And thus, as set out in the Joint Declaration, do we hope to bring an end to the Kerm crisis."

"As do we all, Chief Ambassador. As do we all." Tom took a deep breath. "Before we open the floor to our audience, I do have one question of my own. What is going to happen to Project Starseed?"

"Thus far, the Confederacy has played a very minor part in the space program." Aldwell gestured at Chadwick. "I believe that President Chadwick will be better placed to answer that."

Chadwick nodded his thanks. "Very briefly, Tom, Starseed continues - because it may yet be our one and only option to survive the Kerm Crisis." He ticked off his points on his fingers. "Even if the Awakened Kerm permit cold storage of seeds – which remains to be seen – that merely postpones the inevitable. Many more Kerm would need to be Awakened and to agree to restrict their territories to create sufficient planting space for the ongoing Seeding. As Chief Ambassador Aldwell noted, we hope but cannot presume that they will do so."

Chadwick took a sip of water. "Therefore, the Council stands behind the Kerbin Space Agency and the magnificent achievements of it and all its volunteers." The corner of his lip quirked upwards. "More tangibly, an emergency, cross-Regionality, Starseed funding bill is being drafted, as we speak."

"And about time too!" came a call from the audience, to growing applause. Tom raised his hands for calm. "Mr President?" He saw the slight shake of Chadwick's head. "In that case, I open the floor to our audience. And for our first question... yes, you ma'am, in the green poncho."

“The Joint Declaration seems like an awfully large change of policy for the Twelve Pillars. May I ask what prompted this plan?”

“A very good question,” Chadwick replied. “In truth, it was not a new idea. It had been mooted in Council and proposed a number of times by various sources. Including,” he added, “part of from Geneney Kerman – yes, the KSA flight director – given as part of a testimony on a matter concerning the space program. Mr Geneney advised us that he had communed with Guardian Elton and found him to be a firm supporter of Starseed. On that basis, he wondered if we should find out whether any other Kerm felt the same way. It later transpired from a conversation with Director Lodan that Mr Geneney had previously been heard to comment, rather pointedly, that the Kerm Conflict ‘mostly boiled down to people fighting over what they *think* the Kerm want and that maybe one of us needs to ask one them what they *actually* want.’ “

Aldwell nodded. “Whilst a perfectly reasonable suggestion it did have the very obvious flaw that we could only Commune with one Kerm at a time and, crucially, that there no was no apparent way for widely separated Kerm to confer amongst themselves and arrive at a joint decision without kerbal input. As you’ll appreciate, we anticipated a certain amount of difficulty in finding kerbal go-betweens whom everyone would trust. The Kerm telegraph avoids that difficulty.”

“Yes, indeed,” murmured Tom. He scanned the audience. “Next question please – from you, sir, I think.”

“The Kerm telegraph seems terribly convenient. Other than Mr Jonton’s word, what proof do we have that it’s real?”

Tom chuckled for a second. “Please excuse the levity because that is also a very good question. May I ask, sir, do you watch Engines and Engineers?”

“I can’t say that I’ve seen every episode but yes, I do. Or did.”

Tom nodded. “The Council didn’t expect people to take the Telegraph seriously. I didn’t, when I was first told about it – couldn’t get the image of a big old Kerm tree reaching down with one of its branches and tapping away at a telegraph key.” He waited for the laughter to die away. “They thought everyone might have an easier time believing it from Engines and Engineers which, I have to say, was extremely flattering. So we ran an ‘Is it Fake?’ investigation on the whole thing.”

Tom’s eyes lost their focus for a second. “The scientists at the Berelgan showed us *everything*. We got to Commune with Guardian Obrinn, we got to... experience is the only word I can think of... him using the Telegraph, and we tested that piece of equipment every which way we could think of. We’ll be broadcasting the investigation tomorrow night and I would urge everyone to watch it and make up their own minds.” Tom’s voice shook. “But my mind is quite made up. The Kerm telegraph is real – and it is wonderful. Next question please. Two rows back, striped scarf. Yes ma’am?”

"Who's going to Awaken all those Kerm?" The question dropped into a sudden silence. Jonton raised his hand. "If I may?" Everyone around the table nodded their assent.

"As with so much else about the Kerm crisis, we'll be seeking volunteers. They will get to Commune with Elton and his daughter." A ripple of surprise ran through the audience. "Yes, he thinks of Jonelle as his daughter. The volunteers will get a chance to understand the joy of Communion with two Awakened Kerm. They will also get a chance to understand the risks involved." Jonton's voice went flat. "They will get to see Gerselle and, if I am strong enough to face it, to experience her... accident. Nothing will be hidden."

"Thank you, Jonton." Tom said respectfully. "Another question please."

"What are you going to tell the Awakened Kerm? For all of Chief Ambassador's fine words, how can we tell that the politicians won't just ask the question that gets them the answer they want?"

Aldwell adjusted his microphone. "An excellent question and one which I personally raised in Council although not in quite such blunt terms. However, if I may borrow Mr Jonton's words, nothing will be hidden. *Everyone*, be they kermol, neo-Kerman, or a Child of Kerbin, will have their views put before the Kerm. On that you have my word." Aldwell looked straight at the camera. "In this forum, as a Pillar of the Council, I do place my words on the public record." He turned back to the audience. "I trust you will find that sufficient, sir."

His questioner nodded dumbly. "Very much. Thank you, Chief Ambassador."

"And on a practical note," Chadwick added. "All aspects of our case before the Kerm will be made available to the public for scrutiny and suggested revisions, with the final version being approved by pan-Regionality referendum." He paused. "Tom, before we go back to the audience, I have a question of my own." Chadwick looked at Jonton. "You took it upon yourself to speak for Guardian Elton when you told us that planting Guardian Obrinn was done at his behest. May I presume that you consulted Guardian Elton before attributing these actions to him?"

Jonton nodded. "You may, Chief Ambassador. Before he Awoke, Elton was my Kerm and I was his Keeper. Since he Awoke, I instead count him as a friend and a mentor. In either case I would not have associated his name with such a sensitive topic without his permission."

"And I would expect nothing less. Thank you, Mr Jonton."

Chapter 105

Starflower

Danfen Kerman, the Rockomax Corporation's Head of Structural Engineering, stood bent over an enormous drawing board which was covered from end to end in engineering drawings and other CAD printouts. Beside him, his Assembly Operations Officer summarised the items for the day, indicating different subsystems on the blueprints with a slender wooden pointer. A group of senior engineers and project managers stood around them, listening to the briefing and answering questions on their particular specialities.

The office walls around them were occupied by a whiteboard on one side and a floor-to-ceiling noticeboard on the other. Both were almost hidden behind more engineering drawings, together with a vast array of schedules, lists, and notes, all written in Danfen's tightly spaced handwriting. A computer terminal sat on an old-fashioned style of wooden desk, in front of which, blinds covered a large window.

Danfen dug his fists into the small of his back and stretched. "Right then. Thrust structure is mated to the lower skirt and ready for tankage fitting. The fuel tank and inter-tank assembly are flight qualified, and ready for stacking; qualification of the LOX tank is ongoing, previous problems resolved by the upgraded slosh baffles. Where are we with the forward skirt and payload adaptor?"

"Forward skirt is in fitting and finish; payload adaptor components are in the jigs and ready for primary welding. Schedule-wise, there's still room in the buffers but we are currently projecting completion of both sections in time for LOX tank qualification and stacking."

"Excellent." Danfen turned to another engineer. "Motors?"

"Ullage motors are cast, qualified and ready for fitting and stage avionics integration. The first set of five Skippers are nearing the end of post-assembly and should be ready for test-firing by the end of this week. At present, we remain on track for schedule convergence with the structural work. Two of the backup Skippers are in fitting and assembly, we're still

awaiting critical component delivery for the remaining three. LOX impellers,” she added in response to Danfen’s raised eyebrow.

The chief engineer walked over to the whiteboard and added a note to one of the many lists covering its surface. “Noted. Do what you can and escalate the suppliers to Hanbal if you need to.” He turned to face his team. “Thank you, everyone. Have a good day - and let’s make this happen.”

The project managers filed out, followed by the chief engineers. Danfen watched them go before turning back to his office window. He drew the blinds and stepped back, tucking his hands behind his back. The VAB’s main assembly floor stretched out before him, a Type 6 core stage, all four lateral boosters attached, stood atop its mobile launcher, cradled within a tower of gantries and walkways that allowed access to the various rocket systems. Overhead, the second stage edged towards the launcher, suspended from its oversized gantry crane. Danfen watched the crane crawl past, mentally measuring it up for the massive Type 7 second stage that he and his team were constructing.

At the far end of the VAB, a payload fairing sat nestled within its own gantries, both halves united and ready for mating to the completed Type 6 booster. Danfen could make out the faint seam between the halves, marked by the equally faint bulges covering the latches and modified Roncott actuators that would deploy the fairing in flight, to reveal the second of many cargo pallets to be delivered to the growing *Tenacity* space station.

Nodding to himself in satisfaction, Danfen picked up a full-to-bursting clipboard from his desk and let himself out of the office, locking the door behind him. As he left the VAB, he noticed a crowd gathering around the entrance to Manufactory B. Quickening his pace, he joined the group of engineers and machinists in time to watch a massive, blunt ended cylinder emerge from the main doors on its oversized tractor-trailers. Impossibly, the cylinder kept on coming, dwarfing the figures around it, an immense flag of all-Kerbin painted on its gleaming white flanks. The tips of two gigantic shrouds appeared, their smoothly flaring surfaces hiding the complexities beneath.

And then, finally, the engine bells emerged.

Danfen walked around behind the rearmost trailer and stared up at the five SK-2M Mainsails, each of their gaping maws more than able to accommodate two kerbals, one standing on the other’s shoulders. *Assuming*, he thought, *that such a thing was possible*. He lifted his eyes to the sky, picturing the booster stage in front of him, standing upright on the launch pad, second stage and payload stage stacked atop it in a titanic monument to engineering ambition and desperate need.

“Are they really, um, going to launch that?”

Seelan snorted. “They’d better. After the effort my boys put into building those tanks, they’d be unhappy if we dropped it in the Pool for a practice piece.”

"I suppose they would be," Roncott stared up at the imposing flanks of the Orbital Propellant Test Article. "I thought the Pioneer CSM was impressive but that..." He gestured at the spacecraft hanging from its crane. "That wouldn't even *fit* on an Eve booster. Not even if we used an expanded fairing adaptor."

"No. Supposedly it'll fit flush on a Type 7 though." Seelan shook her head. "Which I have to see."

"You will." Both engineers turned to see Bob walking over to them. "Not this time though – Rockomax are keeping non-essential personnel well away from the launch site in case there are any problems with the vehicle. Anhydrous ammonia isn't as nasty as our old hypergolics but I still wouldn't want to get any in my eyes."

"Nuclear engine propellant," Roncott's voice trailed away. "Are we still, um, planning to use this to refuel the nuclear test article?"

"If everything works. That's way down the line yet though so don't worry about it." Bob eyed Roncott. "You know the test priorities as well as I do. Thermal management, slosh control under spin and full mission-duration storage and integrity test. If," Bob emphasised the word, "we get through all that, then we send up a second vehicle for the first propellant transfer test. *If* that works and *if* the LV-N test flight goes to plan, *then* we try refuelling the LV-N test vehicle."

"And that's assuming we even get to orbit," said Seelan.

"Exactly." Bob gripped Roncott's shoulder. "Propellant transfer testing is not the main objective of this flight, so don't let it worry you."

"I know, Bob. Really, I do. It's just, um..." Roncott bit his lip. "It is for *me*." He waved his arms about shaking off Bob's hand on his shoulder. "We're not getting to Duna without transfer, we can't do proper testing on the ground, we've only got the Endurance test data to work with and that's only for a handful of experiments at low flow-rates – it would take *years* to fuel a colony ship that way..."

"Ron!" Bob waited until he had the other's attention. "It's *fine*. The review team here thought your design was solid. The team at Rockomax thought so too." Bob jerked a thumb over his shoulder. "You've got that spacecraft wired up with more sensors than I can count and with enough onboard cameras to film a movie up there. Whatever happens, we're going to know about it in detail." He looked Roncott in the eye. "But if it doesn't work, it doesn't work. We go back to the drawing board and try again – with plenty of honest-to-Kerm test data to work with next time." A flashing light in the distance caught Bob's attention. "Right now, though, I think our transport is arriving."

As if on cue, doors began opening around them, a growing crowd of kerbals joining the three engineers. Everyone backed themselves against the walls to let the enormous flat-bed truck back up into the VAB, its cab doors painted with the logo of a local speciality haulage company. Bob watched the massive test spacecraft descending centimetre by centimetre, finally settling into place on its shipping cradle. He saw the tension on Roncott's face as a

team of white hatted kerbals tied the spacecraft down. Then, with a blast on its horn and a whine of high-powered electric motors under strain, the truck rumbled forward.

As it cleared the Space Centre gates and pulled out onto the main road, the truck was joined by two outriders from the Barkton Department of Civic Works, the warning lights on their roofs strobing bright orange. Bob could hardly bear to see the look on Roncott's face as the haulage truck, and its oversized cargo, reached the next junction and took a ponderous left turn towards Barkton railway depot. With a last glimpse of flickering orange, the trailing outrider rounded the corner and disappeared from sight.

Jonton writhed on his bed, only deep-seated instinct holding his head still enough to maintain Communion. The memories crashed through his mind, smashing down carefully constructed barriers and flensing still-tender mental scars wide open.

Stop, Enely! It's too fast - too soon! Let them go!

The Kerm shards erupted from Gerselle's mind. Once again, Jonton hurled himself at her, tried to wrap himself around her, to catch the expanding cloud of fragments and gather them to him. And once again, for the barest second, they held.

Gerselle! To me!

Then, yet again, the fragments of memory and personality swirled, twisted around him and then blew apart, everything that Gerselle was and had been, tumbling past him like leaves driven by a hurricane.

Jonton! Help me...J...

GERSELLE!

The mindscape shrank to a pinprick, the mental connection linking him to Elton dimming to an echoing whisper in the back of his skull. A distant part of him registered his pounding heartrate, sensed the throbbing agony in both of his hands. Jonton lay in the darkness; hot, raw tears streaming down his face.

The link spun open a fraction, cool white light absorbing the heat, blunting the physical pain but powerless to dull the edge of splintered glass memories.

I can't do this, Elton.

<no> A sense of reluctance swept down their link. <*I should take this burden from you...*>

For a moment hope flared, only to be replaced by shame. *I cannot ask that of you. I spoke to Patbro – I know you grieved for her too.*

<*and yet there is no other choice. Placing this burden on Enely would be wrong*> Elton paused <*and perhaps my memory of your memory will hurt me less than the memory itself will hurt you*>

We could bear the burden together.

<no. We would create too much pogo> Elton sensed his Keeper's confusion. <it is a word that Jeb taught me. Your pain would increase mine, then mine would increase yours in turn. We would tear one another apart. The same can happen with a wrongly built rocket. Noise builds on noise until all is destroyed>

Jonton blanched. Gerselle's last, desperate plea rang in his ears, his link to Elton constricting again in response. *Including whichever poor kerbals were Communing with us.* His mental voice shook. *I hate to do this to you.*

<as I said, First of my Keepers, we have no choice. But to anyone who wishes to know about Gerselle, I would ask that you tell them of our words. They should know that what I show them is true>

As Elton's mindscape faded into white light and a distant tugging at his scalp, the bond between himself and the Kerm seemed to take longer to break, as if tempered by the promises they had just made. Jonton sat up and rubbed his, still-throbbing, knuckles, the gashes across the backs of his hands matched by the streaks of blood across the bedstead.

The next morning, Jonton watched a small group winding their way up the path to his hut. Most of them were elderly but he was pleased to see a number of younger faces in amongst them. He waited for them to gather at the top of the hill before stepping out to greet them.

"Good morning everyone. Thank you all for coming – it's good to see so many of you. Please come on in. This is Patbro," Jonto gestured at his friend sitting at the kitchen table. "Keeper of one of the nearby Groves and one of my best friends. I spend a lot of my time at Guardian Jonelle's Grove and Patbro has been very kind in helping me look after my hut here and being a companion for Guardian Elton."

"Not that that is *any* sort of chore," Patbro stood up. "Welcome everyone." He studied the group, noting the green trimmed collars on several ponchos. "Guardian Elton has asked to Commune with you all together without myself or Jonton present." Two or three of the faces staring back at him looked suddenly nervous and he gave them a reassuring smile.

"Don't worry if you haven't Communed before; we will be there to help you get ready, and I'm sure some of the Keepers here will be glad to help too. So, if you'd like to follow me please."

Jonton followed the group into his sleep room and its rows of bunks, all neatly made up. He and Patbro moved through the group, helping everyone to get settled, bringing extra pillows for some, and offering discreet reassurance to others, including some of the Keepers. They watched as everyone lifted his or head into a waiting leaf cluster, waited until they were all safely in Communion and then left, closing the door behind them.

"What did you think?"

Jonton scratched his head. "The number of first-timers was encouraging. Definitely a few nervous faces when you mentioned that we wouldn't be there."

"But none of them backed out. They all passed Elton's first test."

"Which was also encouraging." Jonton's face looked suddenly haggard. "I wonder how many will pass the second one."

The clock on the wall had just chimed twelve, when the kitchen door opened and a group of pale-faced and visibly shaken kербals filed into the room. Jonton stood up to greet them.

"I'm sorry that you had to see that." The quiet sincerity in his voice and shadows behind his eyes were enough to still any questions. "One reason that Elton asked to speak to you without me was that he knew I couldn't bring myself to live through it again, even with his support. Please believe me when I say that we tried." Jonton swallowed and when he spoke again, there was an unmistakeable quiver in his voice. "If any of you wish to, you would be welcome to visit Jonelle's Grove this afternoon and see Gerselle for yourself."

"I would like to see her."

A young kermol, possibly the youngest in the group Jonton thought, stepped forward. "I don't know how many new Kerm will be in the One-Twenty but I would like to be Keeper for one if you'll have me." The kermol looked up, shadows behind his own eyes. "My great uncle's Grove was one of the first to Seed." He looked straight at Jonton. "And after Communing with Guardian Elton, I think it may have been seeing great uncle Cormund on the news that prompted you to plant that thirty-seventh cutting in your Grove."

Jonton's jaw dropped open. Before he could speak, one of the older Keepers stepped in and clapped the young kermol on the shoulder "Bravely said, lad. Your great-uncle would be proud to hear you." He turned to face Jonton. "Reckon I'd like to see your Gerselle too – and you can all count me in for the One-Twenty if you need me. If I could talk to my old Kerm like I jus' did with your Elton, that would make it all worth it. And if anything goes wrong, well we've both had a good turn."

His expression turned inward. "My missus passed on two years ago this month and our lad never came home from Wakira. Nobody left to miss this old kermol. And we're at the end of a valley to boot – only one neighbouring Grove and that not close enough to take any hurt. Just promise me that the folks in my village will be taken care of if it comes to it."

As he turned off the highway and onto the back roads leading to Elton's Grove, Jeb glanced at Wernher in the passenger seat. "We missed that last turning when I came here with Gene. Took us a while to find the right road again." The engineer and veteran kerbonaut grunted, staring straight ahead with his arms folded across his seatbelt, as he had for most of the journey. Jeb glanced at his friend and nodded to himself before turning his attention back to the road.

As before, the forest began to thin out and streetlights began to appear by the side of the road. Jeb caught a glimpse of a marquee in a field, ghostly with lights glowing behind its canvas walls. He took a now-familiar right turn, skirting around the village before pulling up at the foot of the hill leading up to Jonton's hut. He thumbed the motor off and rested his hand on Wernher's shoulder.

"If I know Patbro, he'll have a good hot meal waiting for us. Come on – let's not disappoint him."

Wernher nodded and climbed out of the car. He glanced at the multi-story hut silhouetted against the evening sky. "Odd-looking hut. Was the Keeper trying to make it look like something out of a kerblet's storybook?"

Jeb chuckled. "Now that you mention it – and you should have seen it by munlight." He closed the car door. "Long story but Jonton had it built to accommodate all the travellers coming to Commune with him. Apparently, that's when the whole Sage of Barkton thing got started although it was around the time of Ornie's crash which probably explains why I didn't hear much about it." *And about the time you flew out to Site D*, he added silently.

"Oh," Wernher frowned. "I thought Jonton was the Keeper, not the Kerm?" He saw Jeb's patient expression. "Sorry – I think you've explained all this to me before but it didn't really sink in."

"Not a problem." Jeb gripped Wernher's shoulder. "Elton – he's the Kerm – will be able to *show* you everything much more clearly than I can explain it anyway."

As they walked up the path, the front door opened and a figure stepped out to greet them. "Good evening, Jebed... sorry, Jeb." He shook his head. "Preserve me but I'm still not used to that. And you must be Wernher? Please – come inside." Patbro bustled in ahead of them. "There's fish stew on the stove if you'd like, although I don't have much more than herbed bread and butter to go with it and fruit and coffee for afters."

"Fish stew sounds more than welcome to me." Jeb glanced at Wernher, who nodded. "To both of us. You shouldn't have gone to so much trouble though, Patbro."

"Oh, it's no trouble." Patbro hunted in a cupboard and produced a tin. "Do you take your coffee with anise, Wernher? I know Jeb does."

"Yes please. And a pinch of firewhisker if you have any."

Jeb opened his mouth before hastily closing it again. Patbro looked surprised. "You don't sound Wakiran, never mind Hazachim. I should introduce you to Enely."

"No, I'm not Wakiran. I've just spent a lot of time working near the edge of the Hazachi desert. You pick up some of the local tastes." A bleak expression crossed Wernher's face. "One of my colleagues was Hazachim – he introduced me to firewhisker coffee."

Patbro looked from one to the other. "And maybe that's a story for another time, if you ever feel like telling it. But for now, you're here to Commune with Elton and that always goes better on a full stomach. Pull up a seat both of you and I'll serve up."

After a hearty supper in which Wernher was persuaded to take second helpings of stew and Jeb managed to eat over half a loaf of herbed bread, the three kerbals finally pushed their plates away. Wernher sipped at the remains of his coffee, a distant look on his face. Jeb eyed him for a moment before leaning back in his chair. "Thanks, Patbro – that was excellent."

"You're welcome." Patbro cleared his throat. "If you're ready, Wernher? I know Elton would be keen to speak to you tonight if he can."

"I suppose so."

Jeb got to his feet. "I'll help you. It's a bit unnerving the first time." He put his hand on Wernher's shoulder. 'Come on.' He led his friend out of the kitchen, nodding to Patbro as he went. The Keeper poured himself another coffee and retired to the sitting room to wait. He had just begun to think about reading the book that he was thumbing through when the sound of footsteps made him look up. "Is everything all right?"

Jeb came into the room, closing the door behind him. "He's fine, I think. He wasn't showing any signs of coming back out of Communion anyway."

Patbro sniffed the air and glanced at the ceiling. "No reaction from Elton either." He waited until Jeb was seated. "How is Geneney?"

"He's very well. It's been a long couple of weeks for him though, taking the second half of the Tenacity flight." Jeb stretched out his legs. "We can show you Tenacity tomorrow if you'd like, assuming Guardian Elton is still available?"

"He will be for that. We've tried to keep him up to date with the space program but we can only show him what we see on the news." Patbro's face clouded over. "Unless Wernher needs more time with him. I've seen that thousand-metre stare before on Jonton and it was never a good sign."

"No." Jeb sighed. "Between you, me and the four walls?"

"Of course."

"The colleague he mentioned, the one who introduced him to firewhisker coffee, was Hading Kerman."

Patbro looked puzzled for a moment, then his eyes widened. "As in the..."

"Hading Accords? Yep. Wernher was out at Site D when all that happened. Led the survivors to safety and nearly killed himself in the process." Jeb shivered. "I saw him in hospital afterwards – he was *wizened*. Like a piece of fruit left too long in the sun, which I guess isn't far off the truth. The hospital managed to fix his heatstroke and dehydration on the outside but they'll still be there on the inside; locked away behind that thousand metre stare. Elton will help." Jeb's voice lost its bleak edge. "He helped me and before we Communed, I would have told you that that was impossible."

Patbro nodded. "He has a way about him. Sometimes I think it's just his sheer age. I doubt there's much he hasn't seen over the centuries."

"That would give him the long view on most things," Jeb stared at the ceiling reflectively. "Awakening the One-Twenty... I just hope that most of them turn out to be like him."

It was Patbro's turn to shiver. "As do I but I fear they may not be. There's a lot of Jonton in Elton I think, because of the length of time that he spent an-Kerm before Elton's Awakening. The others won't get that."

"And isn't that a cheery thought." Jeb shook his head. "Genie was right though, for better or for worse. Asking the Kerm what they actually want rather than fighting over what we think they want." He glanced at the door. "They're taking a long time in there."

"You took longer," Patbro replied with a faint smile. "How about a game of Tiles while we're waiting?"

"You'll have to remind me how – I can't remember the last time I played."

The game trickled along, both players paying more attention to listening for footsteps than the game board. Jeb was about to suggest that they called it a draw and put the board away when Wernher appeared in the doorway, blinking in the light.

"Great Ker..." He paused. "That doesn't seem particularly appropriate."

"Don't worry," said Patbro. "You're far from the first and I doubt you'll be the last."

Wernher nodded and arranged himself on top of a sack chair. "I see why you insisted on doing this, Jeb. That was...was..." He shook his head. "I could go kermol right now and join the One-Twenty."

"That's far more coherent than Genie and I were after meeting him," Jeb said wryly. "Did you manage to get a word in edgeways or have you been answering questions about spaceflight for the last couple of hours?"

"No...no we talked about a lot of things. A lot of things." Wernher stared at the wall. "Including the thing we came to talk about, before you ask, Jeb." He raised a finger. "Not now. I'm going to need some time to think it all over but tonight... gave me a different perspective on it all."

"I know that feeling," Jeb said quietly. "I'm glad he managed to help you as well, old friend."

Wernher gave him a wan smile. "He certainly did. But if you good kerbals will excuse me, I think I'll turn in." The smile became more genuine. "You should get some sleep too, Jeb. Elton was asking after you and wondering how the space program was going."

<good morning, Wernher. Did you sleep well>

Very well, thank you, Elton. Surprisingly so.

<that is good to hear. Good morning, Patbro, good morning, Jeb. It is good to have you here again>

It's good to be here. Thank you for talking to Wernher last night.

<I would be pleased to talk to him again> Jeb felt the Kerm's amusement *<It is refreshing to speak to a kerbal who does not think in long stories. Unlike yourself and my First of Keepers>*

You didn't find the right story is all, Jeb replied. *Get him started on an engineering problem and he can spin out a conversation with the best of them.* A shimmering haze on the edge of Elton's mindscape, caught his attention, two dim presences hidden behind it and beyond them a misty expanse, veiled by the haze. Elton sensed his sudden comprehension.

<indeed. I would introduce you to Jonton my First of Keepers, his daughter Joenie, and my own daughter Jonelle> A flicker of pride rippled over them and the haze fell away. One of the two presences came *forward*, greeting Patbro happily and studying himself and Wernher with what felt like awe. The second presence stayed back at a more reserved distance. Beyond them, the previously misty expanse flared into brightness, revealing a second, flatter mindscape, a row of trees marking the border between it – her, Jeb realised belatedly – and Elton.

<...Jebediah and Wernher. Wernher builds the machines for flying to other worlds. I believe you will know Jeb>

Jeb sensed the embarrassed pleasure rippling from Wernher's presence.

Joenie's presence flowed towards Jonton's. Fragments of muted conversation and flickering emotions washed over the others, finishing in a wave of resignation that was echoed by an undercurrent of amused tolerance from Elton

All right, Joenie. All right. I'll ask him. Jonton turned to Jeb, his mental voice sounding faintly embarrassed. *I'm sorry about this but my daughter has reminded me to ask if you have time to visit a friend of hers.* An image of a cardboard box appeared, a pair of small feet protruding out from under it and what looked like a framed picture of Kerbin from space resting against the side. A kerblet crawled out from under the box, turned the picture round to show a picture of the Mün and disappeared back inside.

Jeb stared. *I recognise those photos.*

From the old KIS shop I think, said Wernher. *I like the spacecraft design – very compact.*

Sturdier than Kerbal 1, Jeb agreed with a grin. He turned to face Joenie. *I'd be very happy to meet your kerbonaut friend,* he said. *What's his name?*

Gildas. Joenie's presence shrank in on itself.

Ferry and Anlie's son, Jonton said to Elton. *A good friend of mine,* he told Jeb and Wernher, *and his young lad is absolutely obsessed with space.*

<then perhaps he should join us next time> Jeb thought he could detect a subtle deference in Elton's tone. *<He too would want to hear Wernher speak and learn more of the home in*

space. Of course> he added in response to an unvoiced question from the engineer, and the mindscape shimmered into a star-speckled blackness.

They sensed Wernher's concentration and then a shape appeared, an outline at first, which only Jeb recognised, but quickly acquiring more detail. A second, larger, shape sketched itself out behind the first, before it too gained definition and form.

These are the first two parts of the Tenacity space station, Wernher began. As I mentioned to Elton last night, Tenacity can't fly anywhere – it isn't a spacecraft – but we're building it to practice making the parts for the Duna ships and to practice putting them together in space.

<how many kerbals can live inside?>

Only four at the moment. There's room for many more but we can only bring four home if something goes wrong because we only have room for one actual spaceship. A Pioneer capsule blinked into view, docked to the front of the fledgling space station. Eventually we'll have room for a second spaceship, so we'll be able to double the crew, but that won't happen for another two flights. Right now, we're building another part of the station. It's not finished yet but this is what it looks like so far.

One by one, a set of eight tubular spokes appeared, arranged around the central hub module which Wernher had already sketched out. Jeb felt a familiar wave of concentration from Elton, matched by intense curiosity and then delighted recognition from Jonelle. A burst of images flickered between her and Joenie.

<this is good. You make very clear images>

Jeb sensed Wernher's reticence.

I suppose I've always found it easier to build things if I can visualise them first. Anyway, each spoke will be more than twice as long when it's finished and then we'll join them all up to make a wheel. But at the moment...

<it looks like a flower. A flower in the sky>

They all sensed Elton's surprise.

<I suppose it does, my daughter> The surprise faded, replaced by a sudden deep satisfaction. *<and that too is good. For is it not proper that a Starseed should begin as a Starflower?>*

Chapter 106

Leviathan

Danfen and Hanbal stood in front of the transporter crawler. The Type 7 stack blotted out the sun, the brilliant halo surrounding the chequered band marking the interstage adaptor between the rocket and its payload, dazzling the two engineers. Beyond that, the payload stretched out of sight, seemingly touching the sky.

"Dja orbdaban aliant, Leviathan," Danfen murmured.

Hanbal looked at him. "Say again?"

"And they named the beast, Leviathan." Danfen tucked his hands behind his back. *"Pilla. Bar manaliant manalba. Ankerbal taklathdaban ar. Dja orbdaban aliant Leviathan.* Or, in modern Kerba: In truth, the greatest beast of the sea. All the people feared it. And they named the beast Leviathan." He raised an eyebrow at Hanbal's incredulous look. "Just because I'm a hairy-knuckled engineer by day, that doesn't mean I can't I enjoy the classics by night. Chadvey's 'Chronicles of the Deeps' – early Age of Sail. Leviathan was the Kraken's Bane – its sworn foe."

Hanbal shook his head. "Well that won't do. We don't want anyone to fear the Type 7."

"Literalist." Danfen thought for a moment. "How about this? *Pilla. Manaliant soathraban. Ankerbal djaldaban mahomr. Dja orbdaban aliant Leviathan.* Which, unless my Old Kerba is letting me down again, would translate to: In truth, a great beast took flight. The people watched it go. And they named the beast Leviathan." He scratched his nose. "According to legend, Leviathan was the sailor's guardian. Witnesses said that it was big enough to shelter a ship from the fiercest tempests but it was mercurial. Take its name in vain and it was as likely to sink your ship as save it."

"Or somebody ran their ship onto a whale-shaped rock whilst they were drunk," muttered Hanbal. "Better not let Ademone catch you naming rockets after imaginary beasts."

Danfen shrugged. "I think she would appreciate the symbolism actually. A gigantic vessel built to save us from a looming darkness but loaded with enough propellant to comprehensively demolish the pad and surrounding square kilometres of landscape if we haven't built it with sufficient care and respect? That definitely sounds like a mercurial Leviathan to me."

"Save me from engineers with delusions of high culture. Now how about we let our entirely real, and not at all mythological, booster get to the pad?"

Danfen nodded and produced a pair of scissors from his pocket. He stepped forward and, with a brief flourish, cut the green tape, sending the ends fluttering to the ground. Amidst cheers from the watching crowds of workers, he and Hanbal moved off the road. High atop the transporter, a lone, yellow hatted kerbal watched them go before turning to face the booster and raising both clenched fists over his head. With a great clanking of steel treads and a deep thrumming rumble that shook the ground beneath their feet, the transporter crept forward, beginning the half-day journey that would carry the Rockomax Type 7, *Leviathan* to its launch pad.

"T minus forty seconds and counting. Starting sound suppression systems."

"T minus twenty. Gantry retract sequence initiated, we have launch commit."

"T minus twelve... eleven... ten... nine... synchro is green..."

Leviathan drew breath and its breath was thunder.

A shrieking gale howled out from the launchpad, building in pitch and fury until the very air could take no more.

"...three...two...one..."

A sudden thunderclap rocked Launch Control. For a fleeting instant the gale seemed to abate but then the raw sound from the rocket engines struck like the Krakens of legend chasing down their ancient foe.

"Lift-off! We have a lift off!"

Incredibly, impossibly the noise grew louder still, *Leviathan* bellowing defiance at those who would drag it back to earth. Plaster rained down from the ceiling, paper coffee cups spun across console tops and fell silently to the floor. Flight controllers raised clenched fists in triumph, lips peeled back from savage grins. On the main screen, the five Mainsail engine bells appeared as gateways to the abyss, black and forbidding against the inferno raging below. The camera zoomed out revealing the Type 7 at the tip of a blazing spear, ascending into the morning sky.

For a moment, Nelton watched it climb before turning back to her console and starting to page through her communication loops with the different flight control teams; listening to the ebb and flow of reports between the controllers but paying as much attention to their

tone of voice as to the reports themselves. On the main screen, *Leviathan* accelerated through the cloud layer, its exhaust plume just beginning to fan out in the thinning atmosphere.

And then a light stuttered on a flight console before lighting up in a baleful amber that matched the trailing edge of *Leviathan's* exhaust plume.

The controller stabbed a finger at his communication panel. "Flight, FD. I have a pogo warning!"

Nelton's head snapped round. "Booster?"

"We see it too, Flight. No system warnings."

"Copy. You're on the priority loop, monitor and running report."

"Will do."

Leviathan tore through the upper atmosphere, riding atop a great bonfire of light. Nelton sat upright in her chair, eyes locked on her master warning panel, a stream of increasingly urgent reports from the Booster console sounding over her headset. Then a constellation of warning lights lit up on the next console.

"Flight, Propulsion! Low LOX pressure. Centre engine shutdown!"

"I hear you, Propulsion. Status."

"One moment!" Nelton heard her Propulsion controller take several deep breaths. "Good telemetry and correct shutdown sequencing, Flight. We've still got an engine up there."

"Copy. Get me an update on the second stage engines. FD?"

"Still getting a boatload of vibration, Flight. Going long on stage one outboard engines, guidance mode four."

Nelton cast a wary eye at her repeater displays. "Understood." She toggled her microphone. "Payload, update please."

"Payload is Go, Flight. Tank sensors are definitely picking up that pogo but everything's holding."

"Copy. Propulsion – any news on those engines?"

"Aborted chilldown on engine one, Flight. Remaining engines are Go."

Nelton didn't need to consult the mission rules. "Chamber temperature?"

"Warm, Flight. We're thinking a jammed intake valve, maybe a plumbing failure from the pogo but we're not seeing a LOX leak."

Nelton heard more than a few relieved murmurs from around the consoles. "Thank you, Booster. Guidance?"

"Working it, Flight but it's not looking good. We're off trajectory on stage one, which just threw out most of our contingency plans for stage two, which didn't figure on an engine-out before staging anyway."

"Understood. Do what you can."

"Copy."

For a moment Nelton watched as the main screen flicked over to show an updated trajectory plot, before glancing at her master warning panel again. Around the room, the flight controllers sat hunched over their screens, one of them tapping a pen on the edge of his console in a broken rhythm that Nelton doubted he was even aware of. Then a green light glowed on her communications panel.

"Flight, FD."

"Go ahead FD."

"Go for staging, Flight. Switching to onboard camera."

The controllers around the Booster console looked up before going back to their readouts. A sudden silence descended as the remaining controllers turned to face the darkened main screen.

A crescent sliver of light appeared, followed by a dazzling glare from the stage separation motors. The flare subsided, leaving a view of *Leviathan's* first stage falling away towards a curved, blue horizon. Seconds later the interstage slid free, lit from within by the glowing engine bells of the four functional SK1-P second stage engines, and then blasted away, limned with flame, by their exhaust plumes. As the still-burning shroud tumbled away, Kerbin was revealed in all its majesty, the Doreni coastline rolling past the camera.

"Second stage ignition confirmed on two through five. All systems nominal at this time."

There was a patter of relieved applause.

"Thank you, Booster." Nelton sat back in her chair, eyes flicking between the repeater displays on her console and the view from space on the main screen. The sudden jangle of a ringing phone broke the quiet the light on her console indicating an external line. Frowning, she pressed the button to divert the call and turned back to her displays, flipping through her communication loops.

Then the phone rang again.

Scowling, she picked up the receiver. A handful of controllers glanced round and promptly turned back to their consoles at the sight of their flight director's face.

"Nelton." She cocked her head to one side, lips compressing to a thin line as she listened.

"You can tell Ademone that I'll be there at her earliest convenience *after* we reach orbit. Now get off this line." Not waiting for a reply, Nelton dropped the receiver onto its cradle and turned back to the main screen. "How's it going, Guidance."

"Touch and go, Flight." The strain in the controller's voice was audible. "We're in mode eight and our propellant levels are way off the curve."

"Understood." Nelton picked up her phone and dialled for an outside line. "Hello, Gene. We've had a couple of problems here. You have? Yeah, we're working that. Your bird's going to space but we can't guarantee your periapsis. Understood – we'll drop the booster as soon as. Thanks, Gene."

"Flight, Guidance."

"Go ahead, Guidance."

"We've got a periapsis, Flight but we've also got an amber quantity light on both tanks."

"Good work. Stage on red."

"Copy tha... staging! Clean separation!"

All eyes turned to the trajectory plot on the main screen which showed *Leviathan's* payload in a pronounced elliptical orbit. The seconds dragged out, seemingly into minutes, and then cheers erupted around the room as the ellipse began to expand, lifting the lower point of the Orbital Propellant Test Article's orbit out of the atmosphere and up to a safer altitude. Nelton dipped her head, acknowledging the collective thumbs up from her flight controllers before mopping her brow and picking up the phone to Barkton.

"I can see that but what in the seven smoking hells *happened?*" Nelton surveyed the wreckage. One end of the flame trench had collapsed entirely, revealing twisted rebar and torn pipes. Blackened refractory bricks lay strewn across the floor of the trench, like a set of blocks discarded by a bored kerblet. Despite herself, Nelton winced at the sight of still more bricks scattered over the launchpad itself. On both sides of the trench, the massive spray heads for the sound suppression system were twisted out of true.

"I would quite like to know that too." Ademone's quiet words cut through Nelton's shock. "I thought these systems had been thoroughly proven on the test stand?"

"They were." Hanbal ran his hands through his hair distractedly. "We scaled them up from the Type 6 launchpad and added an extremely conservative safety factor on top of that. We never had a single problem on the test stand."

Danfen nodded. "He's right. The sound suppression system was the most reliable part of that stand." He poked a charred lump of brick with his toe. "The only thing I can think of is some kind of resonance effect. Something that only became a problem when the booster lifted away from the pad." He lifted his hands. "Don't hold me to that, but booster altitude is about the only factor we can't simulate on the stand. I'll start with the camera footage and see if we can pin down when it happened – whatever it was."

"Do that." Ademone turned to her flight director. "Could the problems with the booster have been caused by acoustic damage?"

Nelton shook her head. "Too early to tell. It might have contributed but the engine-out happened too high up for it to be the only cause." She glanced at the chunk of brick by Danfen's foot. "We saw a lot of pogo on the way up, so my guess would be that as the primary cause. The second stage problems were almost certainly caused by pogo." She looked at the chief engineer. "We'll cross check the telemetry feeds with your camera footage anyway and see if anything matches up. I'll get a flight operations team together as soon as we hand over control of the payload to Barkton."

"And I'll put a team to work on figuring out the pogo problem." Hanbal rubbed the corners of his eyes. "We found a way to control it on the Type 6 – we'll find a way to control it on the Type 7."

Jonton stacked the last of the lunchtime dishes in the sink and put the kettle on. "Who's for coffee, who's for *djeng*?"

"Coffee for me please," Meleny called from her sack chair.

"Black coffee for me please," said Enely.

"Could I have a coffee and sapwood, Dad?"

Jonton's eyebrows lifted, as the rest of the party called out their preferences. He found a nearly empty bottle of sapwood syrup at the back of one of the kitchen cupboards and set it down on the worktop. The kettle clicked off behind him and presently, the aromas of fresh coffee and hot *djeng* filled the room. Jonton put everything on a tray and carried it over to the living room table. He poured everyone's drink, watching Joenie's change in expression with a faint smile as she stirred two spoonfuls of syrup into her coffee and blew on it before taking a sip. A dish of sweet nibbles was handed round before Jonton disappeared into the next room and returned with a bag. He tapped on the table for attention.

"We all knew this day would have to come but now that it has, I think we all wish it hadn't had to come so soon." Jonton watched Joenie nodding vigorously. "In many ways it feels like Enely has always been here and having him go is going to be like losing one of the family. But we also know that he's leaving to do important work that very few others in the world can do." Jonton lifted his mug. "So, this one's for Enely – and we wish him the very best of luck on his next journey."

"To Enely!" Everyone clinked their mugs against his in a toast. Enely blushed with pleasure.

Jonton cleared his throat. "We've also got a few little things for you to take with you and remember us by." He reached into the bag and pulled out Enely's pack. "This is from Fred and Ferry, hopefully as good as new."

Enely turned his cleaned and mended pack over in his hands, noting the new stitching and straps, their buckles polished up to a soft gleam. Feeling a lump in the bottom, he opened it and pulled out a similarly polished and mended mess kit. "They're better than new." He looked up at Ferry. "You shouldn't have... thank you both very much."

Fredlorf waved his thanks away. "You're welcome. Couldn't let a 'kerb hit the road without mended gear or a good pack to see him right."

"This is from Meleny, Thombal and Adbas." Jonton pulled a small wooden chest out of the bag. "Adbas and Thombal made the chest and Meleny filled it."

"It's beautifully made." Enely looked at Adbas. "You could be a joiner." He opened the chest and found it packed with rows of labelled herb bags, each tied off with a little drawstring.

"They're all traditional Kolan blends. Some for food, some for drinking, and a couple for freshening a room and helping you sleep."

Enely read the label on one of the bags and smiled. "I know this one." He lifted out another bag and tugged the drawstring open. "And I don't need to read the label on this one – thank you all very much!"

Jonton waited for Enely to put his herb chest to one side before handing him two small, oddly shaped parcels. "These are from Mallas and Joenie."

Inside the first parcel was a dark wooden trinket carved into the shape of a cactus. Enely held it up the light, turning it this way and that.

"Kerm wood for luck," said Mallas. "Guardian Elton contributed the wood; I just did the carving."

"It is also beautifully made – and a very good likeness. Thank you, Mallas." Enely unwrapped his second parcel and a polished slice of lighter wood fell out, a keyring fastened through a knothole in one corner. Both surfaces were carved with the letter J, in slightly wobbly strokes."

"J for Joenie," Enely hugged her. "And also, J for Jonelle?"

Joenie nodded. "She let me have a piece of her branch." A note of pride crept into her voice. "And I did most of the carving but Mallas helped with the curvy lines."

"It's wonderful – thank you." Enely clipped the keyring onto one of the buckles on his newly mended pack. "I'll keep it on here and take it with me everywhere I go." Joenie beamed at him.

Jonton waited for Enely to sit down again. "And finally," he said, "I wanted you to have this." He handed Enely a small brass plate, chased with a Kerm leaf design around its edges. "It's from my student days - I don't know if you have them in Wakira but you wear it on your belt for good luck during exams."

Enely took the belt charm. "I don't know... I don't know what to say." He turned the charm over in his hands and noticed two numbers engraved between the belt slots.

"Telephone numbers for here and my hut," Jonton said quietly. He walked round and gave Enely a hug. "Call any time – don't be a stranger."

Enely blinked the dampness out of his eyes. "I won't. Thank you, Jonton."

"You're very welcome." Jonton raised his voice. "We've still got time for Enely to say goodbye to Elton and Jonelle, before we take him to the station. You're all welcome to join us – as most of us have discovered, some things are easier to say in Communion than they are in words."

"I'm going to miss having Enely around. I got the strong impression from this afternoon that Elton and Jonelle will as well."

Jonton stared at the chink of evening sky showing through the living room curtains. "Very much so," he answered. "But as we were lucky enough to get two confirmed Awakeners in the first intake of possible volunteers..." His voice trailed away. "It was the right thing to do. Not easy – none of this has ever been easy – but right."

"Are we getting many more to visit any time soon?"

"Quite a few more, I think. I'd hoped to see a few more from further afield but for our second group?" Jonton lifted his hands. "At least we got a second group."

Thombal tucked his hands behind his head. "I suppose it's still a big decision to travel in from overseas at the moment. Maybe they'll start coming once the airlines start getting back to normal."

Meleny set down her mug. "Or once Enely's had time to help Awaken a Kerm or two that're closer to home. Someone that they can visit, find out that some of your story was true and maybe get curious about finding out about the rest."

Jonton smiled to himself at Meleny's choice of words. "That should help too," he agreed. "Can I get you a top-up, Tom?"

"Please," Thombal paused, mug of *djeng* halfway to his lips, head cocked to one side at the sudden squeak from behind the door. He looked over at Jonton who raised a finger to his lips and shook his head. "Time for one more before bed." He put his mug on the table and watched Jonton refill it from the pot. "That's plenty, thanks." The loud silence from behind the door was broken by the creak of floorboards, followed by a tense pause and another, fainter creak. Thombal looked up, unsurprised by the sadness behind his friend's eyes.

"Joenie?"

Jonton nodded. "She'll be going to see Gerselle again."

Meleny lowered her gaze. "Of course. How long has she been..."?

"Since before our first trip to the Berelgan, probably quite a bit before. I haven't asked."

Meleny looked up at him with a frown. "Don't you think you should?"

"Not yet. Maybe if it starts happening every night. As long as she still feels she can talk to me about Gerselle when she needs to though, I'm turning a deaf ear to any late-night squeaky floorboards."

Joenie froze, berating herself for her mis-step. The murmur of voices from behind the door carried on; she heard her father offering somebody a top-up of something. She lifted her foot, wincing at the second creak, before tiptoeing down the passage to the sleep room. Easing the door open, she darted inside, closing it behind her with a snick. She drew the curtains, letting moonlight spill into the room, before turning to the figure on the bed. Shadowed Kerm vines twined up the bedframe and a fan of silver-tinted hair spread across the pillows. Joenie picked up a hairbrush from the bedside table and sat down on the corner of the bed.

Scooping up one of her mother's tresses, she began to brush it out, her murmured voice rising and falling with the swish of bristle through hair. "We're home, Mum. We stayed at the Grove hotel again on the way back and the waitress remembered us from last time. Dad was worried that something bad might happen to Meleny or Thombal so he sent them and Adbas away to Mr Patbro's Grove. They're back now though." Joenie ran her fingers through the tress of hair, laying it to one side before picking up the next.

"We only stayed for one night at the Berelgan and Professor Erlin was busy, so I didn't get to talk to Obrinn for very long. He sent a telegraph message to Jonelle for me." Joenie smiled, moonlight gleaming from her teeth. "He and Jonelle are getting good at using the Telegraph. They've started making up their own words for some things - I guess it's quicker that way. I think you'd like Obrinn, Mum. He's quite quiet compared to Jonelle, a bit like me and Adbas I guess."

A silvery droplet trickled down Joenie's cheek. "Dad was great on the television, telling everyone about you and Elton and Jonelle and Obrinn. He told me on the train that he didn't think he'd be able to talk about you but he did. I think it worked - people are coming to visit again, the way they did when Dad was still part of Elton. They get to meet Elton and then we bring them in to see you as well. That's why I'm brushing your hair for you again." The brush rose and fell. "Dad said that they needed to know all about what can go wrong if they try to wake up their own Kerm, so they need to see you."

Joenie sniffled. "You scared most of them I think but two of them weren't afraid. There was one old guy - he was all smiley on the outside. He told uncle Enely that he wanted to be able to talk to his Kerm the way we talk to Elton. His eyes weren't very smiley though - I think he was sad on the inside. I hope uncle Enely can help him quickly then he can come back soon." Joenie blew her nose. "The other guy was much younger and sort of cute. I don't think I'd better mention that to Adbas though - and definitely not to Dad. I wish I could talk to you about him, talk properly I mean..."

The silvery droplet became a rivulet, dripping onto the bedcovers. "It's not *fair*, Mum. You can't get to meet him, or Doctor Mallas or Professor Erlin. You can't talk to Jonelle, or Obrinn or any of the other Kerm that uncle Enely has gone to help wake up. The brush clattered to the floor, the rivulet becoming a flood as Joenie buried her face in her mother's unmoving arms. "I miss you, Mum. I wish you could...you would..." A choked sob forced its way out of her throat.

“...wish you would wake up too.”

Quick aside - if you want a musical accompaniment to the Leviathan launch, may I recommend Thunderstruck by AC/DC - especially any live version!

One of my all time favourite rock intros. The way it starts with that lead guitar riff. Then we get a drumbeat backing it up before the bass kicks in. The music moves into the background for that first verse and then...

The sound of the drums. They're beating in my heart.

The thunder of guns. Tore me apart.

You've been...

...

Thunderstruck

And just like that we're off and riding that burning wall of sound into the sky!

Chapter 107

The Rough and the Smooth

The Orbital Propellant Test Article swung along a lopsided orbital path that would take it from its highest point over a thousand kilometres distant, to grazing the upper reaches of Kerbin's atmosphere. Viewed from a distance, it consisted of a central truss, two long fuel tanks mounted alongside it, the internal bellows that had confined their contents during launch now collapsed, allowing the liquid ammonia inside to float freely. A more-or-less spherical systems module at one end sported the unfurling photovoltaic arrays, antennas and sundry other systems required to turn a pair of propellant tanks into a functional spacecraft.

Viewed on the main screen of the Barkton Mission Control room, the spacecraft, like so many before it, was nothing but a marker. From the back of the room, Runcott watched it march along its elliptical path in lockstep with the remorseless logic marching through his own head. *Too large for a Type 6. No spare launch capacity for an all-up test. Quicker to build another OPTA than another Type 7.* He sighed, the last of the frustration in the back of his mind unravelling into resignation.

Sometimes rockets just went wrong. And at least it hadn't blown up. Runcott shook his head remembering long-ago scenes of despondency when Muna 2 had exploded shortly after lift-off. Much as he wanted to, he couldn't find it in himself to blame Rockomax's engineering teams, not least because they were probably as frustrated as he felt. As for their flight control team, whatever 'guidance mode 8' was, it had salvaged the flight.

It was just a pity that it was going to be cut short. Runcott dragged his attention back to the consoles.

"Photovoltaics looking good, Flight. Steady draw through the main bus, all systems powered up and ready."

"Thank you, Payload." Geneney made a note in his flight log. "How's our orbit looking, FD?"

"Not great, Flight." Bill looked up from his console. "We'll keep an eye on it but so far drag on the photovoltaics is having about the predicted effect."

"Re-entry at T plus one-six-two days, plus or minus two, then?"

"That's affirmative. We ran the numbers on re-boosting using the RCS but it would be more effective to reserve the propellant for attitude control."

"Understood. What have you got for me, Guidance?"

"Spacecraft is in orbital rate and within the expected per-revolution deviation from the last attitude correction Flight. Go, No/Go for first correction due in twelve revolutions."

"Copy." Geneney studied the orbital display on the main screen. "Payload, let's spin up at the next apoapsis. Take your timing point at A-minus ten minutes."

"Will do." There was a clatter of keys followed by a pause. "Program transmitted and loaded. Initiating at A-minus ten."

At the touch of a button, one of the subsidiary screens beside the orbital plot blanked out and then displayed a running countdown timer. At the ten-minute mark, the timer disappeared, replaced by a split screen, one side a blur of computer code, the other side a checklist of key events and system start-ups. The one-minute mark was marked by a blue light at the Payload console, which blinked out at the tap of a key.

"RCS firing, Flight. Nulling orbital rate and...spacecraft is in stellar inertial. Control mode FINE, commanded roll rate: point one radians-per-second, commanded angular acceleration point-one milliradians per second per second."

Geneney glanced at his repeater displays. "Copy. How's she handling, FD?"

"Smooth and steady, Flight. Minimal cross-axis coupling, negligible residual translation."

A set of indicator lights glowed on the Payload console and a strip chart recorder whirled into life. "Picking up readings from the slosh sensors, Flight. Radial pressure only, no sustained longitudinal modes. Looks like the baffles are holding it."

At the back of the room, Roncott nodded to himself in satisfaction and turned back to the screens, brow furrowed as he searched for the data he needed. Geneney noticed his expression and keyed his microphone. "Guidance, Flight. Can we get the slosh readouts on screen three please?"

"We can do that, Flight." The screen blanked out before displaying a double column of fluctuating numbers. Roncott raised a hand in thanks.

"Flight, FD."

"Go ahead, FD."

"Spin axis orientation is holding, Flight. No cross coupling."

"Copy. Payload?"

"Looking good, Flight. Structural integrity holding, internal temperatures within expected range with no hotspots that I can see. Roll rate at point-zero-seven radians per second and climbing.

"Excellent." Geneney studied the guidance display, watching the roll rate click upwards, occasionally flicking a glance at his repeater displays. Then, with a sudden flurry of shifting data and a patter of applause from the flight controllers, it ticked over to the commanded point one radians per second and steadied. Geneney leaned back in his chair and looked up at the orbital plot. "Good work, team. I'm calling that a Go on stage one testing. Five revolutions, spin down, back into orbital rate and review. We're not getting as many revolutions as we'd like, so let's make them all count."

"The sad thing is that they weren't bad neighbours before this started."

Gusemy studied the other's careworn face and nodded in sympathy.

"I mean, it couldn't have been easy for them – the soil isn't good up there anyway and without a Kerm to improve it?" The ambassador shrugged. "There's a reason we're mostly livestock farmers around these parts. They *tried* though, even managed to get a respectable harvest in last year. Not enough for them to share we didn't reckon, but plenty to keep them going by and by."

"But this year?"

The ambassador sighed. "Whatever they were doing, it wasn't enough. They came down here looking for help – and that must have been a bitter pill for them to swallow. We gave them what we could – they wouldn't take anything Kerm-grown but they were happy to take as many carcasses as we could spare. I suppose they figured that the beasts must have been grazing on clean grass or something."

"Or they were too hungry to care."

"Or they were too hungry to care," the ambassador agreed. "We gave them what we could of course. It cut into our Starseed donations but what of that. The space program will still be around next season but without food, they probably wouldn't have been." She grimaced.

"Not that everyone saw it that way."

Gusemy nodded. "Not with the space program starting to look like it's going somewhere. It's always easier to help out with something that's working."

"And not give any more to those fools on the hill who are too proud to have enough to share but not too proud to take from those that have." The ambassador closed her eyes briefly. "Not my words, Ambassador and, as I said, we did what we could but it just rubbed some folks up the wrong way. And when they took to stealing as well as taking, that was the last straw." She lifted her hands. "We tried speaking to them about it – after they tried denying everything, they chased us out of their... village at gunpoint. So, we called the authorities."

"Understandable." Gusemy made a note on his pad. "I don't suppose you could give me an idea of the kinds of weapons they were carrying?"

The ambassador gave him an incredulous look. "No. I can't say that I can. For one, I wasn't there, and for two if someone pointed a gun at me and told me to leave, I'd be too busy leaving to tell you anything about the gun."

"Of course." Gusemy pinched the bridge of his nose. "I'm sorry but I had to ask." He closed his notebook and tucked it inside his poncho. "You'll be compensated for the lost livestock of course and please rest assured that those responsible will be brought to account. Thank you very much for your time."

"Thank you, Ambassador."

Gusemy nodded and turned to leave.

Once outside the hut he walked across the village green to the off-roader parked on the other side, oblivious to the curious looks from the villagers. He opened the door and climbed in. "About what we expected from the complaint. Armed neo-kerman enclave; isolationist, turned to livestock theft when their crops failed. No further information on the number or type of weapons."

The plain-clothes inspector in the drivers' seat gave him a resigned look. "Never heard that one before." He gestured across the green at a low-built stone building with a sheet iron roof and a heavy steel door. "To hear these backwoods types talk, you'd think they'd never seen a gun, let alone the inside of the village armoury." He started the motor. "At least they've had the sense not to start a shooting feud over a handful of stolen creva."

The road out of the village quickly turned steep, zig-zagging down to the valley floor before following the banks of a winding stream. Gusemy glanced around at the coarse, short-cropped grass, broken by the occasional patch of low-growing ferns or scraggly evergreen, and dotted with creva. Now and then, one of the creatures looked up as they passed, regarding them with an indifferent stare before lowering their heads to graze.

As they approached a fork in the stream, Gusemy leaned forward. "The turn-off should be just up ahead. Just a single-track road, I think. Ahh – that looks like it there."

His companion just nodded, pulled up at the side of the road, and climbed out of the off-roader. Gusemy watched him cross the road and walk along the verge, stopping by what looked like the end of a farm track and staring along it for a moment, before turning and walking back.

"Nothing to see at this end. Some of them like to put up a barricade or have a couple of lookouts. They'll probably have something nearer the village."

"All the ones I've been to had," Gusemy agreed.

"Let's get on with it then." The inspector slammed his door shut and started the motor again. "Everyone alright in the back? Yes? Good. We'll go in nice and easy to start with but

you all know the drill.” He glanced around, then pulled out onto the road before turning up the farm track.

The track went on for longer than Gusemy had expected but was also in considerably better repair than he’d expected. The track itself was still paved in places, with the larger potholes filled in with well tamped-down gravel. As they rounded a bend, he saw the weather-beaten remnants of two herder huts silhouetted against the skyline, the track petering out as it wound its way up the hill.

“Ah. Hunting rifles I’d say, and they look comfortable enough with them.” The inspector applied the brakes, bringing the off-roader to a smooth stop. Berating himself under his breath, Gusemy dropped his gaze back to the road and saw four kerbals dressed in heavy jackets, each with a rifle pointed not-quite-casually at the ground in front of them. He swallowed hard.

“First time having a gun pointed at you?”

Gusemy forced his voice to remain steady. “No – but I can’t say it’s happened often enough for me to get used to it.” He was answered by a snort.

“The one time you do get used to it will be your last. Shall we see what these good kerbals have to say for themselves?” The inspector raised both hands, palms outward, then lowered them to point at the doors. One of the kerbals in front of them lifted his weapon fractionally but nodded.

“Slowly does it. Keep your hands where they can see them. I’ll go first.” The inspector reached down and unsnapped the holster on his own sidearm, before opening the car door and stepping out onto the road. Gusemy counted to five under his breath before following him.

“That’s far enough. I don’t know who you are or where you came from but I suggest you get back in that fancy car, turn it around and leave.” One of his companions murmured something that Gusemy didn’t catch and the leader’s eyebrows raised. “And you should button down that holster before somebody gets hurt.”

“I’m afraid I can’t do that, sir.” The inspector paused. “I’m going to take this badge off my lapel and put it down where you can see it.” Moving deliberately slowly, he removed his rank badge, took two steps forward and laid it on the ground before stepping back again.” He watched one of the four pick it up and inspect it with a sudden hiss of indrawn breath.

“Exactly so, sir. Why don’t we all put our weapons down? I can avoid adding a great many firearms offences to your charge sheets, my colleagues in the back of the car won’t need to join us, and we can all sit down to talk like civilised kerbals.”

“And wouldn’t that be nice.” The other didn’t quite sneer but Gusemy noticed him lowering his rifle again. “What do you want from us... officer?”

“I’d like you to put your guns down.”

One of the kerbals cast an uneasy glance at the car. The inspector noticed her look. “Quite.”

"Blight it all – I don't want any part of this grolnisch." She held out her rifle at arms-length with its muzzle pointing one side and its safety catch turned towards the inspector. She flicked the catch on with exaggerated slowness and put her weapon on the ground. The fourth kerbal followed suit.

The leader glared at his two companions but made no move to put his own rifle down.

"C'mon, Lant." The last of the four kerbals spoke out of the corner of his mouth, eyes fixed on the inspector. "They're not here to shoot first else they'd all be out here together." He cast a disparaging look at Gusemy. "For damn sure they wouldn't bring an ambassador along." A third rifle joined the other two on the ground. Sullenly, Lant put down his own weapon.

"We bought this place fair and proper. Nothing you can do to get rid of us."

"That's not what we came for," Gusemy said quietly. He gestured at the surrounding hills, ignoring Lant's truculent snort. "There's nowhere to plant a new Grove here that wouldn't overlap badly with the next one along the valley. As I think you knew," he added.

The sneer slid off Lant's face.

"We did," one of his companions spoke up. "But if you ain't here to plant a murdering tree, what in the seven smoking... places," he amended, seeing the inspector's eyebrow raise, "do you want?"

"Truthfully? We came here to ask for your help."

Lant's jaw fell open. "You what?"

"We came here to ask for your help," Gusemy glanced at the inspector. "I think we all need to put our weapons down first though." He watched the inspector unbuckle his gun belt and lay it on the ground, the butt of his weapon pointed towards them. "Thank you." He turned back to Lant. "My name is Gusemy Kermol. When I'm not at my own Grove, I work at the Berelgan Institute." One of the villagers started, her look suddenly intent. Gusemy dipped his head to her.

"Most of what we do these days is exactly what you're doing here – working out how to grow different crops in Kerm-free soil." He gestured at the village behind them with its paved roads and neat rows of brightly painted, corrugated iron houses, flicking his fingers to indicate the terraced fields lying fallow beyond. "We'd like to compare notes, if you will."

"Could have shown you more last year. No harvest to speak of this year." She clapped her hand to her mouth, wilting under Lant's furious look.

"Which is why you took to stealing livestock." Gusemy nodded to himself at the shamefaced looks from the other villagers. "Please don't be foolish," he added wearily, seeing Lant's eyes twitch towards the guns lying on the ground. The inspector gave Lant a quelling look as Gusemy continued.

"We will need to talk about that I'm afraid." Gusemy's expression wasn't unsympathetic. "Theft is theft, even if the reasons for it are clear to see. But after we've dealt with that, yes, I would very much like to speak to your farmers. If they were willing, we would have them Commune with our Kerm too." He held up a hand, seeing the hardening expressions in front of him. "Forget I mentioned it. Perhaps one of my colleagues might talk to them instead and learn their story."

"Why?"

"Because if they're unwilling to tell it to our Kerm, then I, or more probably our former Director, Erlin Kermol, needs to tell them instead. Under oath, I should add, with a witness in Communion with him, to ensure that nobody is misspoken."

The villager blinked. "Why... sorry, I'm sounding like my youngest. That seems like a lot of trouble to go to, Ambassador."

"It is," Gusemy agreed. "You are familiar with the One-Twenty, I presume?" The dark looks and angry muttering from Lant and his other companions were all the answer he needed. "If I may borrow Chief Ambassador Aldwells' words: 'Nothing will be hidden. Everyone, be they kermol, neo-Kerman, or a Child of Kerbin, will have their views put before the Kerm. On that you have my word. In this forum. As a Pillar of the Council.' "

Gusemy took a deep breath. "If we are to seek answers from the One-Twenty, then we must seek answers for all. You, your village, deserves to be heard as much as any other. And for their part, the Kerm also need to learn that kerbals are no longer wholly dependent on their Groves for food and shelter." He looked straight back at the villager. "We are indeed going to a lot of trouble. But only by guaranteeing that everyone gets their voice now, can we save a great deal more trouble in the future."

"Kerm, that's quite the view." Jondun checked her tether and pulled herself free of Eve 6's hatch. She glanced at Calzer and Malmy who were watching her through the bridge windows. She raised her hand in acknowledgement before turning her full attention to the vista in front of her. Behind the bridge, the hub module stretched out before her, five of the eight spoke trusses arrayed around its circumference visible and gleaming in the reflected sunlight from Kerbin. Her home shone blue and green through their shining silver lattices as *Tenacity* raced over the Northern Ocean, the Firesvarn western coastline just coming into view, Humilisia hidden by the curving bulk of the hub module. She peered up through her mirrored visor, catching a glimpse of the newly installed knuckle on the far end of its spoke, the lip of its auxiliary docking port peeping out from the white thermal blanket that swathed the rest of the module.

"Never gets old," Tommal agreed. "Okay, Flight, EVA-1 and 2, tethers secured and heading aft to the work site."

"Copy that, EVA-1. Tenacity, please confirm your status."

"I have EVA-1 and 2 on camera, Flight. Malmy is in the Hub and ready to initiate inflation."

"Very good."

Tommall and Jondun made their way over the Bridge module and across the hub, reporting each tether change and significant manoeuvre to Mission Control as they went.

Aboard *Tenacity*, Calzer switched from camera to camera to keep them in view.

"Beginning visual inspection." Tommal clipped his tether to the spoke truss and began a slow walkaround of the unstowed inflatable module already installed alongside the truss, stopping periodically to check the indicators set into the docking ring. "All packing straps have released correctly. So far as I can tell, the module skin looks evenly tensioned around the circumference, no obvious bulges or protrusions. Docking probes on knuckle port look good, hub port tell-tales are all green."

"Good work, EVA-2. Please withdraw to minimum safe distance."

"On my way." Tommal walked around the module, gathering in his tether as he went before joining Jondun behind the truss, which the mission planning team hoped, would provide some protection if anything went awry with the inflatable. "EVA-2 is restrained and tethered at primary and secondary points."

"EVA-1 is restrained and tethered." Jondun's voice was calm.

"Understood. Tenacity, you are Go for inflation."

"I hear that, Flight. Beginning minimum pressure expansion."

As the minutes ticked by, Tommal thought that he could begin to see a subtle shifting of the shadows around the inflatable module's circumference. He tipped her head to one side, peering through the truss structure to try and find a reference point.

"Back-pressure is holding steady on all four inflators, Flight."

"Flight, EVA-1. I have visual inflation."

"Copy, EVA-1."

Tommall lifted his head a fraction, squinting along one of the truss cross-braces. Sure enough, the upper edge of the module was creeping past it, millimetre by painstaking millimetre, lifted on a gradually filling-out ring of fabric. "Good eyes, Jondun. EVA-2 confirms."

The first hour of the EVA came and went, the fabric ring now fully inflated and beginning to pull out a second ring from the stack of folded material attached to *Tenacity's* hub. The twelve structural tubes linking the two rings were clearly visible through the fabric panels which formed the outer shell of the inflatable module and the cross-tubing between them was starting to acquire definition. Tommal and Jondun shifted within the confines of their spacesuits, exercising muscles and joints in the almost subconscious routine of the experienced spacewalker.

"...and hold it there."

"Copy, Flight. Master regulator closed. Closing secondary valves on all inflators."

"Thank you, Tenacity. EVA-1, please proceed to work site and report."

"Understood." Jondun unclipped one of her tether points and slipped her boots out from under their restraining bar. "Proceeding." She made her way around the truss and began her own circuit of the partially inflated spoke module. Aboard Tenacity, Calzer zoomed his camera out to keep her in view. "Okay, Flight, we're looking good here. Knuckle port is parallel with hub port, within visual limits. Upper ring is fully inflated, longeron inflation looks even around the module. Difficult to get a good visual on the cross tubes but I'm not seeing any obvious kinking or protrusions. Outer shell looks to be unfolding cleanly."

"Very good. We're not seeing anything on the telemetry either, so I think we can take things up a notch."

"Will do." Malmy paused. "Okay, I've let the regulator out a click. Ready when you are."

Calzer watched Jondun make her way back behind the truss and heard her confirm her position to Mission Control. He cocked his head, listening for anything untoward in the Hub module before turning back to his monitors, Malmy's report that inflation had restarted coming both over his headset and from directly behind him. On the screen, the spoke module began to expand at a brisker pace.

"Looking good...looking good...no wait." Malmy threw the master regulator closed. "Got some pressure variance here, Flight. Backpressure on inflators one and two. Anything visible from outside, you both?"

"Got a little bit of flexing about the hub port. It's damping pretty quickly though. What do you see, Jondun?"

"The same. A little bit of stiction on the third ring I think but yes – it's pretty much stationary now."

"Understood. EVA-1, what is your assessment?"

Outside, on the space station hull, Jondun thought for a moment. "I would pulse inflators one and two a couple of times, wait for any motion to settle, then restart inflation at minimum pressure and see if we get smooth elongation. If not, Tom or I will inspect ring three, we call off the EVA for today and head back inside. Speculatively..."

"Go ahead, EVA-1."

"A little bit of grease on any problem folds might resolve the issue at that point, Flight."

"It may well do but let's not borrow trouble for ourselves. The team here concurs with your first plan. Tenacity, do you read?"

"I do, Flight. Pulsing inflators one and two now."

Jondun frowned, staring at the partially inflated module through her visor. "No obvious deflection from out here. Tom?"

"Nothing visible, that's for sure."

"Here goes nothing, then. Restarting inflation, minimum pressure."

Jondun blinked and tipped her head to one side. "Hmph. Looks like whatever was sticking just came unstuck. I'm seeing a steady extension, a little faster than before I would say."

"And I think we'll keep it that way. Sorry, EVA-1, you're out there for the long haul."

"Not a problem, Flight. Initial deployment was smooth as you could hope for though. With the second tube, we could maybe try a slightly less conservative inflation to ring two?"

"We'll run it past the Barkton team. Right now, let's focus on installing tube one before worrying about tube two."

"Copy that, Flight."

Much to the relief of both spacewalkers, over the next few hours the spoke module continued its stately crawl up the truss until, at long last, the docking port attached to its far end was within range of the matching port on the knuckle. A sigh of relief sounded in Jondun's headset before Malmy came on the air to report what she could already see for herself. *"And that's a hold, Flight. Pressurant reserves well within estimate. How's she looking, Calzer?"*

"Lined up just as neat as you could hope for. Looking good on the camera and we're clean and green on all four probe sensors."

"Looks beautiful from out here," Tommal called out.

Jondun thought she could hear a deep breath over the ground to air loop.

"Copy that, EVA-2. Good to have you on standby out there, even if we didn't need you to jockey this one into position. Tenacity – you are Go for docking."

"I hear that, Flight!"

Jondun tilted her head back and watched the spoke module restart its slow upward creep as Malmy and Calzer worked their way through the familiar – but not yet routine – checklist. *Probably not ever routine*, she thought, *at least for crewed spacecraft.*

"Inside the capture zone, Flight. Standing by for contact."

"Soft dock confirmed. Master regulator off, closing inflators."

"All latches at pre-tension, confirming fine alignment and initiating hard dock..."

The inflatable crept up an almost imperceptible amount. Jondun squinted through her visor, unsure whether she was just imagining it.

"Flight, we have a hard dock."

Jondun grinned, the applause from Mission Control filling her ears, the view of Kerbin shining through the spoke truss replaced by a broad expanse of white fabric, the regular

bulges of the inflatable tubes that gave it form, clearly visible. “That’s quite the view, Flight. Can’t wait to see what it looks like from the inside!”

Chapter 108

New Trajectories

“I’ll take your word for it.” Erlin scratched his head. “It looks a touch smoother around the edges, the handgrip is better placed, and the extra seals around the sockets are a good idea, but apart from that?” He lifted his hands in a half shrug.

Halsy patted the tubular stem of the Kerm telegraph interface, resting on the workshop table. “It’s not so obvious from the outside,” he agreed. “Our basic design turned out to be fairly practical in the field. The insides though, have been completely overhauled. Part count is down, chassis is lighter, the electronics are far more rugged and refilling is nowhere near the chore it was with the prototype. Plus, we’ve added a couple of safety improvements.”

He rolled the device over, pointing out a row of discs set into its claw-like tip. “Ultrasound and pressure sensors. Lets you know when you’re touching the Kerm fibre so you can back off a little.” He gestured at the three collapsed legs folded up around the stem. “The toggle linkages on the supports have been reworked so that they can be unfolded and locked with one hand. They’ll still be installed by teams of two but one person will be able to handle the positioning whilst the other does the backfilling.”

Erlin nodded. “That was the hardest part according to Mallas. So, you’re satisfied that we can sign off on the production version then?”

“I am. The team have put both test articles through their paces in the lab and in the field and assure me that all the problems with the Mark 3 have been resolved. Blind testing with the final version of the installation checklist was successfully completed yesterday.” Halsy rested his hand on the interface device’s hemispherical end cap. “We’re ready for the roll-out, boss.”

“That’s good to know because we’ve got two newly Awakened Kerm busy with their reading lessons and six an-Kerm lining up behind them.” A shadow passed over Erlin’s face. “It was

touch-and-go with the oldest Kerm but it and its Keeper are recovering well, thanks to Enely's efforts."

"Another eight Awakened Kerm." Halsy couldn't quite keep the awe out of his voice.

"And eight new Anchors to help with the next wave of Awakenings." Erlin shook his head. "I just hope you *are* ready."

It was, thought Hanbal, typical of the Rockomax Corporation's company manager. Despite the meteoric rise in company capabilities and ambition, her memorabilia collection was still held in two glass-fronted cabinets by her office window, the old pared back to make way for the new. He smiled inwardly at the sight of the wrench still occupying pride of place in one cabinet, remembering the presentation by James, Sherfel and the *Endurance* flight team. Evidently a tool used for the first on-orbit repair of a spacecraft was still deemed to be a worthy memento. And so, apparently, was the old firework mortar on its stand, the jagged Speciality Fireworks Company logo sprawling across it now faded by time.

The company manager herself sat deep in thought, drumming her fingers on the edge of her desk. "Agreed," she said at last. "Any delays to the Type 7 program will be manageable and it would be politically wise to show the Doreni that Rockomax is taking the KSA's request seriously."

Hanbal nodded. "How are the Doreni taking it?"

"About as well as you might expect," Ademone said dryly. "I gather that Lodan received a *terribly* polite private welcome from his opposite number, after all the warm words for the cameras."

"But a 'waste-anything-but-time' funding bill with a united Twelve Pillars behind it is providing a big enough carrot and a big enough stick to keep everyone smiling?"

Ademone raised an eyebrow. "I prefer to believe that both sides are putting their disagreements to one side for the good of all kerbalkind. Although the funding bill will be helping no doubt."

Hanbal picked a speck of lint off his trousers. "We'll probably have to give them the SK1-P," he said. "Lodan's briefing seemed quite clear on that point. The Doreni want to launch their Duna shuttle prototypes on their own boosters, Lodan is in favour of that anyway because he doesn't see any point in shipping Doreni built spacecraft halfway around the world to launch them from Kolus, and the Council wants Doren launching Starseed payloads as soon as possible, if not before."

"Give them it?"

"We might as well. Again, judging from Lodan's briefing, their Hammerhead engine was intended to have roughly the same performance as the SK1-P and it's operating on the same cycle anyway. By the time we solve the combustion instability problems they're having, we'll

probably end up with something that's a Skipper in all but name, so why not save ourselves some time and effort, bank some political favours, and move on?"

Ademone steepled her fingers under her chin. "It would certainly be a generous gesture," she said thoughtfully. "Depending on requirements, that would let them field anything from an Endurance to a Type 5 equivalent."

"Which should be enough for their shuttle program if they use the same Kerbin orbit rendezvous mission profile that we used for Pioneer," Hanbal finished. "Which is good because I'd prefer not to hand over the Mainsail just yet." He eyed Ademone. "Let's see how the Doreni get on with the Skipper first before we spend what will need to be a great deal of time setting up a Mainsail production line for them – time that I think could be more usefully spent updating our own launch facilities and putting the Type 7 into full production."

He saw the faint smile tugging at the corner of Ademone's mouth. "Dammit – it's not *that*! Leaving aside the fact that unless we make Starseed work, we'll be going bust anyway, the SK2-M is a dead end. Oh sure, we'll need the Type 7 to get Starseed into production but I can guarantee we won't be using it by the time we're done." Hanbal sat back in his chair. "The Type 7 is big, expensive, and disposable. By the time we get a couple of colony ships built, I think people are going to start noticing that last part. So, by then we need to be thinking about the next generation of launch vehicles."

Despite herself, Ademone leaned forward, intrigued. "Which is?"

"A reusable booster." Hanbal spread his hands on her desk. "C7's spaceplane program is going well by all accounts but I doubt they'll be lifting more than crew to orbit with it. I've run the numbers – even if the rumours are correct and they do have a working airbreathing engine - they won't have the mass fraction for anything else. For serious payload, we're looking at a two stage, reusable rocket." He gave Ademone a rueful look. "I've bounced some ideas around with Danfen and right now we're not sure what that's going to look like, but one thing's for sure – it won't be using an SK2-M. Too big, no throttle and no relight capability."

"Hmmm." Ademone began ticking points off on her fingers. "I'd like to see those ideas. Once you're back from Doren, and the Type 7 failure investigation is complete, and the launchpad is back in operation, and the Type 7 program is in full production phase, and..."

"I get it. I get it."

Ademone's expression softened slightly. "It's a good point and one that I'll run past Loden but I think we have enough to be getting on with for the moment. For now, I agree that giving the Doreni the SK1P – assuming they need it – could be expedient. Keep that as a reserve option for now, find out whether their HH2 program is salvageable, and I'll speak to Loden and the Board." She picked up a glass cube paperweight from her desk and rubbed her thumb over one edge. "When do you leave?"

Hanbal watched the sliver of Mün rock inside the cube appearing and disappearing behind her thumb. "I'm flying out the day after tomorrow. One of the first charter services to start flying again, I believe."

Ademone nodded. "Good luck – and thank you, Hanbal."

"What time is your train tomorrow?"

Jeb appeared from beneath his desk, holding a can of chilled sapwood in each hand. "Not until after lunch." He passed Bob one of the cans and popped the top off his own. "So Gene can get his beauty sleep in."

Geneney pushed the plunger down on his coffee press, waited for the grounds to settle, and poured himself a cup. "I'll need it after tonight. Good to see business picking up again for Jorfurt though."

"The seed inspections hit him hard." Jeb agreed. "Good to see those easing off a bit. What can I get you, Bill?"

"Another water for me. Sparkling if you have it?"

"Coming right up." Jeb fished out a bottle from his fridge, unscrewed the top and handed it to Bill, who poured it into his mug. "Hey, Wernher."

"Evening," Wernher stood in the doorway for a moment, before taking a seat. "How did the party go?"

"Not too badly at all." Jeb flopped into a sack chair. "Even if I am getting too old for this sort of thing." He grinned at Wernher's rolled eyes.

"It was a good turnout," Bob agreed. "Eldrin was a bit wild-eyed to begin with though, sitting in a *bar* with *the* Jebediah Kerman, as he put it."

"If only he knew," said Geneney. "Coffee, Wernher?" He poured a second cup and handed it to the chief engineer. "And now that we've all got a drink, I'd like to propose a toast." He lifted his cup. "To the One-Twenty."

A motley collection of mugs, cans, and cups clinked together. "The One-Twenty!"

Bob wiped his mouth. "And I'd like to propose a toast to something I never thought I'd see in this lifetime." He raised his can. "To Jeb the diplomat."

Geneney chuckled and lifted his mug again. "Jeb the diplomat!" The others tapped their drinks against his. "And I can't think of a better kerbal to teach the Awakened Kerm about spaceflight."

"Official KSA ambassador to another species." Bill shook his head. "It sounds like something out of a science fiction story."

"But it's not," Wernher said softly. "And it's a long way from the firebrand rocketeer I remember from the Institute. You make an old teacher proud, Jeb."

Jeb suddenly became very interested in his can of sapwood.

"We're just planning ahead is all. If we ever find anyone else up there," Bob pointed in the vague direction of the ceiling, "we'll be able to send Jeb out to make First Contact with them." There was a ripple of laughter.

"We are the kerbals. Take us to your leaders!" Geneney managed a credible impersonation of Commander Kerbiman 'Kerb' Kerman, making Jeb raise his eyebrows.

"I didn't know you were a Heroes of Duna fan, Genie." He shook his head. "Being an ambassador to the Kerm is a big enough job for me thanks."

"I can imagine," said Bill. "You're going to meet Guardian Obrinn at the Berelgan first. Is that right?"

"Yep. Obrinn. Held by Erlin, awakened with Obrett and Gusemy. First Kerm – along with Guardian Elton – to be connected through the Kerm telegraph and actually the one who got them thinking about a telegraph in the first place." Jeb blinked. "Apparently he was lonely, so they decided to figure out a way of letting him talk to Guardians Elton and Jonelle."

Wernher walked over to Jeb's chair and gripped his former student's shoulder. "It sounds like you know him already."

"It does," said Geneney. "Good luck, old friend and give my best to Guardian Elton." He shot a mock-exasperated look at Bob. "First Contact, or no First Contact, there's always a space on the flight roster for a returning ambassador."

<He was very nice. I think my Erlin liked him but was scared too>

There was a long pause and then another train of chemical pulses bombarded Elton.

<Not right. Not scared but I do not know the right kerbal word>

<Awed? Jeb has done many impressive things. It would be right for other kerbals to respect him>

Obrinn thought it over. **<Yes. That is better. I will remember that new word>** The pulses became a torrent, saturating the soil around Elton's receiver into meaninglessness. The telegraph systems responded, shutting down the incoming link and starting a purge sequence.

<Slowly. Wait> Elton appended the codes for 'patience' and 'understanding' to his message. **<The kerbal machine is not fast enough for me to hear you>** He waited for his soil to clear. **<Try again now>**

<I saw the whole world!> The codes for 'excitement' spilled into each other. <Very small. No> Obrinn corrected himself, <not small but far away. I saw the Mün too but I didn't like it> <<fear>> <It was dead and dark. Why do kerbals want to go somewhere dead?>

<I do not truly know> Elton replied. <Jeb said that he went because it was there>

<That is a strange reason>

<Yes. But then he told me that he went to explore the Mün but the most important thing was that he found Kerbin>

<I do not understand>

<<reassurance>> <I had to think about it too but the answer was not hard. Kerbals have found more worlds like the Mün and they think that all of them are dead too. Only Kerbin is alive but...>

<It is also very small and lonely>

<Yes. I think this is something that all kerbals – and all Kerm – need to learn>

<I will try. But now my Erlin wishes to talk to me. I would like to leave>

<Professor Erlin> Elton corrected him. <Please tell him that Elton says hello. I too would like to leave now>

<Overandout, Elton>

<Overandout, Obrinn>

Elton waited for his soil to clear again. Then, with a sudden flex and droop of his leaves, he sent a carefully orchestrated wave of messenger chemicals towards Jonelle's territory. An answering wave swept over his outermost fibres, followed by the faint touch of not-self, as his daughter extended her fibres towards him.

<father?>

<Jonelle. Do any of your kerbals speak to you at this time?>

<no. Joenie spoke to me before half-sun but no kerbals speak to me now.>

<that is good. I would have you tell no kerbal – and especially not Joenie – of my words here>

<father?>

<my daughter, does Gerselle speak to you in these days?>

Jonelle's fibres stiffened, twitching away from Jonton before she could bring them under control. <no. Joenie asks me this too. The me before me remembers her words but I have never heard them>

<have you looked for her?>

<yes. I have found small things. Pictures that I do not know, thoughts that I do not remember or recognise. But I have not found Gerselle>

<I think you have found small parts of her> Elton paused. <my daughter – before we Awoke, we were both broken but we survived. Jonton became one with my shattered parts and, in time, helped me to heal although he did not know it. Enely found your shattered parts, brought them together and made you whole. Perhaps you can do the same for Gerselle>

He sensed his daughter's doubt.

<they are such small things and I have not found many. I do not know if this will be possible>

<I know. That is why I would not have you speak of this to the kerbals. To have them hope and then see that hope fail would be cruel. I will help you, my daughter - I knew Gerselle through Jonton and might know the thoughts you do not recognise.>

Jonelle's answer was muffled by a loud burst of chemicals.

{Incoming Call}

Jonelle wasn't sure whether her father's response would have made Joenie blush or giggle.

<I apologise, my daughter. I should answer this>

<Ready>

<Hello. Is that. Elton?>

<Yes. This is Elton. My daughter, Jonelle is also here. Who do I speak to?>

<My name is Enedred> A pause **<My Enely asked. me to pass. on his res... respects? Is that a right kerbal word?>**

<It is. Please pass on my thanks to Enely> Elton paused to let his telegraph interface clear. **<It is good to hear your words, Enedred. I would have you be welcome, for we have much to discuss>**

Chapter 109

Twenty-Five

*This could be the very minute
I'm aware I'm alive
All these places feel like home

With a name I'd never chosen
I can make my first steps
As a child of 25

Snow Patrol: Chocolate*

Patbro watched the car pull up at the foot of the hill and a familiar figure climb out of the passenger seat. The figure leaned through the car window for a moment before stepping back and waving as it drove off. Then he turned and walked up the path towards the hut, a thoughtful expression on his face.

"How is she?"

Jonton smiled. "Very well. She'll be happier once she's able to get outside again, I think. I got the distinct impression that that part of being an-Kerm is starting to become tedious."

Patbro chuckled. "No. Tivie was never one for sitting around." His expression turned serious. "And how's her Kerm?"

"Lively. If she's anything like this once she's Awakened, then uncle Elton is going to have a full-time job on his hands, for want of a better expression." Jonton looked at his friend. "Her Awakening isn't far away either, if I'm any judge. I'm still happy to be one of her Anchors, if you'd like."

Patbro took a deep breath and exhaled slowly. "I would – thanks." He raised his eyebrows. "Uncle Elton?"

Jonton looked at him wryly. "It rolls off the tongue more easily than 'Kerm that I would like to be my daughter but isn't my daughter'. I think he feels a certain responsibility for her, having given up part of his territory to make room for her."

"He's taking the idea of a family very seriously."

"Yes – which is probably a good thing. If he can set an example for Tivie's Kerm and Ludvis's too, then there'll be just enough room to plant a new Kerm between them. Tivie, Ludvis, Elton and Jonelle should make a nice Cluster with room for one more volunteer if we get one."

"Which could be whoever sets up between Tivie and Ludvis?"

"I'm not sure. Possibly. I think it depends on the range of Kerm ages that we get for the other three Kolan Clusters." Jonton scrubbed the back of his hand on his forehead.

"Although there aren't any middle-aged Kerm around Barkton."

"Just old-timers and new saplings," Patbro agreed. His voice turned wistful. "I wish my old-timer wasn't planted so far away."

Jonton gripped his friend's shoulder. "He can be the start of a new Barkton Cluster once the One-Twenty are awake." *Assuming that's what they choose*, he added silently.

If Patbro shared his reservation, it didn't show on his face. "How many are Awake now?"

"The Berelgan think that Tivie's will be the twenty-fifth. Difficult to say for sure since the times from going an-Kerm to Awakening have been all over the place so far and there doesn't seem to be any obvious pattern between Kerm age, Keeper age and Awakening time." Jonton smiled. "The next two have only just gone an-Kerm though, so they're pretty sure that Tivie will be next."

"Twenty-five Awakened Kerm." Patbro shook his head. "We'd better get on with this second telegraph line then. Do we know where it's going yet?"

"Eventually? Anywhere that Elton wants - it's just a telephone line after all. For now though, it'll probably be mostly for calls to the first Doreni Cluster at Almkat. He gets a lot of calls from Enedred's Cluster in Wakira, so between those and the regular conference calls with Erlin and his team, he thought it would be better to 'show goodwill and respect' to the Doreni by having a dedicated line installed for their Clusters."

It was Patbro's turn to smile. "Very diplomatic."

"And absolutely nothing to do with Jebediah's report that the Almkat Kerm are as space-crazy as he is," Jonton agreed. "He's been spending a lot of time reviewing what memories he has of Jebediah's namesake and trying to understand how he was able to get everyone to agree to the original Council of Twelve Truths. He hasn't said as much but I suspect that he

sees an alliance with Almkat as a way to garner support for Project Starseed amongst the Doreni Kerm."

"Preserve me. A diplomat *and* a politician." Patbro glanced up at Elton's gently swaying branches. "Although we kerbals could do an awful lot worse."

"Indeed." Jonton gestured at a large crate and a reel of cable stacked next to his front door. "Shall we make a start on the Doreni hotline?"

The criss-crossing trails of dead clover stood out clearly against the dense carpet of green which now surrounded Elton's trunk and Jonton thought he could have found a good site for the second Telegraph interface even without the ring of bright red canes marking the spot. He and Patbro scraped away the first few centimetres of earth with a spade before setting to work with their trowels. One of the red canes tumbled into the deepening trench and Jonton set his trowel aside and cleared away the last of the soil around Elton's fibre by hand.

Patbro handed him the U-shaped emitter jig which fitted easily over a large cluster of nodules on the main fibre, just behind a point where it split into two. Jonton marked the position of the jig holes, set it to one side and drove the two mounting pegs, for the emitter itself, into the soil.

"Right then." Jonton scanned the instruction card taped to the underside of the crate lid, before lifting the emitter assembly out of its packing. "Switch on the installation sensors. Okay, we've got two green lights, so the sensors are working and the battery is charged."

"So far so good," said Patbro.

"Yep. Hold the emitter unit by both handles. Depress trigger to release the guide grip, slide unit over the mounting pegs, and carefully lower it towards the Kerm fibre. An audible warning will sound when the emitter is at the correct height. Release the trigger to lock it in place." Jonton raised his eyebrows. "I'm so glad they told me to do this carefully."

Patbro shrugged. "Better safe than sorry."

"Hmph." An insistent bleeping noise sounded from the emitter unit. Jonton lifted it fractionally to shut off the alarm before releasing the trigger. "Okay. Now for the support legs – hmm, these are much easier than I remember. Could you do the backfilling while I hold onto this?"

"Not a problem." Patbro began scooping soil back into the trench before tamping it down, taking special care to pack it around the support legs. Gingerly, Jonton let go of the emitter, hands hovering near the handles in case the alarm went off. Reassured by the silence, he stepped back and retrieved a stainless steel cartridge from the crate before squatting down beside the emitter and unlocking an access panel set into its stem.

"Open the port. Insert double ended cartridge here, close the port and lock up." Jonton got to his feet and watched Patbro threading the telephone cable through a series of guides on

the other side of the stem before plugging into its socket on the underside of the emitter's hemispherical cap.

"That should be everything." Jonton dusted off his hands. "Time for the moment of truth. Well sort of. I guess that part comes later when Elton tries to use it but..."

"It definitely won't work unless you switch it on," Patbro said gently. "I can do the honours if you like."

"No. No, I should do it." Jonton unlocked a second access panel, revealing a single switch. He paused for a second then pressed it. A row of green lights under the emitter cap lit up in sequence and then winked out. Patbro gave him a thumbs-up.

"One Doreni hotline installed and powered up. He grinned at Jonton. "Now let's go and face that moment of truth."

"Are you getting this?" Chad peered into his viewfinder and adjusted the focus.

"Looks fine from here. Reading you loud and clear on the audio pickup."

"Well alright then. Let's get set up for the big intro." Chad panned his camera round until the viewfinder showed nothing but blackness edged by curved metal corners.

"Patching you through to the studio now, Chad. Going live in two."

"Copy, Flight." The chatter of technicians and television crew filled his ears alongside the more measured responses from the capsule systems team. Then the background noise cut out, replaced by a single familiar voice.

"Good afternoon everyone. I am Leland Kerman and this is a KBS News spaceflight special. With us today will be kerbonaut Chad Kerman, pilot scientist aboard Pioneer 6 and one of two remote operations specialists for this, the fifth Tenacity crew and its first full complement crew of eight kerbonauts." Leland paused. "Foxham Mission Control has just confirmed that they're ready and waiting so, without further ado, let's go live to Tenacity. Can you hear us, Tenacity?"

"Loud and clear, Leland. It's good to have you with us."

"Our pleasure, Chad and thank you for taking time out of your busy schedule."

"You're very welcome. We've been working pretty hard up here for the last couple of weeks and we're looking forward to giving everyone back home a little guided tour." Chad cleared his throat. "Right now I'm at the far end of Spoke 1, our outermost spoke. It's the second one to be completed here aboard Tenacity – I was actually in here just this morning closing out the final set of leak tests and air quality checks."

"I remember James Kerman talking about a 'new spacecraft smell' when he first opened Endurance's hatch. Do you still get that onboard a modern spacecraft?"

Chad laughed. "Very much so – and we like to try and keep it that way. A big part of the life support systems – well big for us crew anyhow - are the charcoal filters. They're mainly for removing any unwanted odours from the spacecraft systems but they do a pretty good job of keeping everything pretty close to new spacecraft fresh, even with eight of us floating around the place."

"Are the spacecraft systems really that smelly?"

"The biology racks over in Spoke 5 sure can be. We've been running some experiments for the long duration life support team, looking at different algal and bacterial cultures, to try and find one we can use for scrubbing carbon dioxide out of the air. Some of those can get pretty ripe."

"I can imagine. Now, before we start, I'm not seeing a great deal from our camera feed. Am I right in thinking that's because it's pointed at the outermost window?"

"Absolutely, Leland. I don't know how much you'll see from a movie camera but I can tell you now, this view is a treat. Stars upon stars upon stars."

"We're just getting a black disc, I'm afraid."

"Oh. Well I'll see what I can do to fix that after the show. Try and give the folks back home an idea of what it's like. Don't get me wrong – you never get tired of looking at old Kerbin either, but I'm looking forward to just bringing a ration pack up here sometime and spending some time with the universe over dinner, you know." Chad stretched out an arm. "For now I'm going to do a slow pan around the module. There's not much to see at the moment – we've got storage lockers and ventilation around the forward window there and then moving around, you can see the hatchway through to the rest of the spoke. Now that we're cleared for habitation in here, we'll be keeping the hatch open mostly but we can close it to seal off this module from the rest of the station in an emergency."

The image on Leland's screen continued its stately pirouette, coming to rest at a second, closed, hatchway that, to his eye, looked very similar to the first.

"And this here, is the aft hatch. Identical to the one you just saw to save on manufacturing costs. Right now it doesn't lead anywhere except hard vacuum but if we were onboard one of the actual colony ships, we'd be facing backwards along the length of the craft towards the engines." A hand appeared in shot as Chad pointed at the hatch. "And this would be the way into the main living area. During the journey to Duna, the ship will be spinning about its long axis which means that anything through there gets pushed out against the spacecraft hull. It's not real gravity but it's the next best thing."

"If you want to see how it works back at home, take a bucket of water, tie a rope to the handle and spin it round your head. Even if the bucket goes upside down the water won't fall out because the spinning is pressing it against the bottom of the bucket." Chad pushed off from the hatchway. "You should probably try that outside though."

Leland chuckled. *"Yes, for the benefit of our audience, KBS News recommends that any scientific experiments involving swinging buckets of water around, be carried out outside. Oh – now this is looking a little more lived in?"*

The view from Chad's camera showed the interior of what appeared to be an immense tubular blanket, wide enough for two kerbals to pass one another with ease. On the left-hand side, a row of flattened, slightly convex, lighting panels stretched along the tube wall linked by slender fabric sleeves. Leland tilted his head to one side, trying to match up the image on the screen against what he knew of *Tenacity's* construction.

Here and there along the opposite side of the tube, somebody had stuck a handful of posters depicting scenes from Kerbin. They were, Leland noted, mostly of woodland or other rural scenes, and he wondered if any of the kerbonauts aboard the station had put up a picture of their Grove. Between the posters, sections of webbing had been strung up and now held a eclectic assortment of high tech equipment, squeeze tubes of water, paperback novels and other personal items.

"Yep, that's the great thing about Tenacity," Chad said. "There's enough room for us to get some personal space. When you're down in the Hub or the Bridge modules, there's no getting away from the fact that you're inside a spacecraft but out in the spokes it's quite cosy. Although, unless you're in a spoke that's rigged with equipment racks, there is a limit to what you can attach to the walls. Hang on – I'll just leave the camera here a minute."

There was a confusing jumble of images and then Chad appeared in-shot, floating next to one of the posters. "Can you see me?"

"We can see you fine and I think our viewers will really be getting that zero-G feeling, watching you."

"Excellent. Now, I'm gonna let you all into the big secret of living in space." Chad peeled back a corner of the poster revealing a patch of bristly looking fabric. "Good old hook-and-loop fasteners. Pretty much everything you see in here is stuck to the wall with it and actually, any time you see anything at all attached to a spacecraft wall, it's a good bet that it's either welded on or stuck down with hook-and-loop."

Chad pressed the poster back into place. "And before any of your viewers ask, the reason we don't use thumbtacks in here is not because we're worried about popping the tube but because we don't want anything small and sharp getting loose and floating around at eye-level."

"That is a question that a lot of our viewers have asked so thanks for clearing that up for us." Leland watched the kerbonaut retrieve his camera, orient himself and then push off along the spoke, the almost perfectly steady movement of the camera making him feel slightly nauseous.

"Okay then, we're passing through the hatch into the knuckle module. This is the halfway point of the spoke and, as you can see, it's got a window over there and two docking ports on the other sides. Right now, we've got a Power, Assembly and Logistics module or PAL

docked outside but down on Spoke 4 we're looking forward to hosting the very first Duna shuttle prototype, courtesy of a whole lot of hard work from our Doreni colleagues over the last year."

"And some help from the Rockomax Corporation?"

"I believe so, Leland, although I'm told that the shuttle is an all-Doreni design. I'm no propulsion specialist but I know a lot of folks have been getting very excited about their KR-1L engine from Kerbodyne. Anyway, their first LKO test flight is underway but if all goes well, their second test vehicle should be docked to Spoke 4 in a month or so."

"For more of that new spacecraft smell?"

Chad grinned. "Yep! Incidentally, that PAL outside used to be docked on the back of the Hub module – we moved it to this spoke to help out with construction and to free up a docking port for the second Bridge module." Chad drifted over to the window. "Now, the angles aren't great from here, so I'm going to pass you across to Mission Control for a moment, so you can get a good look from one of our external cameras."

Leland's screen flickered and suddenly he was outside the space station, staring at the PAL spacecraft docked to its spoke, photovoltaic arrays gleaming in the sunlight and its robotic arm angled towards the far end module where Chad had begun his tour. The camera tilted before zooming in on the knuckle window from which the kerbonaut was waving back at him.

"Oh my."

"It's something isn't it? I was out on the end of the arm the week before last, helping to nudge that second inflatable section into place. Riding that thing is a blast – makes the EVA so much easier!"

Somewhat to Leland's regret, his screen flickered again and he was back inside *Tenacity*.

"Welcome back. Let me just get myself turned around here. Little push against the window frame... and there we go." Chad slipped through the hatchway and along a second fabric tube, which was also adorned with posters and the occasional photograph. Leland caught a glimpse of a group of kerbals sitting around a picnic table, mugs hoisted at the photographer.

"Okay, around the hatch here you can see the couplings for the equipment racks." Chad pointed at a set of clamps and connectors on either side of the hatchway. "Mechanical interface, power supply and data feeds. You can fit in two racks per module but it doesn't leave you with much of a gangway. Not a problem once we've finished up the wheel – we can designate any double-racked spokes as a one-way street so to speak but right now it's kind of handy to have enough room for two crew to get past each other."

Chad checked his slow drift against the hatch frame before poking his head through. Leland reeled away from his screen at the sudden vertiginous sense of space yawning below him before perspective reasserted itself.

"And welcome to the Hub. In here, you can almost believe that you're flying a spacecraft again. Hi, Milden. Quick wave for the folks back home?"

"Hi, Chad. Hello everyone."

"What's on the tasklist for today then, Milden."

The other kerbonaut dipped her head. "Um, clearing any fan debris and checking the filters. Then Mitzen and I are prepping the rack mounts in Spoke 7."

"I was just telling Leland about the filters. Are you still with us, Leland?"

"We're right here, Chad, and wondering if kerbonaut Milden could spare us a moment to talk about the fan debris. That sounds pretty serious?"

"Oh it's nothing much," Milden said. "All the hard modules here are equipped with ventilation fans to keep the air moving in zero-gravity and to pull it through the air conditioning units where the carbon dioxide is taken out and fresh oxygen put back in. The fans also act like little suction-cleaners – any loose items floating around tend to find their way to a fan eventually, so keeping them clear is one of our housekeeping tasks."

"If you find my lucky cufflink, that would be great," Chad put in. "No idea where that's got to."

Leland got a distinct impression that the other kerbonaut was trying not to roll her eyes. "I will, Chad. I should be getting on though – it was good to speak to you, Leland."

"Thank you for your time, Milden."

Chad watched Milden disappear into one of the spokes before turning his attention back to the camera. "Where were we. Ah yes – the Hub." He cleared his throat. "On the actual colony ship, the Hubs are designed as emergency radiation shelters for the crew in case of any sunspot activity from Kerbol. They'll also contain the acceleration couches for the crew to use during any significant manoeuvres. Here on Tenacity, we're using our Hub as the main eating and sleeping area." The camera turned to give a view of a set of shelves, sleeping bags and more elasticated webbing for personal effects. "The sleeping arrangements haven't changed much since our very first space station, Endurance. They're simple but they work and they're pretty comfy in zero-G. We keep the dining table packed away during the day – one less thing for everyone to bump into."

Chad checked his watch. "We're almost out of time I'm afraid folks, but I've got one last thing to show you before we go. Spoke 4 is pointing at Kerbin right now and the view out of the window there is pretty good – but you've all seen the inside of a spoke now. So we're gonna head through to the first Tenacity module to be launched into space." He pushed off one of the sleeping shelves and towards a dim hatchway.

"This is the forward gangway leading to the main docking port. And here," Chad reached over his head, caught a handhold and began pulling himself along the ladder, "is the access way to the Bridge. Officially it's the forward observation deck but on the actual colony ship

it'll be the bridge, so that's what's stuck. As he emerged from the access tube, he heard a sudden intake of breath over his headset.

"Pillars preserve me." The veteran broadcaster's voice shook. *"It looks ready to fly."*

Chad drifted over to the centre seat, panning the camera round as he went. Everyone in the KBS studio were treated to a view of the seats secured to the convex floor and the instrument panels and monitoring stations arranged around the outside walls, before the image on their screen settled on the view of Kerbin through the bridge windows. Then the camera tilted up slightly and zoomed in to reveal three items secured to the centre window frame. A carved wooden space capsule, its darkly polished surface reflecting streaks of blue light from outside sat flanked by a miniature flag of all Kerbin on one side and a equally miniature pennant emblazoned with a white cross painted on a tree stump and a stylised hand clutching a dripping paintbrush.

"Guardian Elton's gift, the flag of all Kerbin and the White Cross Company logo. How completely appropriate."

"We thought so," Chad said soberly. "Having all three of them there with Kerbin in the background – well it helps put this whole thing into perspective."

Gusemy climbed out of the off-roader and eyed the Veiidan squad with trepidation. Clad from head to foot in Kerm-protective gear complete with helmets and full-face steel mesh masks, they resembled a cross between a motorcycle racer and a warrior from one of the more lurid historical dramas. The overall effect would have been comical were it not for the obviously Kerm-worn state of their armour and the air of grim competence that hung over them. Their sergeant stepped up to Gusemy's companion and saluted.

"Perimeter is set, sir. Bravo squad report no sightings of resistance."

"Acknowledged." The commander frowned for a moment then shrugged and turned to Gusemy. "Right. Let's get you suited up, sir." He opened the back of the off-roader, hauled out two sets of armour and began climbing into one. Following his lead, Gusemy removed his shoes before pulling on a pair of heavy padded trousers, their tough fabric slightly ridged under his fingers. By the time he'd donned his belt, matching padded jacket and steel capped boots, the sergeant had sorted through the pile of plates, straps and buckles at his feet.

"Vest on first." A heavy chest and backplate linked by shoulder straps dropped over his head. The chestplate gave slightly as the sergeant tightened its waist straps and Gusemy felt the metal plates inside shifting in their pockets. Knee, elbow and shoulder pads went on next followed by supple chain gauntlets and an aluminium gorget around his neck. The sergeant studied him for a moment. "That'll do. He's all set, sir."

"Thank you, sergeant." The commander studied Gusemy too. "Right. You've been to your share of neo-Kerman villages and I've heard you can stay calm with a gun pointed at you. That's good." He looked the ambassador in the eye. "Unfortunately, the Children of Kerbin

are nothing like your average neo-Ker. One camp might come quietly, the next will fight you tooth, nail and vine. Your armour should keep you out of most trouble but if it all goes south you hit the dirt and let my lot deal with it. Do I make myself clear?"

"Quite clear, Commander. Thank you."

The other grunted in reply before turning to his squad. "Form up, move out, and stay sharp for Kerm trees."

The squad formed up around Gusemy and set off towards the forest at a trot. Weighed down by his armour, the ambassador did his best to keep up but by the time they reached the treeline, his gorget was already chafing and his shoulders were starting to ache. As they slipped into the forest, the Veiidans fanned out and, much to his relief, slowed to a fast walk.

As they pushed on into the forest, Gusemy swore he could see shadows flitting between the trees. The commander made a low hooting noise before making a sharp hand gesture to his troops. He saw Gusemy's raised eyebrows and nodded.

"It's them," he advised quietly. "Good woodcraft – we wouldn't be seeing them unless they wanted us to."

A cold trickle of sweat ran down Gusemy's back and, despite himself, he swallowed hard.

"Yeah, I don't like it either. Remember – if it goes south, hit the dirt."

The sergeant jogged over and muttered something into her commander's ear. A grim look crossed his face and he glanced at Gusemy before turning his attention back to their surroundings.

The forest began to thin out around them until they emerged on the edge of a large clearing, dotted with tree stumps. Further back, clapboard hut, linked by cobbled paths, had been built around the larger trees. Gusemy's nostrils twitched at the mingled scents of woodsmoke and drying fish and he noticed a larger hut, constructed from rough-dressed stone and set well away from the others, a ragged tendril of smoke leaking from its chimney.

Here and there, pieces of more modern technology broke the rusticity. Gusemy spotted the occasional hut sporting an antenna or photovoltaic array on its roof and some of the huts were equipped with steel rain barrels. And, in the very centre of the clearing, he was unsurprised to see a larger hut built around a Kerm tree.

Around the edges of the clearing hut doors opened and groups of grey-clad figures filed silently into the clearing dressed in long cowled ponchos. In eerie unison they pushed back their cowls, revealing circlets of woven Kerm leaves around their foreheads and lines of livid raised weals across their cheeks. To Gusemy's horror, the younger figures bore lines of swollen and still-weeping puncture marks. The sudden hiss of indrawn breath from the commander told him that the Veiidan recognised them too but before he could say anything, one of the figures broke away from the group, hands flung out in surrender.

Before she could take more than a second step she was cuffed to the ground, the impact cutting off her sudden cry.

“Kermbal minsathona!” One of the figures stepped forward and spat on his sprawling companion before lifting his head and staring contemptuously at the Veidans. “I see the cowards and the unworthy have arrived at last.”

Chapter 110

To Walk Amongst Them

"You might want to reconsider that, my friend." The commander's voice held an edge of steel.

The kerbal in front of them looked down the rifle barrels pointed directly at his head and laughed. "As I said - cowards. Unworthy to set foot inside She who watches over us." He raised his arms and five Kerm vines erupted around him in a shower of earth. Three of them snaked over to the figure still lying prone on the ground, the other two rose to caress his fingertips, before bending and unfurling into a double ring of needle-sharp teeth. Slowly, almost languorously, the glistening inner tendrils emerged and waved at the commander.

"I am the Speaker to the Unworthy." He gave the commander a mocking smile, before prodding the fallen figure with his toe. "I could kill her with a thought. I could kill all of them with a thought." Two of the tendrils twisted together into a point. The vines on the ground curled around the prone figure's head and plucked the circlet of leaves from her brow. "And as for you, your foolish masks will not save you here."

Something glinted from the eaves of the Keeper hut and Gusemy looked up sharply.

"Stand down." The commander's voice was suddenly ragged. The Veidans lowered their weapons, fear showing in more than one pair of eyes. Their sergeant took a step back, her tongue moistening the corner of her mouth.

Gusemy cleared his throat. "It would be a difficult shot for me," he said. "But I don't imagine it would present a challenge to any of my companions." He pointed at the hut in the centre of the clearing. "Your Keeper is good but she will find it rather harder to control the vines without a camera to see them with." He gave the Veidan commander a grim look. "With that level of control, we're dealing with a Kerm which can see through its Keeper's eyes and is intelligent enough to take instructions."

The commander's eyes widened. "Awakened then. But the Children wouldn't break the law of..." He turned back to the crowd and the look on his face caused his sergeant to take another step back. Behind her, the Veiidan troops raised their weapons again. "I don't know what you've done here, but you will take me to your Keeper. Now."

To his utter astonishment, the other gave him a lopsided smile that wasn't quite a sneer. "Are you sure you want to, my kermbal minsathona? We are not blasphemers here, who would break the most sacred Law. We keep to the old ways – the forgotten ways."

"Enough of this!" The commander whirled and pointed at four of his troops. "You, you, you and you. With me. And you, Ambassador." He beckoned Gusemy over before spinning round to face the Children. "Let's go."

One of the waving vines bobbed up and down in an unmistakeable nod. The Speaker looked at the soldiers, malice dancing behind his eyes. "Let us go indeed." He walked over to the hut, flung open the door and bowed. "After you, good kerbals."

The four Veiidans piled through, Gusemy and their commander close behind. They found themselves in a wedge-shaped room, with doors on both of the long walls and a Kerm trunk visible at the far end. A sparsely furnished kitchen area ran down one side of the room and a scattering of homespun sack chairs around a low table occupied the other side. The cinnamon laden air caught the back of Gusemy's throat making him cough.

The commander waved two of his squad over to one door and took up a position at the opposite door with the others. He gave a low whistle and both doors crashed open, propelled by the shoulders of the largest soldiers. Gusemy hurried in after them and stopped in dismay.

In the middle of the room by the Kerm trunk, a naked kerbal sat on a hewn wooden throne, her modesty preserved by a short loincloth and the profusion of vines wrapped around her legs and waist. Her head rested against a forked branch, swathed in multiple clusters of Kerm leaves.

Gusemy glanced around the room, barely hearing the pungent oath from one of the troopers as he took in the rows of bunks curving out from either side of the throne, each of them occupied by a small white-robed figure, head nestled within a leaf cluster. Almost absently, he noticed their blank-eyed stares, their sandaled feet barely reaching the end of their bunks. Then his mind caught up with what his eyes were telling him and the acrid taste of bile rose in the back of his suddenly heaving throat.

"Why?"

He was answered by creaking branches and a gust of cinnamon. Then an all-too-kerbal voice replied from amidst the Kerm leaves.

"This one I speak through was the first. The older ones broke and were shed but the young ones were resilient. They joined with me and then they became me."

"Who are you? What are you?" The commander spoke through clenched teeth, whether through anger or the need to control his own stomach, Gusemy couldn't tell.

"I have no need of names. I am Kerm."

Outside the hut, the five vines whisked back under the soil. The kerbal on the ground picked herself up and looked around warily. The Speaker waited for a moment then, when the vines remained out of sight, raised his arms to the sky.

"She calls! To me, my brethren - to me!"

At his cry, the still-silent crowd came to life, scurrying towards the Keeper's hut, which was rapidly surrounded by a ring of bodies several kerbals deep. One figure, robes streaked with dirt and her cheek still sticky with saliva squirmed her way to the front door where she stood behind the Speaker.

"Clear the entrance!" The Veiidan sergeant cocked her weapon. "Clear the Blighted entrance!" Seeing no movement from the crowd, she fired a single shot over the hut roof.

"Stand and be true, my brethren! They cannot harm us in Her sight!" The Speaker folded his arms over his chest. "Would you kill us all? Females and children too? I named you well, *coward*."

A small part of Gusemy's mind began to pick out the details in what he was seeing. The rivulet of drool escaping from the corner of the Keeper's mouth, eyes staring at a screen suspended from the ceiling. The splashes of colour adorning the wrists of the motionless kerblets on their bunks. The Kerm vines openly coiling around bedsteads and kerbal flesh alike.

"...so many kerbals. I only have so many vines and most are needed to keep their bodies alive. But there are always more kerbals, and with care..."

The Keeper's gaze snapped round. A wet, tearing noise plucked at Gusemy's ears followed by the thump of bodies hitting the ground. They convulsed, bloodstains blooming against the whiteness of their robes, then lay still.

"...I may regain the use of enough vines for the purpose."

Gore streaked tendrils slashed at Gusemy, the needles around their base strung with gobbets of tissue and shreds of green skin. With an inarticulate cry he reeled back, arms thrown up to shield his face. The needles scored parallel grooves across his sleeve, snagged against his elbow pad and ripped free.

Hit the dirt and let my lot deal with it.. Gusemy dropped to the floor, arms curling protectively around his head. He felt a second and then a third vine lash against his armour before coiling around his boot and pulling. Panic rising, he kicked out with his other leg, scissoring one boot against the other. The insidious tugging relaxed and he rolled away, yells

and then barked commands sounding overhead. He crashed into the side of a bunk, swearing as he struck his head, and then gunfire made any further thought impossible.

Despite himself, the Speaker flinched at the gunshot, it's deafening retort only slightly muffled by the hut wall. "Stand, my Brethren! The Vines will protect us!" Sporadic shots crashed out, accompanied by shouts and yells. "Feel their panic! Smell their fear of Her wrath!"

The crowd began to shuffle, twitching at the muffled sounds of combat from inside the hut, flinching at every shouted order. The Speaker's gaze flicked from side to side. "Stand! Or be forever cast out as Unworthy!"

Another burst of gunfire crashed out and the crowd broke. Seizing their opportunity, the Veiidans charged, knocking fleeing figures aside as they went, before kicking down the hut door and dashing inside.

He ran.

Ignoring the fleeing Children around him, doing his best to ignore the furious cries and promises of eternal suffering at Her hands, he ran. Part of him flinched with shame at every screeched imprecation, knowing that deep down at the core of his being, he was indeed unworthy. Another part of him noted the lack of pursuing vines and knew that his worst fears had come true.

The forest enfolded him, vast and comforting, and yet another part of him slipped into the familiar routines, avoiding fallen twigs that would give him away, skirting around the animal trails, stepping around the soft ground that could reveal a stray boot-print, snatching up a handful of mud to smear over his clothing or a fallen bough to brush out the signs of his passing.

The Unworthy were not lacking in skills of their own but they did not have his intimate knowledge of this forest. He wormed his way into a patch of thorny bushes and waited, mud-smeared clothing blending in with the shadows. Eventually, satisfied that the chase had been abandoned, he drifted back to the village breaking off every so often to circle his own trail, alert to any signs of lingering pursuit.

Creeping from tree to tree he made his way to the edge of the village clearing, anger rising at the sight of his brethren herded like kaya and watched over by stony-eyed Unworthy. Then he caught sight of the white-robed figures laid out in a row in front of the hut and anger congealed into fear.

Even without the bands of green at her collar, the very size of one figure, when set against the rest of the Blessed, would have been enough to give her away as his Keeper. His eyes flitted from one set of forlorn robes to the next, scanning the patches of colour at their sleeves. A flash of yellow caught his eye and he stiffened.

The chequered band seemed to taunt him, its uneven pattern a mute testament to his inexperienced needlework. He felt her arms around his neck, her voice reassuring him that the Kerm wouldn't mind and that she didn't care anyway because yellow was her favourite colour.

Fear erupted into blazing fury. He tensed, lips writhing in a silent snarl, poised to hurl himself at his tormentors, hooked fingers ready to gouge and tear until the cowards could finally put an end to him.

Don't be silly, Daddy.

The fury collapsed. Shaking with grief and self-loathing he crawled back into the forest.

The cars drew up at Jonton's front gate. He watched the driver climb out, followed by a pale-haired kerbal whom he recognised as Gusemy's aide. Finally, the ambassador himself emerged, face drawn with weariness and something else that Jonton couldn't put a name to.

After a strained lunch, during which the ambassador's mind was very obviously on other things, his staff retired to their rooms upstairs. Gusemy stood listening, head on one side, then at the quiet click of two closing doors, turned to face Jonton. "Is Elton available?"

"I spoke to him immediately after your telephone call. He's expecting us."

"Good. I have no desire - or intention - of going through this twice."

Jonton nodded and held open the sleep room door. "After you, Ambassador." He watched Gusemy approaching his bunk with a curious reluctance, lips moving soundlessly as he arranged his pillows and lay down. For a long moment he stared at Elton's leaf cluster over his head with what looked like revulsion before finally closing his eyes and submitting to their touch. Brow furrowed with concern, Jonton lay down on his own bed and joined them.

He emerged above a similarly furrowed mindscape, which thrummed across his nerves like the air before a thunderstorm. A dark, hunched figure stood alone, tension radiating from him in waves. Jonton sensed Elton's presence maintaining a discreet distance and wondered why the Kerm wasn't doing more to reassure the obviously distressed ambassador.

<I have tried. Any closer and my presence causes him too much fear to contain>

Fear?

<I do not understand either, First of my Keepers. I would have you ask him, kerbal to kerbal, whilst I listen from a distance>

I think that might be for the best. Jonton broke his private connection to Elton, letting himself drift forward towards Gusemy.

"Is he listening?"

Yes, but he's promised not to come any closer. He seems to think you'd prefer it that way.

Given the choice, I'd prefer to be as far away as possible from any Kerm, let alone a sapient one. A harsh laugh scraped across their mental link. But since when have my duties ever been so obliging. Gusemy gathered himself. You told him the release word?

Yes, and he will honour it, although he doesn't understand why it should be necessary

He will. You both will. Black loathing flooded down the link like a tide of raw sewage and Jonton swallowed the bile that rose in his own throat in response. But I can promise that neither of you will like it.

An image of armoured figures standing around an olive green off-roader appeared.

I'd been working with the neo-Kerman - visiting their camps and doing what I could to persuade them that we were serious about giving them a voice before the One-Twenty. We thought - hoped - that we could also persuade the Children of Kerbin that were serious about throwing ourselves on the wisdom of the Kerm...

As the final image of discreetly covered corpses being gently lifted into the back of that same off-roader, faded away, Gusemy felt his mental links with Jonton and Elton widen fractionally and then a little further, the Kerm clearly trusting that he'd be able to keep his emotions in check once more. The mindscape had turned a uniform slate grey, ominous thunderheads building up in the distance, sensed rather than seen.

Why? Jonton shook his head. Wrong question. How?

From what we learned speaking to the villagers, a wilful and reckless lack of control. Jonton sensed that the ambassador was deliberately retreating behind formal language. We already knew that a sizeable faction of the Children held a... romanticised view of a kerbal's place before their Kerm and apparently that was reinforced by your historical revelations. Gusemy felt Jonton blanch. I'm afraid so - at least one of this particular village had Communed with you which, unfortunately, reinforced their worldview. Even more unfortunately, it introduced them to the notion of mass-Communing as part of that worldview.

I'm not sure I like where this is going.

No. They revelled in their first mass Communion believing it to be a long-lost gift from the Kerm. Secure in that belief, they made no effort to damp down their emotions. In retrospect they were lucky that the mental feedback didn't kill them. Given the depths of madness that feedback eventually led them to, it would have been better if it had.

A whiff of sewage trickled down the link.

Sorry. Word of their rediscovered Kerm gift leaked out and in time their village became the hidden centre of a cult of Kerm worship. Which is how we eventually learned about it of course. What we didn't reckon on was the effect of years of uninhibited mass Communion. At some point - we don't know when or how - they decided that the true reason for the historically documented mass Communion was to raise their Kerm to new heights without breaking the most sacred Law of Thirty Seven.

Instead of adding the mental capacity of a thirty-eighth tree to Awaken their Kerm, they used kerbal minds instead. The mindscape around Jonton's presence turned pitch black.

Yes. Gusemy's mental voice was toneless. They gave themselves willingly, even when the first volunteers died. Then they gave their own children to the cause and, for the honour of serving the Kerm, they went willingly too. Apparently younger minds were flexible enough not to break under the strain.

Lightning flared in the distance and Gusemy wasn't sure whether the growling roll of thunder that followed was a leak from Elton's thoughts or his former Keeper's.

Were they an-Kerm?

We don't know, Gusemy replied. Nobody tried Communing with it to find out. I suppose it's possible though. He paused and Jonton sensed his unease rolling down their link. *And the worst of it is that I can't get rid of the idea that they were right - about mass Communion I mean.*

<no> The negation was absolute. <I cannot speak for all Kerm but my kerbals were free to join with me and leave as they wished - unharmed> Images of prehistoric kerbal villages flickered around them. <young kerbals made the best fighters and were needed to make more kerbals. I do not think that any Kerm would have thought to use them in that way>

No Kerm would have, Gusemy thought privately.

<you were wise not to Commune with the insane one. If there are any kerbals sharing its mindscape there may be ways to speak to them but they will be dangerous. I would speak of this to the One-Twenty when they Awaken but until then, no kerbal should go near it.>

I don't believe that anyone will argue with that.

And any kerblets still in Communion with it will be physically safe, Jonton added. *It needs to keep them alive after all.*

I suppose that is some small comfort. Although the thought of those poor souls left in the middle of nowhere, in thrall to.... A wave of desolation rolled out across Elton's mindscape.

<I will speak with the One-Twenty and any kerbal who wishes to join our talk. We will rescue them if we can>

Gusemy sighed. *I know. Could you release our link please, Guardian. I would like to be alone for a while.*

<you are welcome to join me again whenever you wish. But until then, farewell, Ambassador>

Gusemy's presence faded and then vanished into nothingness. Jonton felt their connection dwindle and then break. *Do you think they have any chance?*

<the young ones who became a part of the insane one? No. A part of them may live on as memories within its memories but I think the rest of them will be lost>

That's what I thought. We have to try though.

<yes> The Kerm seemed strangely distracted. <I would speak to you of another matter now, first of my Keepers>

Of course - what is it?

<Gerselle>

Jonton froze. The mindscape around him remained a bleak, formless grey. *What about her?*

A vast sadness pressed against Jonton's consciousness. *<my daughter and I searched everywhere but could only find a poor few of her memories - and our memories of her. But Gerselle is gone. She too is lost>*

Chapter 111

Legacy

*She acts like summer and walks like rain
Reminds me that there's a-time to change...*

*But tell me. Did the wind sweep you off your feet?
Did you finally get the chance to dance along the light of day?
And head back to the Milky Way*

Train – Drops of Jupiter

Elton's words were muffled and indistinct, as if heard from the far end of a dark tunnel. Unseen, a line of trees sprouted across the mindscape and a part of Jonton gradually became aware of another sadness brushing against himself and Elton.

<Jonton?> A tentative mental voice spoke from the blackness. *<I could not find Gerselle so I let my father share my soil and my thoughts. He could not find her either>*

The trees vanished, leaving a thin red line of star poppies behind. Hosts of Kerm fibres crawled towards the line from both sides and mingled with one another, leaving the poppies intact.

<We preserved what we could of her, First of my Keepers> Elton's mental voice was only slightly less tentative than his daughter's. *<when you are ready, we can share them with you>*

In a dark corner of the back of Jonton's mind, a wall of interlocking sparks stood defiant against the enemy swarms. The sparks flickered out, replaced by a devastated sunfruit field. He stared at the poppy line, iridescently alive despite the Kerm fibres writhing beneath them and finally grasped what Jonelle was telling him.

Jonton hunted through the emotional thicket of his own mind, reaching for words but falling short. *Thank you*, he said at last, trusting to the Communion link to share his tangled feelings with the two Kerm.

He sensed a flicker of thought from Elton and a younger version of himself appeared, standing scowling in front a Kerm sapling, ready to ward off any threat. A copse of other saplings sprouted around them, glowing with a soft inner light. The younger Jonton staggered and was caught by an outgrowing branch as the light surrounded them. Understanding and sympathy flooded the combined mindscapes in verdant hues and even in Communion, the elder Jonton felt tears flowing freely down his cheeks.

The light engulfed him washing away the images with the pearlescent white of a new Communion link and shrank down to a pinprick, in response to an unspoken need. The pinprick vanished; Elton's last words a whispered echo in his ears.

<when you are ready...>

Jonton sat up and wiped his eyes. He looked up to find Gusemy sitting cross-legged on his bunk, staring at the wall. For a while they both sat in silence, each with his own thoughts, before the ambassador roused himself. "Preserve me but I'm glad that's over, although I doubt it'll stop the nightmares." He caught sight of Jonton's expression. "I did promise that you wouldn't like it."

"No." Jonton opened his mouth, then closed it again. "I'm sorry, Ambassador, Elton had some bad news for me. Not as bad as yours or bad but in a different way, a closer to home way." He buried his head in his hands. "Luckily it's not far away. Gerselle's family's Grove that is. Not far to take her home."

Gusemy's forehead wrinkled in puzzlement for a second before a sympathetic expression settled over his face. "She was kerbal," he said simply. "My condolences."

"Thanks." Jonton didn't look up. "Stupid of me really – she's been as good as gone for so long."

"But you never quite lose hope."

"No. Deep-down, I guess I always hoped that she'd find herself somewhere in there," Jonton gestured at the Kerm branches criss-crossing the ceiling, "and Awaken, like Elton and all the others."

Gusemy rested his forehead on his knuckles. "That doesn't bode well for those poor..." He set his thoughts firmly to one side. "Not the time. Sorry." He looked at Jonton. "I'll need to pass this up to the Council, I'm afraid. Any Awakening related fatalities have to be reported and learned from." He saw anger flare in the former an-Kerm's eyes, which faded to a defeated acceptance. "I didn't know her as well as Erlin did – but if he cannot be here, I would also be honoured to carry a spade for her."

"And Gerselle would be honoured in return." Jonton said mechanically, before shaking his head. "Thank you, Gusemy – that means a lot to me."

Jonton stood in the corner of his sleep room and watched Joenie brushing Gerselle's hair. It fanned out over the pillows, the sunlight catching against a faint waviness that he didn't remember being there before. Joenie knelt by her mother's head, bent over her task and ignoring her silent father. She leaned back and examined her work with a critical eye before gathering up one side of Gerselle's hair into three tresses and began plaiting them.

Oh. Jonton closed his eyes, wondering how many times Joenie had to have braided and brushed out her mother's hair to put a permanent wave into it. By the time he opened them, one plait lay flat against Gerselle's neck, the end tied off with a length of black ribbon, and Joenie was kneeling on the other side of the bed, hairbrush rising and falling.

"You're very good at this."

Joenie didn't bother looking up. "I've done it before."

"I know. I've heard you. Just sometimes though, when you forgot where that squeaky floorboard was." He saw his daughter's shoulders tense up. "It's alright, sweetheart. I'd have been more worried if you hadn't been finding time to spend with your Mum."

The brush stopped moving. "Why didn't she wake up, Dad?"

For a long moment, Jonton didn't trust himself to speak. "I don't know. I wish I did."

Jonton! Help me...J...

He gritted his teeth, Gerselle's last, terrified cry ringing in his ears. "I wish we'd never tried to awaken her," he whispered to himself.

"Dad?"

"I thought she would wake up one day, but Elton was right." He looked at Joenie. "He and Jonelle tried everything but..."

"They couldn't help." Joenie's voice was flat.

"No. They couldn't bring her back." He watched his daughter finishing off the second braid. "I hate to do this sweetheart, but we need to ask Jonelle to take her vines out before the funeral. She'll be as gentle as she can – I know she will."

"I don't think I want to see that. Can we tie her sheet on, Dad, in case it falls off?"

"Of course we can." Jonton walked over to her and sat down cross-legged beside her, staring unseeingly at the vines curled around the bedframe. "I don't think I want to see it either." He plucked at the sheet, twisting a fold of it between his fingers. "I'm not sure that tying it on will help though. I'll be back in a minute." Glad of something to do, he patted Joenie on the shoulder before leaving the room and returning with his mending basket.

"Let's start by tucking the sheet in, as much as we can. I'll do this side and you do the other one? Don't pull it too tight – I'm going to cut out some windows for the vines."

"Okay." Joenie set to work. Jonton waited until she was finished before smoothing the sheet over Gerselle and tucking it in on his side. "That's good. I'm going to need two pairs of hands for the next bit. Can you hold it here? Little bit further from the vine? Perfect." He retrieved a fabric pen from the basket and made a mark. "Same on the other side... and a mark across the top." He looked at Joenie anxiously. "Are you alright doing this?"

"No. Not really. But I don't really want to talk to Jonelle right now and I don't know what else to do."

Jonton nodded. "That's about how I feel too, sweetheart. Come on – the quicker we get this part done, the quicker we can go into the living room and finish it off. Maybe over a sapwood coffee or a prickleberry juice and mint?"

"I suppose." Joenie shook her head before giving him a wan smile. "Sorry. That would be nice, Dad."

Presently, the sheet covering Jonelle was decorated with a fringe of pen marks. Jonton stood up and helped Joenie to her feet. "I'm going to take the sheet off now. Do you want to go and make a drink and I'll come through in a minute?"

Joenie nodded and left the room, closing the door behind her. walked over to the bed, pressed his fingers to his lips and brushed them against Jonelle's cheek. "She's so very much like you, you know," he said softly. "She's going to make us both proud – I just wish you were here to watch her do it." He slid the sheet off her, being careful not to snag it against any of Jonelle's vines, and gazed at his wife's closed eyes.

"That's no good." Jonton fetched the covers from the spare bed and draped them over her, tears prickling the back of his own eyes. "Couldn't just leave you there getting cold." He balled up the sheet, hands knotted within the tangle of fabric. "Just... couldn't do it. I'm sorry, I'm not doing this very well."

You're doing it just fine, seeing as you're keeping it together for my daughter and my father.

"I should go and help Joenie."

Why don't you do just that, Jonton Kermol.

Jonton inhaled deeply, letting his breath out through his mouth. Then he slung the sheet over his shoulder, picked up his mending basket and left the room.

He walked into the living room to find Meleny and Adbas sitting with a red-eyed Joenie, both hands wrapped around a mug of juice. Giving Meleny a grateful look, he spread the sheet out on the floor and began cutting along one of the pen marks decorating its border. Meleny watched him cut out a strip of fabric and set it to one side before starting on the next set of marks.

"Do you have any spare scissors?"

Jonton didn't look up from his work. "Two, I think."

"Just right for these two spare pairs of hands sitting next to me. This is for Gerselle isn't it?"

Jonton nodded.

"I thought so. Now why don't you hand over your scissors to me and make yourself useful putting a hem down that slot you've just cut. If we're going to do this, let's make a proper job of it. Adbas – you start on that side. Joenie – you go and work on your Dad's side, and I'll start here."

She received a watery grin in reply. Adbas gave Joenie an anxious look as she sat down beside her father, before taking up his own scissors and peering at the edge of the sheet. Jonton retrieved a needle from his basket and began threading it.

By the time that Thombal arrived, scissors had been swapped for needles and thread all round. He took a seat in the corner and watched Adbas finish a line of stitches, tongue poking from the corner of his mouth.

"Finished, Mum."

"I'm finished too." Joenie put her needle back in its box and sat cross-legged on the floor, staring at her feet.

"I think we're all done." Jonton put his own needle away before tidying up everyone else's tools and gathering up the sheet. "Thanks, Meleny, thank you, Adbas." He squeezed Joenie's shoulder briefly before getting to his feet. "I'll be back in a moment."

After a murmured conversation with Joenie, Adbas, disappeared into the garden, leaving Meleny and Thombal in an awkward silence that was only broken by Jonton's reappearance.

"You can come through now, if you'd like."

They followed him into sleep room, to find Gerselle's body draped with the sheet, its edges tucked neatly away, and Jonelle's vines disappearing under it through the hand-stitched slits. Thombal and Meleny bowed their heads in respect, before Adbas tiptoed in and handed Joenie a pair of flowers. She stepped forward, jaw clenched, and arranged them on her mother's chest, bowing her own head for a moment before walking back to her father's side.

The day of the funeral dawned bright and clear.

The lack of funeral cars available for hire, even to the Sage of Barkton, had been a sobering reminder that, for so many others outside his Grove, life was only just beginning to return to normal after the war. In the end he had made do with Fredlorf's old tractor and trailer, both cleaner than the day they'd been bought, and draped in black. Somewhat to his surprise, Gerselle's father had wholeheartedly approved of the impromptu arrangements, reminding anyone in earshot that his daughter had been a hard-working lumberkerb before she became a Keeper.

Atop the trailer, Gerselle's body lay in repose, wrapped in the traditional white linen on a bower of fresh Kerm branches donated by both Elton and Jonelle.

In one Grove, villagers lined the sides of the road to bid farewell to their Keeper. In another, they turned out to the last kerblet to escort one of their own to her final resting place. They walked alongside the trailer, the muted rumble of the tractor's electric motor providing a sombre accompaniment to their footsteps.

At the end of the field, at the edge of the Grove proper, the sweetblossom pole stood against the skyline, the officiant's podium already set up in front of it. The tractor drove through the gate and stopped; its escorts already making their way across the field to take their places by the graveside, leaving six figures standing by themselves.

Jonton climbed onto the trailer and lifted one end of the bower. Fredlorf and Thombal caught the other end, passing it back hand-over-hand to where Gusemy and Enely stood ready. The four bearers stepped back, careful to keep their burden level, to give Jonton and Ferry room to climb down and take up their end of the bower.

They marched across the field in lockstep, all heads turning to follow them as they made their way through the centre of the rows of villagers and set down the bower by the graveside. Jonton knelt by Gerselle's side for the last time, picked up her burial mask from its Kerm wood stand and gently placed it over her face.

Six black ropes were tied onto the bower frame, the bearers taking the strain and then lowering it into the ground, the eyes of the mourners upon them all the while. The village Keeper bowed to Jonton from behind the podium. He counted the spades set out in a row beside him and cleared his throat.

"Good kerbals. We are gathered here today to celebrate the life and mourn the passing of Gerselle Kermol. She was kerbal, and as she came forth from her Grove, so in the presence of us all, does she return..."

Jonton let the words flow over him, soothing in their rhythm and intent. As they came to an end, he picked up his spade and waited for the remaining four bearers to join him. Head down, he scooped up a load of earth and sprinkled it over Gerselle's mask, before the others joined him with their own spadesful of soil.

The eulogies seemed interminable, the line of mourners from both his and Gerselle's villages moving slowly forward to be introduced to the crowd and handed the microphone. Jonton was surprised, and touched, by the messages from President Obrick and Chief Ambassador Donman. Then, all too soon, the last villager stepped down from the podium and the Keeper was beckoning him forward.

"Good kerbals."

"I thank you all for your kind words today. My name is Jonton Kermol and Gerselle was my beloved and irreplaceable wife. She leaves me an equally beloved - and just as irreplaceable - daughter, Joenie Kermol." Jonton looked up to see Joenie staring back at him, clutching Meleny's hand.

“I cannot possibly hope to say anything that hasn’t already been said about Gerselle today but I would ask you to remember that in a very real way, she leaves us all with so many more sons and daughters. The Kerm awakening across three, maybe four now, Regionalities,” Jonton’s shoulders lifted. “They too are her children – and her legacy.”

Chapter 112

We Will not Seek

The forest enfolded him; vast, comforting, and a source of food and shelter. He watched the Unworthy from afar, taking care never to approach the village from the same direction twice. His Brethren were allowed to return to their homes whilst the soldiers maintained their vigilance outside. None of the cowards dared venture near Her abode.

The Blessed were buried side by side with his Keeper. The soldiers offered to help dig the graves, too ignorant to know the offence they were giving. Once this was made clear, they kept a respectful distance until the Rights were concluded, and took pains to avoid the sacred grounds thereafter.

In time, more soldiers came with more of their vehicles. His Brethren were taken away, abandoning the village to Her, to those Blessed who remained in Her service, and to the instrument of Her Truth and Her wrath.

Don't be silly, Daddy.

This is not foolishness beloved daughter, Chosen of Him and my heart; this is proper. I am the last of the Brethren, the last Kerm-olia to stand between the Kerm and those who would break the Law most Sacred. I will seek him out and he will learn the Truth.

Who will you seek, Daddy?

The Corruptor, the so-called Sage who would sacrifice all for his pride. He will suffer - as I have - and in suffering will bring the Unworthy back to Her Truth.

And I know where he may be found.

Imbued with new purpose, he strode back to his dwelling. Dragging his bed to one side, he knelt and scraped away the thin covering of earth with his bare hands, revealing a long-buried trunk which he opened, revealing the clothing and trappings of a past life. Stripping

down to his smallclothes, he pulled on trousers, a colourful but faded undershirt, and a poncho, unable to hide a shudder of distaste at the unclean and unworthy clothing.

I would suffer far more in Her service.

Next was the money belt, clinking faintly as he strapped it on under the poncho. He thought for a moment, then undid it, slipped one end through the scabbard of his hunting knife, and buckled it up again. An old but serviceable pack was dragged out of the trunk and its contents checked. It was the work of a few moments to pack it with food, a map, and other small items for a long journey.

Then, after a brief stop at the communal sweetmoss pool to fill his water bottles from the village tap, he turned and walked away from all that he considered good and right in the world.

At the edge of the village he turned and genuflected towards Her dwelling then slipped into the trees and began the long walk back to the nearest town of the Unworthy.

“Any volunteers that show up can wait or Patbro can introduce them to Elton. They’ll understand if you’re not there in person.”

“You need to get out,” Meleny said bluntly, putting her mug down on the table. She glanced at Thombal and saw the agreement in his eyes. “Of course everything reminds you of Gerselle – how could it not. But more to the point, Joenie needs to get out. She’s not talking to Adbas, she’s not reading her books, she’s not even Communing with Jonelle.”

“I know.” Jonton stared at the fridge, resisting the temptation to fetch a bottle of prickleberry cider.

“And before you tell me that you don’t know where to go, why don’t you take Joenie back to the Capital? You could show her the Grand Gardens and the Wildlife Museum and whatever else she didn’t get to see the last time. If you both feel up to it, why don’t you carry on out to the Berelgan and say hello to Mallas and Professor Erlin.” She gave Jonton a sympathetic look. “If it wasn’t too much, you could even speak to Obrinn.”

“If you can, I think that reminder of her legacy might help you,” Thombal said quietly.

Jonton sighed. “You’re both probably right.” He looked at Meleny. “She might want to stay with you, you know? You’ve been a mother to her for so long now.”

“And maybe when she’s ready, I can be again.” Meleny gave him a half-smile. “She’s getting to the age where she’ll have things to talk about and she probably won’t want to talk about them with her dad. But right now, I’m not her mother, and she knows it. I don’t think she’ll want to stay with me.” She raised a hand as Jonton opened his mouth to speak. “And that is quite proper and I’m not remotely offended.”

Jonton scrubbed his eyes with the heels of his hands, before looking up at her and Thombal in mute gratitude. “I don’t know how we would have got through all of this without you

both. Through all of this.” He leaned back in his sack chair, closing his eyes for a moment. “I’ll talk it over with Joenie tomorrow. If she wants to go, I’ll let Elton know what we’re doing and ask him to tell Jonelle.”

“You might ask Joenie first in case she wants to tell Jonelle,” said Thombal. “From what you were saying about your last Communion with her, I think she would probably understand why Joenie needs to leave her Grove for a little while.” He stood up. “And now that all the hard talking’s done, I think we’ve earned a prickleberry cider between us. Can I get you anything, love?”

Meleny shook her head. “I’ll be heading to bed soon. Forestry teaching group tomorrow.” She rolled her eyes. “We’re at the ‘pollination of economically valuable trees’ stage, so I’ll be spending all day rigging safety harnesses and getting covered in climbing gum.” She saw the momentary shadow behind Jonton’s eyes and decided not to comment. “Both of which need a good night’s sleep behind me if I’m not going to end up strangling one of my little teenage darlings before the day is done.”

Thombal popped the top off a bottle of cider and poured it into two glasses. “No sapwood tomorrow night then?” Meleny gave him a look, as he handed Jonton his drink before settling onto his sack chair. “Cheers.”

“Cheers.” Jonton took a sip of cider and sighed. “Thanks, Tom. Thanks for helping with the hard talking and making sure it was done first.”

The ticket clerk watched the figure approach, the sound of his trail boots loud on the tiled floor. He wore a dusty, road-worn poncho, the shirt sleeves beneath printed in a pattern that even the clerk, long past the age of caring about such things, recognised as old-fashioned. The stranger turned to one side and fumbled with a money belt under his poncho, before walking up to the desk and setting down his pack.

“One to Barkton, please.”

There was something in his accent that the clerk couldn’t quite place. “Certainly, sir. Single or return?”

The stranger appeared to give this some thought. “A single,” he said at last. “I do not know if I’ll be coming back.”

Ahh. The clerk smiled at him. “Going to volunteer for the One-Twenty? You’re not the first kermol we’ve had passing through.” He bent over the ticket machine, missing the momentary look of confusion on the other’s face. “That’ll be one kero eighty and twenty-five funds please.” He watched the stranger scrabbling around in his coin pouch before finally putting down the right amount. “Thank you, sir. You’ve got three changes, four if you stop over at Cabaralb.” He slid a printout across the counter with the ticket. “I’ve printed out a reminder of them for you here. You’ve missed the morning train I’m afraid but at least you’ll have plenty of time for lunch - the next one doesn’t leave for just over two hours. Platform three.”

The stranger studied the printout before carefully folding it up and tucking it into his poncho along with his ticket. "Thank you."

"My pleasure, sir. Good luck at Barkton."

As Meleny had expected, Joenie chose a trip to the Capital over staying at home, although without any great enthusiasm. Somewhat to Jonton's surprise and pride, she also chose to tell Jonelle about the trip herself. When he asked Elton about it later, the elder Kerm merely reported that neither his, nor his Keeper's daughter had spoken to him, but that he had sensed acceptance instead of distress from Jonelle.

No sooner had he and Joenie packed, than they were being bundled into Ferry's car and driven over to Barkton. At the station, Meleny pressed a sheet of handwritten notes into his hands and hugged him and Joenie goodbye. Ferry leaned out of the car window to add his own goodbyes, before they were shoed on their way by Meleny.

As they walked in through the grand archway to Barkton Central Station, Jonton was struck by the quiet. The hubbub of soldiers that he remembered from his and Joenie's first trip to the Capital had gone, replaced by the occasional group of civilian passengers, most of them soberly dressed or carrying attache cases. Some things though, he reflected, watching the station manager hurry over to them, did not change.

"Keeper Jonton! It's good to see you again." He handed Jonton an envelope. "And also yourself, young lady."

Joenie blinked.

"Tickets to the Capital, I believe; one adult, one concession. One shared and one private compartment booked on both trains. The lady on the phone didn't say but we assumed you'd prefer to take adjacent ones. Now, if you'd just like to follow me through security, we can get you to the platform in time for the evening train."

They followed the manager across the concourse and into a sectioned off area where their bags were checked. The searches were still reassuringly thorough and Jonton had to stifle a grin at the expression on one inspector's face after Joenie's approving little nod. Another inspector fastened a tag marked with a white cross onto each of their bags and waved them through.

The station manager escorted them on to the platform. "Your cabins are in the second carriage from the front. I'm afraid I won't be able to show you onto the train but I think you'll find everything just the way it was for your last journey."

"I'm sure they'll be fine," Jonton replied. "Thank you for arranging everything at such short notice."

"Oh, it's my pleasure, Keeper, my pleasure. Have a peaceful journey and enjoy your stay in the Capital when you get there." He tipped his hat to Joenie and hurried off across the concourse.

Joenie watched him go. "I don't know why he's in such a hurry. There aren't that many people here."

Jonton gave her a wry look. "Not really, no. Maybe he's expecting more to arrive later." He inspected his luggage tag and nodded to himself. Joenie looked at her tag curiously. "Why the white crosses, Dad?"

"After the White Cross Company, I would imagine." He saw his daughter's blank look. "They were a group of volunteers during the war. According to Patbro, they used to help with the Kerm seed inspections to speed up food and medical supply shipments, although he did hear rumours that they helped the space program too." Jonton fingered his tag. "I guess they're either still going, or people just got used to putting a white cross on anything that's been checked for Kerm seeds."

Joenie's reply was drowned out by a train arriving at the platform behind them, accompanied by a raucous announcement from the overhead speakers. She scowled, clamping her hands over her ears, and even Jonton winced at one particularly loud squeal of feedback.

"Maybe that's why he was in a hurry – he had to go fix the speakers." Joenie removed her hands from her ears, staring balefully at the offending equipment.

"Probably," her father said. He glanced at the station clock. "Twenty minutes till our train arrives. Do you want a book while we're waiting?"

As promised, their compartment was very much as Jonton remembered, right down to the cupboard under the table and the water heater set into the wall. He busied himself stowing their luggage whilst Joenie went off to explore her private cabin. By the time she returned, two cups of steaming djeng sat on the little table and her father was sitting by the window, watching something with great interest, as their train pulled out of the station.

"What's happening, Dad?"

"A rocket I think – or a part of one. Over there, hanging from that crane by all the floodlights. I guess they must be sending it to the other launch site on the east coast."

Joenie peered out of the window. "It's got no engines," she said doubtfully. "I don't think it can be a rocket. Gildas would know."

"I'm sure he would," Jonton agreed. "Maybe it was part of that space station that Wernher and Jebediah showed us. It was pretty big whatever it was." He blew on his djeng before taking a sip. "Hmm, that's good. I made you one too."

"Thanks." Joenie perched herself on the bed opposite him. "Could I have this compartment, Dad? The one next door doesn't have a moss room."

"Of course you can. Now - how about a game of Triangles before bed?"

"Triangles?"

Jonton produced a worn cardboard box. "I haven't played since I was a student and to be honest, I'm not even sure if anyone makes it anymore." He slid the box open and removed a scuffed game board and a bag. "It's a travel set – works pretty well. He drew a triangular wooden piece from the bag and placed it on the board. "You put your first piece here, where it's marked and every new piece you put down has to touch an existing one along one edge. The idea is to match the colours along the edge if you can and you get bonus points for making different patterns. Here." Jonton took a yellowing piece of paper out of the box and unfolded it. "Chains are pretty easy but rings and linked rings are harder. I don't think I ever managed to get linked rings in the same colour!"

Joenie saw the hopeful look on her father's face and didn't have the heart to turn him down. "Sure, sounds good."

"Excellent!" Jonton rubbed his hands together. "New players go first."

Joenie drew a piece from the bag and placed it on her starter zone. She drew a second tile, studied it for a second then placed it next to the first. "Blue matches blue."

"Good start," Jonton drew his own piece. "And blue matches blue again."

After the first few moves, Joenie began to take more of an interest in the patterns unfolding across the board and by the time her chains began to cross over onto her father's half of the board, she was engrossed, her mug of djeng long since gone cold. After narrowly winning a second game and losing a third, her offer to make it a best three out of five was interrupted by a prodigious yawn.

Jonton glanced at his watch. "I think..." his eyes widened as he too yawned hugely. "I think it's later than I thought." He drew the curtains of their little compartment before standing up to retrieve his overnight bag from the luggage rack. "You're definitely on for tomorrow though!"

"That was fun – thanks, Dad."

"Glad you enjoyed it. Good night, sleep tight." The compartment door slid shut behind Jonton. Smiling slightly, Joenie unpacked her washbag and started to get ready for bed.

The next morning, the fifth game of the set was interrupted by the train driver's announcement that they would shortly be arriving at Cabaralb station. Jonton declared the set to be a draw, raising an eyebrow at his daughter's unspoken demurrals. Joenie gave him a half-smile and began packing away the board.

Their stopover in Cabaralb was much more cheerful than their previous visit. Jonton was relieved to find the station empty of any military presence and was pleased to see more fishing vessels than warships in the harbour. For her part, Joenie bounced along the far busier streets and had to be pulled away from two or three of the shops, much to her father's secret amusement.

Both of them agreed though, that the best part of the day was visiting the transformed town park. The flowerbeds and gardens were in full bloom amidst the freshly gravelled paths and the central meadow was newly mown and dotted with groups of kerbals enjoying the sunshine. The patch of raw earth that Jonton remembered had been weeded, fenced off and planted with a new Kerm sapling. The other thirty-six saplings were dotted around the park and a faint whiff of cinnamon filled the air.

They stayed at the Grove Hotel again that night where, much to Joenie's surprised delight, their waitress recognised them from their previous visit and brought her a minted redfruit juice with ice without having to be asked. The food was just as good as she remembered, especially the greenleaf fondue which turned out to be a plate of crispy greenleaf stems served with a herb jelly and a pot of cheese dipping sauce which arrived at the table on its own little nightlight heated stove.

The train journey to the Capital passed by in a pleasant blur of reading, Triangles, and watching the world go by from the carriage window. What roads they saw were busy with traffic: trucks hauling all manner of supplies and construction materials, White Cross cars, and the occasional private car. As the train followed the coastline south towards the capital, Joenie spotted a single contrail streaking the sky over the Great Tranquil Sea, a glinting speck just visible at its tip.

By tacit agreement, what conversation there was steered carefully clear of anything that would remind them of Gerselle and if either became distracted mid-game, or lost in their own thoughts, the other would find something else to do for a while. Even so, towards the end of the journey, Joenie disappeared into the moss room, returning sometime later with a freshly scrubbed face and red-rimmed eyes. She shook her head as Jonton started towards her, giving him a grateful look as he pulled a spare handkerchief out of his pocket and passed it over to her.

Joenie's subdued mood lasted through their arrival at the Capital and walk to the Grand Gardens. Jonton eyed the tik-tik lot as they left the station and briefly considered hiring one of the pedal-powered buggies but decided that Joenie probably wouldn't be interested. They crossed the Boulevard and turned onto City Avenue, stopping every so often for Jonton to consult his map.

At the far end of the Avenue, the arches and domes of the Capital Building stood out against the skyline, it's flagpole still visible over the rooftops as they turned right onto Progress Walk and towards the Gardens. A quiet descended as they passed through the wrought-iron gates, the trees around them screening out the bustling streets outside. Joenie looked up at a songbird perched on a nearby branch and her mood seemed to lift a little.

A sapwood coffee and a cake from a nearby concession stand lifted it a little further and by the time they reached the glasshouses near the centre of the enormous park, Joenie's head was turning from side to side as she took everything in. Jonton caught a glimpse of immense shapes through the panels of one glasshouse and tapped his daughter on the shoulder. "Shall we start in there?"

Puzzled, Joenie followed his finger, then her face cleared. "You remembered?"

Jonton grinned at her. "I wasn't going to forget after our last visit. Come on."

The centre of the desert hothouse had been fenced off and planted with a group of kerbahusk cactuses. Joenie stared up at them in delight, remembering the papier-mâché version she'd made with Enely, although she had to admit that the real-life spines looked rather more impressive than pieces of drinking straw glued to a model. She read the nearby sign warning visitors not to climb over the fence and touch them and nodded to herself, Enely's voice clear in the back of her head. *Stroke the spines one way and they're not dangerous but stroke them the other way, away from the bulb, and they'll cut your fingers to ribbons. They make good knives but you have to be careful.* Smiling at the memory, she moved on to a sandy area dotted with large boulders which were draped with fleshy green ribbons. Patches of twisted, knotty tubes, improbably decorated with tiny crimson flowers, sprawled across the sand between the boulders.

Jonton caught up with her by another sandy patch, this one planted with rows of what looked like brown clay balls. He saw Joenie's puzzled expression and walked over to her. "What's up?"

"I thought these ones were malkaballs but the name on the sign is totally different." Joenie heard a choking noise behind her and turned to find one of the hothouse gardeners behind her.

"They're malkaballs all right but it's been a long time since I heard anyone else call them that." He studied Joenie through deep brown eyes. "You don't look Hazachim if you don't mind me saying."

Joenie blinked in surprise. "I'm not, but one of my friends is and he taught me about them." She scrunched up her face in thought. "He always said they tasted very... sathy, even if they don't look very nice."

The gardener's face broke out in a broad grin. "Sathy they are. What was your friend's name?"

"Enely."

"Oh, now, now. I knew a young Enely once. He was the village Keeper's son – wasn't much older than you are when I last saw him."

"He could well be our Enely then," Jonton said. He caught the flicker of recognition in the gardener's eyes. "He left his village when their Kerm seeded and to cut a long story very short, ended up living with us just outside of Barkton."

The gardener eyed him. "A very long story – and not a happy one I'm thinking, if he ended up leaving his own Kerm behind. What happened to him after he left you?"

"He went to help Awaken the One-Twenty," Jonton said quietly. "I don't know exactly where he is now but I do know he's doing well."

"Well now." The gardener looked like he was about to say something but had thought better of it. "There's no reason he should remember me but if you cross paths with him again once that business is all done, you can tell him that he'd be welcome to stop by the Gardens any time he likes." He looked at Joenie, the corners of his eyes crinkling in amusement. "You can also tell him that he might want to teach young'uns the *polite* name for those cactuses over there. Anyway, I should be getting on. Enjoy the rest of your visit."

"I'm sure we will," Jonton replied, "and I'll be sure to let Enely know."

Joenie nodded in agreement. "Thank you!"

"You're very welcome, miss. You have a sathy day now."

Jonton pushed his bowl away and watched Joenie chewing on the last of her sandwich. The Glass Café was quiet, with most of the waiting staff spending more time cleaning tables or serving drinks than bringing out food. He glanced at the clock on the wall, braced himself inwardly, and turned back to Joenie.

"I've been thinking. We could go to the Wildlife Museum tomorrow if you like and spend the rest of today here instead?"

Joenie swallowed her mouthful of sandwich. "I'd like that." She paused for a long moment. "Are we going to the Berelgan afterwards?"

"Would you like to?"

His daughter stared at her plate. "I don't know. Probably? I don't want to go home yet and it would be nice to see Mallas again... but I don't think I'll be able to stand it if he starts talking about - you know. It."

"Me neither." Joenie looked up at her father in surprise as he continued. "It would be good to talk to Professor Erlin again and maybe to Commune with Obrinn. Meleny and Tom both thought that would help me but I'm not sure I can do it." Jonton sighed. "But I don't think I'm ready to go home yet either."

"We should go to the Berelgan then, just so you can tell Mr Thombal and Meleny that you tried to speak to Obrinn. We don't have to stay very long if it's too weird."

"That's true." Jonton gave her a quizzical look. "And when did you start getting so grown-up?" He pinched the bridge of his nose. "Forget I asked, Keeper. Silly question." He drained his glass of fruit juice and pushed his chair back. "I thought we could take a walk around the arboretum this afternoon, unless you wanted to see the cactuses again?"

"We are now arriving at Capital Station. All change. All change, please."

He gathered up his belongings, checked to make sure that his knife was still tucked away in the bottom of his pack and stood up to join the queue of passengers waiting to disembark.

As he stepped onto the platform, he stared around at the cavernous railway station, hiding his private dismay behind an impassive stare.

I would suffer far more in Her service.

Shouldering his pack, he set off towards the main concourse, striding past his fellow passengers, only to join another line of travellers at the turnstiles. He turned his pack to show its white-crossed tag to the nearest guard, who merely nodded and waved him through. Walking by a line of tables where a handful of kerbals were having their bags searched and past a row of shops, he emerged into a huge vaulted atrium, a line of constantly shifting departure boards at its far end. He wrinkled his nose in distaste at the overly-grandiose archways leading outside. Then he caught sight of two figures walking into the station and his jaw dropped open.

Even from afar, her Will prevails.

He hurried across the atrium before the two figures could disappear into the crowd, following the wake of gawkers and excited onlookers pointing them out to each other. Skirting round another group of shops, he slowed to a walk, holding his pack up again as he passed another turnstile and onto platform fourteen where, according to the signboard, the train to Olbinat would shortly be departing. Waiting for the two figures to board the train, he got on the same carriage by the opposite door and found a nearby seat from which he could eavesdrop on them. Then he settled down to wait.

The Corruptor and his daughter spent most of the journey reading or exchanging trivialities over what appeared to be a pointless and tedious game. Eventually though, the kerblet started complaining of hunger and asking when they would get to the Berelgan.

Which can only be the Berelgan Institute. Good. He leaned back in his seat, closed his eyes and tried to block out the irritating chit-chat from across the aisle.

With a start, he awoke to find the train juddering to a stop amidst a raucous announcement that it was now arriving at Olbinat. The Corruptor and his daughter were both overburdened with luggage, giving him time to retrieve his own pack and follow them off the train at a discreet distance. Trailing them across the station and outside into the pleasantly shady car park, he watched them greet another kerbal before being ushered into an off-roader and driven away, leaving him standing, momentarily witless, outside the station.

A Kerm-olia is not so easily defeated - not after She has delivered them into my hands.

Cinching up his pack as he went, he set off in pursuit. The road out of town was easy to find and a little way past the final cluster of houses, a signpost declared the Berelgan Institute to be thirty-two kilometres away. He glanced up at the afternoon sun and slowed his all-out march to the easy, kilometre eating pace which, he knew, he could sustain for most of a day if necessary.

By the time he reached the turreted brick archway marking the entrance to the Berelgan grounds, twilight had long since turned to night. Light spilling from a window illuminated a heavy looking and conspicuously locked gate. He stood motionless by the verge, well back from the pools of radiance thrown by the roadside lamps and waited for any signs of activity.

His patience was rewarded when a patrol of guards marched past and stopped by the gate. After a brief conversation, they disappeared inside the gatehouse, leaving its previous occupants to begin their own patrol. Noiselessly, he drifted into the surrounding trees, freezing as torchlight played over the ground nearby. He waited for a long moment, using the time to check his pack for loose buckles or straps, before pulling his poncho cowl further over his face and slipping deeper into the woods.

Crossing the open pastureland between the woods and the brightly lit buildings in the distance became a test of nerves. Shadowed mounds lurked in the fields near the road, the smells of dung and warm fur giving them away as some kind of animal. He crept past them as quickly as he dared, praying to Her will that the creatures would not spook at his scent and give him away.

Reaching the top of the driveway, he skirted round an expansive gravelled space; a row of boxy off-roaders parked along the side nearest to the grand buildings behind. Nodding in satisfaction, he stared at their ornate façade, fixing the position of the front doors and the steps leading up to them in his mind, before slipping away between the smaller outbuildings which surrounded the car park. Slinking from shadow to shadow, he searched for a concealed spot from which to watch the main entrance and the vehicles parked outside; eventually settling for a nook between a drainpipe and the moss-covered entrance to what had once been a wood cellar.

Satisfied with his hiding place, he prowled the Berelgan grounds, scouting out what escape routes he could, until the first fingers of dawn began to show on the horizon. Then, murmuring a prayer to Her will under his breath, he returned to his nook and settled in to wait for sunrise.

Jonton stood at the top of the manor house steps, gazing out over the Berelgan grounds and savouring the early morning smells of greenery and dew. He yawned, watching Joenie and Mallas walking across the car park, the fresh air doing more to wake him than his morning coffee.

With a crunching of scattered gravel, a figure burst into view, racing towards Joenie, something glinting in its hand. Jonton heard a muffled scream and sudden oath from Mallas, then Joenie was being dragged away, heels scraping along the ground, the stranger's arm around her neck. Heart hammering in his chest, Jonton hurled himself down the steps, only to see Mallas scramble into one of the off-roaders and Joenie bundled into the back at knifepoint. The hooded figure swung himself up into the passenger seat, the door slammed

shut and Jonton had to shield his face against a spray of stones. By the time he looked up, the off-roader was already careering down the driveway.

He sprinted for the nearest vehicle and wrenched at its door, an icy band of fear clenching around his guts. Finally realising that the door was locked, he swore and ran for the manor house.

The off-roader jolted over a speedbump, Mallas's jaw clenching as the stranger's knife pricked his skin. "Does this place have a Kerm?" The knife dug little deeper. "Quickly. Does it?"

He felt a trickle of blood running down his side. "Yes!"

"Then you will take me there. Quickly."

Mallas nodded tightly, gunning the off-roader over a rise before glancing in his passenger mirror and seeing Joenie's terrified face staring back at him. Eyes to the front again, he saw the track to Obrinn's planting site coming up and eased off the accelerator, not daring to brake. He swerved sharply left, missing the drainage ditch by centimetres and put his foot down, the off-roader's rear wheels throwing up a rooster-tail of mud. Racing up the track to the copse of Kerm trees, he pulled up outside Erlin's hut with a wrenching jerk that bounced his head off his headrest. The stranger leapt out, flung the rear door open and dragged Joenie off the back seat before marching her up to the hut and disappearing inside.

Kicking the front door closed behind them, he pulled Joenie into the sleep room and flung her onto the nearest bed before shoving her head into a leaf cluster.

Obrinn sensed the kerbal under his leaves, brightening as he recognised her as Joenie. Then the leaf connection solidified and a torrent of fright and incomprehensible images battered at the young Kerm's mind instead of the friendly presence he was expecting. His response was swift and instinctive.

Mallas heard a scream as he pelted into the sleep room and into a tableau of frozen Kerm vines, their needle teeth splayed behind motionless inner tendrils. He saw Joenie lying on the bed, her abductor leaning over her, one hand holding a knife to her throat, the other...

Oh Kerm. Oh Kerm, oh Kerm, oh Kerm....

"Don't move." A fist jerked the leaf cluster wrapped around Joenie's head, making her cry out. "Or I rip these out of her. Where is the Sage?"

"I...I don't know."

Joenie screamed again. For an instant, Mallas saw a haze of leaf hairs stretched taut between her skull and Obrinn's leaves.

"I don't know! He was behind us, he'll have gone for help, or broken into a car, or... I don't know! Just don't pull out the leaves! Please!"

Her mental link to Obrinn flickered. The mindscape heaved, jagged forks of lightning slamming to earth all around her. A wave of lashing vines swept towards her and she sensed him gathering himself.

No, Obrinn, no!

A distant part of her brain wanted to cry out for help. Ignoring it, she focused all her attention on Obrinn, frantically trying to calm the raging Kerm.

I'm alright – I'm not hurt!

The link flickered again, more sharply this time, and she felt herself hurled high above the suddenly fading mindscape, the bright skein of thoughts linking her to Joenie beginning to unravel. Twisting round, she grabbed at the skein, sobbing in fear as it slithered out of her grasp. She felt herself falling, tumbling, the mindscape an insubstantial blur as it rushed up to meet her. Then all turned to whiteness.

A distant part of... someone... erupted down the failing link and stormed past her, hunting for anyone – or anything – to save it.

And from out of the whiteness, a single overwhelming command screamed out to the Kerm telegraph. Overloaded, Obrinn's interface unit had time to transmit one incoherent blast of noise before its sensors shut down.

Elton's branches smashed through the roof in a cascade of shingles and broken battens. He flung a query at the telegraph systems, scanning the blast of noise for any hidden words or sense codes, but finding nothing. Then a line of, instantly familiar, codes appeared in his mind.

Obrinn...

Along one section of Elton's fibres, vesicles burst open in quick succession, the signal from one drowned out by the next. The saturated soil triggered an automatic purge sequence from the telegraph systems but not before he sensed his message being sent. The response was so fast as to be almost illegible.

<Joenie!> <danger!>

The ceiling creaked under the strain, the smaller beams beginning to splinter along their edges. The ground around Jonton's hut began to bulge and ripple, vines which had not seen the sun for millennia bursting free before being whisked underground again. Images tore across Elton's mindscape as the Kerm thought furiously. Then the mindscape turned pitch black.

I am sorry, Jonton.

Elton turned his full attention to the telegraph systems.

<be calm, Obrinn. What danger?>

<danger!>

<listen to me, Obrinn! You must not kill! Not even for Joenie>

She lay in the eye of the storm.

A line of pulsating red slashed across the whiteness and suddenly the storm collapsed in on itself, becoming a tornado hurling her upwards. Unbidden, her hands reached out, clutching for the red line; her fingers spasming then holding, pain shooting through them.

She glimpsed a string of alien telegraph codes stretched across the whiteness and sensed someone, or something, focusing on them. Another line of codes flashed into view and the whiteness began to fade, a bright tangle of threads uncoiling towards her.

Another awareness brushed against hers in a burst of confusion and towering rage. She felt the awareness circling back as yet another line of alien codes stitched their way across her mind's eye, followed by ones that she recognised as kerbal letters.

<Joenie? This is Elton. You must let Obrinn use your eyes!>

The door crashed open and Jonton raced in, Erlin hard on his heels. He spared one horrified look for the frozen vines surrounding the bed before a flicker of movement caught his eye. His head snapped round to see Joenie slumping against her pillows, a figure standing over her holding a fistful of Kerm leaves. He heard a hoarse yell as Mallas threw himself forward...

And the vines rose.

A wall of writhing green lashed out at Joenie's abductor, one vine whipping around his wrist, the others twisting him round and hurling him away from the bed. Jonton heard a sudden, wet, crack and a knife clattered to the floor. More vines lashed out, coiling around ankles and wrists. Mallas kicked the knife away and sprang back, staring in revulsion at the screaming figure spreadeagled in front of him. Another vine uncurled towards it, needle teeth fully extended, tendrils probing blindly at his open mouth. The screaming stopped abruptly.

"I have a message from Elton, Dad."

Jonton spun round before sagging against the wall in unutterable relief, barely noticing as he slid down it and thumped onto the floor.

Joenie sat up; shoulders hunched to avoid disturbing the Kerm leaves re-wrapped around her head. She wiped a finger across her throat and stared, shuddering, at its bloodied tip, before looking up at her father. At her feet, the vines stilled, teeth retracting as their inner tendrils retreated from sight.

"It's important." Joenie's lips moved soundlessly for a moment, then she began to speak.

"Professor Erlin, Dr Mallas, First of my Keepers.

"Although he has caused much suffering, this one before you shall be allowed to live. You will bear this message to your Council of Twelve Pillars.

"We are Kerm. We will not seek vengeance."

Chapter 113

Blackout

The bunker doors rumbled open amidst a deep thrum of buried machinery, followed by a metallic clanking as the barriers around the freight elevator unfolded. A pair of headlights lit up the darkness, accompanied by the whine of electric motors starting up. Then, with a rumble of heavy tyres over textured steel, a truck emerged and drove onto the concrete apron surrounding the bunker.

A row of heavy steel bollards sank into the road and the truck lumbered forward, towing a flatbed trailer behind it. A half cradle, supporting a rocket engine of unusual design, was bolted to the trailer, both the engine and the trailer sporting the distinctive logo of the Kerbin Nuclear Standards Agency alongside numerous warning symbols denoting nuclear materials and radiation hazards.

A figure pushed a set of wheeled steps up the trailer and locked them in place before stepping back to let a group of figures gather round. One by one, watched by the hundreds of others lining the roadside, they climbed onto the trailer to inspect a stamped golden foil attached to the engine turbopump casing, before rejoining their colleagues. Finally, Wernher Kerman, rocket engineer and veteran kerbonaut, climbed the steps and examined the foil for himself.

It was printed with a simple list of names, headed by Dr Hading Kerman, Dr Macbus Kerman and Dr Desden Kerman.

Wernher bowed his head, lips moving silently as he recited the list from memory. Then he turned and walked down the steps to join the other Site D survivors.

The truck rolled forward and stopped behind a double white line painted on the road, its trailer coming to a halt beneath a gantry crane. The crowd watched as the second half of the cradle was lowered into place and made secure. A team of construction workers attached

steel panels to the completed cradle, forming an armoured crate around the rocket engine. The panels were also stencilled with warning symbols and the KNSA logo.

Two pipers struck up the Lament for the Lost Explorer as the truck drove away towards the compound gates, a convoy of Kolan Border Security vehicles falling in behind it. With a farewell blast on its horn, it cleared the gates and turned onto the main road, heading south towards the Foxham Space Centre.

"President Obrick to see you, sir."

Donman looked up from the pile of papers on his desk and saw his aide standing in the doorway. "Thank you, Corsen. Please show him in." He waited for Obrick to take a seat and for the door to close behind him before raising his eyebrows.

"The blackout just went into effect. The last of the Telegraph operators signed off as of twenty minutes ago. We're monitoring the consumables in the interface units in case we need to replenish them, but that's it."

Donman swept his papers into a pile and rested his forearms on his desk, head bowed. "And now we wait."

"And now we wait," Obrick agreed.

"At least nobody can say we hid anything."

"No. I have my differences of opinion with both Aldwell and Enemone but they stood up when the time came. Aldwell always did make a pretty speech on television and when the insider crowd around the Capital found them working together in earnest...?" Obrick raised his hands, palms upward. "As I said, they stood up when the time came."

"A pity they couldn't have seen fit to stand up any earlier," Donman muttered.

Obrick sighed. "Not helpful, Don."

"Sorry. Blame it on having to stand on a metaphorical cliff edge until the One-Twenty make up their collective minds."

Obrick waved his apology away. "You and me both. He rested an elbow on the corner of Donman's desk. "At least we've got one advocate in there."

"Guardian Elton? He certainly seems to be an advocate for Starseed and that last message about not seeking vengeance was encouraging. Beyond that?" Donman shrugged. "He's one voice. Or vote, if Kerm decide anything by voting."

"Indeed." Obrick's expression turned bleak. "And the One-Twenty's verdict on that... other Kerm was *not* encouraging." He looked at the Chief Ambassador. "Is there any news from Veidd?"

"Burned to the ground. The rescue team pulled those poor kerblets out first but in truth there was nothing left of them to rescue. Half of them were dead on arrival at the medical

centre and the other half died shortly after. Their parents are still awaiting trial, mostly because we still haven't found a competent defence brief willing to take their case."

Obrick closed his eyes. "Kerm trees burned to the ground because of the hubris of kerbals. It seems your metaphorical cliff edge overlooks a new Age of Madness."

"The thought had occurred. And all we can do is wait."

"Wernher, Richlin, Lucan and Gene should be arriving for lunch. We figured Lucan and Gene would probably enjoy the chance to take a close-up look at a Mainsail, so we'll leave the VAB tour until this afternoon if that's okay?"

Jeb smiled. "Not a problem, Bob. No need for the VIP treatment either, if you and Bill have things to be doing."

Bob gave him a mock-indignant look. "Please. Give us some credit for planning and organising."

"And we're due a day off anyway," Bill said. "Besides, I think the official KSA ambassador to the One-Twenty counts as a VIP."

"Who needs to be shown around by such senior KSA managers as befits his exalted position," finished Bob. "Not least because he hasn't set foot inside a VAB for Kerm knows how long and might break something."

Jeb laughed. "I've missed you guys."

Bob squeezed his friend's shoulder. "It hasn't been the same without you either." He looked at Jeb. "Ambassador jokes aside though, is there any news you can share from the One-Twenty?"

Jeb shook his head. "Not really. Even before the last of them were awakened, the Telegraph operators were run off their feet keeping the interface units replenished, so we know they were doing a lot of talking about something, even before the blackout." He cocked an eyebrow at Bob. "Kerm don't go in for small-talk as a rule, so they were probably talking business and if I know Guardian Elton, his idea of business is Starseed. So, I'm guessing we'll get a decision sooner rather than later but a guess is all it is." He looked at Bill. "Those interface units are nice pieces of kit by the way – I think you'd find them interesting. If you ever fancied a trip out to the Berelgan, I gather they're already working on a Mark 5 version."

"In my spare time," Bill said dryly.

Bob drummed his fingers on the edge of his filing cabinet. "I just wish we had some idea..." He shook his head in frustration. "I get why the Council insisted on the blackout, strict neutrality and all that but it's been weeks now. I just wish we knew something!"

"We'd probably be none the wiser if we were listening in," Jeb told him. "The interfaces are pretty slow so the Kerm started making up their own shorthand almost as soon as the first Telegraph links were laid, and they've been growing it ever since."

"A second major language on Kerbin is going to take some time to get used to," Bill noted.

"Yep. Complete with codes for mood signifiers and probably a whole collection of other codes for Kerm talk – soil conditions and what have you – that won't translate well into any kerbal language. The diplomatic team – the proper diplomats that is," Jeb added, "think we'll probably be able to work with the One-Twenty in time, to develop a simplified version for kerbal use."

Bob shook his head again and checked his watch. "Speaking of time, we've got plenty of that to go before lunch." He pinched the bridge of his nose. "We could go and get a coffee or something while we're waiting, unless there was anything you particularly wanted to see?"

"Actually there is." Jeb gave them an embarrassed half-grin. "I was thinking on the way over that I haven't actually seen any flight-ready Starseed hardware, just photos and drawings and training mock-ups." He scratched his head. "I think that Roncott's prototype inflatables or Communing with Wernher was about as close as I ever got to the real thing."

"Well that's not a problem anyway. We'll take a cart out to the payload integration facility and you can take a proper look at the Bridge."

"Sounds good. Lead on, Bobcat!"

Bob rolled his eyes. "If the ambassador would care to follow me?" He checked that his desk drawers and filing cabinet were locked before waving Jeb and Bill out of his office and closing the door behind them.

The little electric cart purred through the Foxham space centre grounds; Bob at the wheel, Jeb in the back nodding intently as Bill pointed out the various newly-built facilities for Type 7 manufacture and operations. They pulled up outside the Payload Integration Facility and Bob was unsurprised to see a knot of kerbals already gathered outside the doors, waiting to greet them. As they crossed the reception area, he watched Jeb working the room; offering a quick word here, a smile or a handshake there, and was reminded of a long-ago trip to KSA's Alpha Site. *Which worked out pretty well*, he added to himself. Seeing that the crowd showed no sign of dispersing, he caught Jeb's eye, tapping his watch meaningfully.

Jeb nodded and raised his arms for silence. "Thank you all for the welcome, folks – I don't know what to say."

"That's a first!" somebody called out, to general laughter. Jeb smiled.

"I've got a couple of things to see right now but I'll be around after the launch so hopefully we'll get a bit more time to catch up then, okay? If I can still hear you that is – I've been told those Type 7s are pretty loud off the pad." He waited for the politer laughter to die away.

“Seriously though, folks – it’s great to be back. Thank you!” Jeb made his way over to Bill and Bob and let them usher him out of the room towards the cleanroom changing facilities.

After donning gowns, dust caps and overshoes, the three kerbonauts stepped out onto the main assembly floor. A fully assembled bridge module rested on its dollies, nestled within the test bay scaffolding and already attached to its forward hub module. Skeins of cables emerged from the airlocks at either end of the spacecraft and from various access points on its hull, snaking across the floor and into the back of a line of test consoles. Groups of engineers clambered over the scaffolding, running tests on the module exterior systems and occasionally one engineer would leave his or her place behind the consoles and climb inside the larger of the two airlocks, clipboard in hand.

Bill watched a grin of pure delight slowly spreading over Jeb’s face as he studied the colony ship bridge, circling around the scaffold to get a better look at the hub module. Bob walked over to the consoles, waving at the engineers as they looked up and recognised him.

“Afternoon Ribory, afternoon James. I brought someone in to have a look at the ship - Bill’s over there keeping an eye on him to make sure he doesn’t touch anything.”

James frowned and opened his mouth to speak, before catching sight of Jeb standing at a respectful distance from the test bay, still staring at the two spacecraft sections. “Great Kerm above – look who’s back.” He raised his voice. “Afternoon, Jeb! You want to come over here and take a proper look rather than standing there cluttering the place up?”

Jeb grinned and came over to join them. “Afternoon, James. Afternoon all.” A glint of reflected light caught his eye and he glanced up. Then, to the bewilderment of the younger engineers, he stepped back from the consoles and took a longer look up, eyes resting briefly on the open petals of the docking port cover, before watching the test crew at work through the bridge windows. He frowned, tipping his head to one side, before walking back to the test stand.

“What’s with the missing panel under the windows?”

“That’s for the nameplate,” James answered. “Once a name’s been decided.”

“We’ve had plenty of good suggestions,” Ribory said, “but none of them have really stuck yet.”

“Not even the Jebediah Kerman,” James added blandly.

Jeb raised his eyebrows. “I would have thought there’s one obvious name.” He spoke two words, watching as James thought them over.

“That works for me,” Bob said quietly.

“And me,” Ribory agreed.

One by one, the other engineers nodded.

Jeb pushed his plate away with a contented sigh. "Now that was a real treat. Can't remember the last time I had a good old fashioned creva stew." He grinned at Lucan. "I know beans and mushrooms never hurt a kerbal but even in Doren, there are only so many ways to cook them."

"And no greenleaf soup either," Lucan answered, mopping up the last of his stew with a hunk of cornbread.

Jeb laughed. "Nope." He turned to Wernher. "And now that we're done with lunch, what's the plan for the afternoon. Do they need you over at the pad?"

"Not unless they need to scrub or recycle the count," Wernher pushed his own plate away. "Or there's a problem starting the LV-N for TMI."

"What about you, Genie?"

"I did offer but Nelton's got everything covered. If I can find enough to do in the meantime, I think I'll be watching from the gallery on day seven though."

"Kerbin orbit insertion." Lucan's eyes were bright. "I think I'll be joining you, Gene."

"Refuelling at OPTA-2, rendezvous and docking with the Doreni shuttle, and then onwards to Duna. That's a beast of an all-up test." Jeb grinned. "Sounds like a beer and sunset plan from the old KIS days except I don't think we were crazy enough to factor in nuclear rockets."

"It does cover most of the critical mission points," Bill noted. "On-orbit refuelling, a good shakedown flight for the LV-N, and the moment of truth for the landing craft test programme."

"And a real confidence boost to the whole Starseed programme if it goes to plan," Bob said quietly. He looked at Jeb. "Bigger than the Pioneer 4 boost, I'd say."

"No question," Jeb agreed. "Getting Tenacity finished up was a pretty big step too but once I see that shuttle on the ground at Duna, I'll be starting to think we've got a flight plan." He helped himself to a redfruit from the fruit bowl in the middle of the table and bit into it, wiping the juice off his chin. "Mmmm, haven't had one of these for a while either." He looked at Geneney, "I don't suppose we could skip coffee?"

"Not a hope." Geneney snagged his own redfruit. "I'm pretty sure the rocket will still be there if we leave it another half hour."

Conversation around the table turned to reminisces and after the half hour drew out to nearly an hour, Bob abandoned his plan of an after-lunch walk to VAB-2 and quietly left the room to reserve two electric carts.

By the time they arrived, on the dot of two, Danfen was waiting by the staff entrance. As he watched the seven kerbonauts approaching – even Geneney, he remembered, had flown on *Kerbal 2* – he couldn't help the shiver that ran down his back. Knowing and working with seven individuals, he thought, was not at all the same as watching the entire *Kerbal 1* team

– the kerbals who had launched and flown the very first crewed rocket ship – walking towards him.

Their response to the Type 7 though, was everything he could have asked for, even if work across the VAB came to a complete halt as every engineer, technician and machinist on the assembly floor came over to pose in front of the mammoth rocket with Kerbin's original kerbonauts. Overhearing a slightly awestruck comment from Jeb, Danfen went back to his office and, after rummaging around in the very back of his filing cabinets, pulled out an old and slightly faded project folder. Flipping through it, he studied one of the cutaway drawings for a moment, eyebrows lifting in surprise. *Hmm - if your capsule was about the same size as our old R1, then yeah. It would just about fit into the Mainsail engine bell. Probably wouldn't be much room to spare though.*

Jeb watched the chief engineer disappear into his office, shrugged minutely, and turned back to Geneney and Wernher, glancing round to check whether Richlin was in earshot.

"It's a shame we're one short today," he offered quietly.

Geneney looked at him warily.

"But," Jeb continued, "I think we've done him proud." He smiled at Wernher. "I still remember your eulogy. Learn, move on, never give up. Find out what went wrong and make sure it never happens again. I think we did exactly that."

Wernher nodded. "Ornie would have expected nothing less. And I agree. I think we have honoured the memory of one of the finest kerbals that I ever knew."

"T minus twenty. Gantry retract sequence initiated. We have launch commit."

"T minus twelve... eleven... ten... nine... synchro is green..."

"...six...five...four...three...we have ignition...and we have a lift-off!"

Seven members of the former Kerbin Interplanetary Society watched the Type 7 booster thunder off the pad. The sound of five SK2-M Mainsail engines in full cry was everything that Jeb had been promised and more.

They watched the rocket arc out over the sea, lighting up the sky with a torrent of fire. Minutes later, Rockomax Mission Control reported a successful separation and second stage ignition and Wernher's shoulders relaxed. "We did it, old friend," he murmured to himself. "We made it all worthwhile."

Lucan shook his head to clear his ears. "Sorry, Wernher. What was that?"

For a moment, Wernher watched the plume of rocket fire disappearing into the sky. "The last conversation I ever had with Hading," he said at last. "We had the prototype LV-N working by then and before he went out to his death, he made me promise to see it fly. Told me that would make it all worthwhile." He smiled at Lucan. "I'm glad I was finally able to keep that promise."

Val flipped a set of switches on her instrument panel. "RCS armed, guidance locked in. Initiating phase three climb-out."

"We copy, Starhawk."

"Tank pressures nominal. Opening pre-feed to LOX-INT." Val's hand closed around her control stick, thumb resting against a caged button set into its top. She flipped open the cage and a row of green lights lit up on her instrument panel. "Intake vents primed; auto-igniters armed; MACE sequencer showing five by five. Transitioning to LOX-INT." She eased the throttle back to rated power, feeling a faint queasiness in the pit of her stomach as her *Starhawk's* ramjets shut off and the spaceplane coasted onward under its own momentum. Then her thumb came down.

She barely had time to register the thump of the air intake slamming shut somewhere underneath her cockpit, before the MACE rocket engine exploded into life behind her. Immediately she pulled back on her control stick, eyes locked on the flight-path indicator projected on her heads-up display, feeling the weight build up against her chest. Shadows swept across her cockpit canopy, the bright glow of Kerbin's atmosphere from under her wings replaced by utter blackness as the *Starhawk* pointed its nose towards space.

"Transition complete. Burning for orbit."

"Punch a hole in the sky, Commander. That's an order."

"I hear you, Control."

The airspeed indicator on the instrument panel fell to zero and a numerical display lit up beneath it, driven by the inertial guidance unit. Val flicked a glance at it before returning her attention to the heads-up display, the data projected on her canopy now crisp and green against the blackness. She eased her control stick forward, dipping the *Starhawk's* nose below the horizon. "Guidance mode orbital. Projected apoapsis is two hundred kilometres. Propellant consumption on the curve."

"Copy that, Starhawk. You're looking good."

A light glowed on the instrument panel and another, rapidly climbing, number appeared below the apoapsis readout on the HUD. Val slid her throttle to idle. "I have a periapsis, Control. MACE auto-shutdown initiated." Her instrument panel displays shifted and then the vibrations coming through her seat stopped. "Engine stop. Stable orbit achieved, two-zero-two by one-niner-six"

"Welcome to space, Commander. We're patching through to the KSA network now."

"Copy." Val flipped a switch, feeling her control stick tighten up in response. She waited for her instrument panel to confirm manual RCS control, then nudged the stick to one side, setting her craft into a slow roll. Only long training made her cancel it again as Kerbin spun into view.

Val stared out of her cockpit, breath catching in her throat, a crackling radio transmission from a long-ago documentary playing through her mind.

...just Kerbin...Only not quite and all of it at once...

Control seemed to read her thoughts. *"That's got to be some view, Starhawk."*

"You can say that again, Control." Val shook her head as if to clear it. "What's the word on our rendezvous sequence?"

"KSA have cleared our flight plan and given us a Go for approach to Tenacity."

Val untwisted her helmet from the neck ring on her pressure suit and stowed it under her seat. "That's good to hear." She pulled out a keyboard from its receptacle under her instrument panel. "Bringing up the orbit raise program and requesting status check."

"We're ready when you are."

Several hours later, Val looked up from her radar display, grabbed a squeeze bottle from the side of her seat and took a mouthful of water, swilling the floating globules around her mouth before swallowing them. "Okay, Control. Holding at approach point beta. Thrusters safed."

"Good wor..." The line went silent for a minute before Control came back on the air, an odd tone in his voice. *"Hold that, Commander. We've just received word of a message coming in over the Kerm telegraph. Patching in now – I think we're all going to want to give this one our full attention."*

"It's time." President Obrick dipped his head to Jonton. "After you, Keeper."

Jonton gave him a tight nod in reply before settling back on his bed and lifting his head towards Elton's leaf cluster. He saw Obrick, Donman and their two witnesses sit down on their own beds before everything became light.

He emerged above an empty mindscape surrounded by slowly churning veils of mist. His link to Elton shrank down to a hair's breadth, the Kerm's mental voice sounding oddly toneless. He sensed Donman's presence appear alongside his, followed by Obrick and then two presences whom he didn't recognise but took to be their witnesses. To avoid any appearance of collusion, one witness had been chosen from Firesvar and the other from Doren, both of them strangers to Obrick and Donman. In another five Groves across Kerbin he knew that similarly anonymous witnesses would be accompanying the Presidents and Chief Ambassadors of the other Regionalities.

His thoughts were interrupted by a discreet flicker of thought from Elton.

<Mr President, Chief Ambassador, honoured witnesses, First of my Keepers. I bring a message from the One-Twenty>

Donman's presence came forward. *On behalf of both the Conclave and the Ruling Council of Kolus, I thank you, Guardian. Before these witnesses and your Keeper I, Chief Ambassador Donman Kermol, and President Obrick Kerman, stand ready to receive your message.* Jonton felt ripples of tightly controlled emotions curling out from behind the formal language.

<very well> Elton's mental voice seemed to deepen. <Kerbals of Doren. Kerbals of Firesvar, Kolus, and the Spierkan-Forseti Confederacy. Kerbals of Veiid and Wakira. You charged us, the One-Twenty, to make a decision for all Kerbin and a decision we have made>

The mists swirled around them, subtly damping the waves of tension radiating from all five kerbals.

<since the beginning, kerbals have carried our seeds to new lands. You have cared for your Kerm and, in return, our children have cared for you. Now the ancient cycle shall begin anew on another world>

<Our children shall sleep, preserved in cold and darkness. You will guard them well. You will carry them with you to the deserts of Duna. And there, in the fullness of time, you will Awaken them>

The mists lifted, burned away by the sudden sunrise over the mindscape.

<and as it shall be on Duna, so shall it be on Kerbin. We charge you, our kerbals, with another great task. The Awakenings will continue. The One-Twenty shall become many. And in time we, the Kerm, may learn to accept our children and allow them to grow amongst us>

<Since the Age of Madness, we have been beholden to the Law of Territory and the Law of Thirty-Seven. Now, in this Age of Fire, they shall hold us no more>

In a lone cockpit, high above Kerbin, there was absolute silence.

Val nudged her thruster controls, turning the *Starhawk* cabin away from Kerbin before flicking off the cabin lights. As her eyes adjusted to the darkness, she stared at the stars coming out around her, trying to take in the Message and all it implied. Then, with a scant few puffs of vapour from the reaction control system, she rotated her craft back into the standard, nose-forward configuration, gazing anew at her home as it spun into view.

Snowy mountains decked in dark green forest. The regular chequerboard of towns and Groves and fields standing out in geometric contrast to the sinuous coastlines separating them from azure ocean waters, all spattered with a froth of gleaming cloud.

And set against them all, like a diamond on a field of turquoise, the *Tenacity* station floated in space, the octagonal edge of its great wheel discernible even from this distance. An international hub for kerbonauts from across the world to meet and train before being assigned to the colony ship construction sites or one of the many other programs now coming together under Project Starseed. Soaring from sunrise to sunset over the seas and continents of Kerbin; an eternally circling symbol of hope for all the kerman, kermol and Kerm below.

One world.

No borders.

United at last.

Chapter 114

Now - and Forever

*I'm the king of my own land.
Facing tempests of dust, I'll fight until the end.
Creatures of my dreams, raise up and dance with me.
Now and forever...I'm your king.*

M83 - Outro

The SK1G “Poodle” engine shut down as smoothly as the Rockomax engineers responsible for building it could have wished. Even so, the crew of the *Kerbin* class orbital transport were thrown forward against their harnesses like every kerbonaut before them. Wilford sneaked a look at the zero-G indicator mounted on the upper instrument panel but the sight of Commander Kerbiman Kerman bobbling at the end of his tether merely confirmed what the familiar lightness of limb and fleeting queasiness in the pit of his stomach were already telling him. He smiled at Barrie’s old mascot and keyed his microphone.

“Second stage shutdown confirmed, Flight. Standing by for separation.”

Wilford felt the gentle thump of the Roncott actuators against his back as they pushed his spacecraft away from the nearly-spent booster stage, before the service module thrusters fired a short burst to complete the separation manoeuvre. Beside him, at the pilot’s station, Jondun had already called up the orbital flight readouts on her main multifunction display. The numbers on the screen shifted fractionally as the computer recalculated their trajectory.

“We’re tracking you at two-one-nine by two-twenty-one, Wilford. Please confirm?”

“Wilford confirms two-one-nine by two-twenty-one dot four,” Jondun replied, checking the radar display. “Second stage clear for disposal burn.”

Although the test flights - uncrewed and crewed - of the *Kerbin* spacecraft had adhered to the same numbering convention used by every KIS rocket since *Kerbal 1*, the sheer number of flights: construction crew transfers, logistics and supply runs, and finally prime crew launches, required for Project Starseed, quickly rendered that convention too cumbersome for routine air-to-ground communications. Wilford himself couldn't remember the production number of his spacecraft, *although the Barkton Rocket-Spotters almost certainly could*, he thought. Instead, the Kerbin Space Agency had borrowed the Pioneer and Prospector convention of using the spacecraft commander's name as its radio call sign.

Cold gas thrusters pulsed in the vacuum, slowly rotating the booster stage end-over-end until the gaping maw of the SK1G engine bell pointed forward along its direction of flight. Residual vapours provided just enough pressure to force the last litres of propellant into the combustion chamber. An ignition cartridge flared green and the engine thundered to life for the last time, pushing the now empty rocket stage safely out of orbit and on its way to a fiery but harmless demise in Kerbin's upper atmosphere.

"Disposal burn complete, Wilford. Guidance is standing by to verify your transfer."

"Got the numbers right here, Flight," said Jondun, reading them off her display. "Do you concur?"

"We concur. FD tells me you should have a good sun angle for the rendezvous."

Wilford glanced at the silent third member of his crew. "Good to hear, Flight," he said. "It's a small dark target against a big dark background after all. We'll have plenty of time to suit up before the intercept."

The cabin pressure gauge fell to zero and the mini-thrusters arrayed around *Wilford's* nose fired in short, jolting bursts as Jondun made the final compensations to their velocity. Down by the open airlock hatch, under the twin decks of couches, Wilford felt the spacecraft jerk under his feet and then steady. He turned to his companion, the concern on his face hidden by his mirrored spacesuit visor.

"Are you sure you'll be alright?" he asked. "I can solo the EVA if you'd prefer?"

Richlin's faint smile was hidden behind his own visor. "I'll be fine but it's good of you to ask. Go on - I'll see you out there."

Wilford patted him awkwardly on the shoulder before pulling himself through the airlock and out into space. He clipped his safety line to the nearest tether point and hooked his feet under a conveniently placed pair of restraining bars. "Flight, EVA-1. Egress complete."

"Copy EVA-1."

Wilford watched two helmet lamps appeared over the airlock rim, followed by Richlin's head. As soon as his crewmate was clipped and clear, he leaned forward to check his tethers. The two kerbonauts inspected each other's suit readouts then, as if by some unspoken agreement, turned to face the other spacecraft that they had come to find.

The old Mark 1 *Moho* capsule floated off *Wilford's* nose, reaction control module still attached, ablative hull panels pocked with micrometeorite damage and faded by long exposure to sunlight and vacuum. So far as Wilford could see, the cabin was intact not, he knew, that it mattered. "Flight, EVA-1. Rendezvous complete; target within tether range."

"Flight copies, EVA-1," came the solemn reply. *"How does she look since the last maintenance flight?"*

"A little faded but still going strong, Flight," Wilford said. "We built this one to last."

"That we did. Please confirm EVAs 1 and 2 at safe distance?"

"Restrained and tethered, Flight. Go for remote access."

There was a long pause. Wilford shifted in his restraints, playing his helmet lights across the end of the *Moho* capsule. A crack appeared in its hull and then the entire nose assembly swung outward, revealing a glinting shape inside. He bowed his head and clicked his radio over to the crew's private channel. "After you, Richlin," he said quietly.

There was no reply. Richlin braced himself against *Wilford's* hull, bending awkwardly in his EVA suit. Wilford clipped the buddy loop on the other kerbonaut's safety line to his own belt and wedged his own boots more deeply into their restraints.

"Braced."

Richlin propelled himself across the gap between the two spacecraft, safety line and tethers flapping stiffly behind him. He caught hold of the nose assembly, bending his arms to absorb his momentum before swinging his boots down onto the capsule sill. Wilford watched him working, unclipping two of his tethers and attaching them to something inside before heaving it free.

"Secured."

Working hand over hand, Wilford reeled in Richlin's safety line, letting him drift the last few metres before reaching out with both arms to catch him. He waited until his crewmate's feet were safely restrained before the kerbonauts each took hold of a tether and, at Richlin's signal, began to pull. In the privacy of his suit helmet, Wilford swallowed hard as a gleaming aluminium casket slipped out from the shadow of the *Moho* capsule and drifted towards them.

"Flight, EVA-2. Outer hatch sealed."

Richlin emerged from the airlock to find the casket secured to the capsule floor and both Wilford and Jondun floating beside it in respectful silence. He bent over and slid back a panel at one end, staring at the face inside for a long moment. "We made it, old friend," he murmured. "Just one last adventure to go for the both of us."

Wilford cleared his throat. "Flight, Wilford actual. Four kerbonauts aboard."

"Copy, Wilford," came the solemn reply. "Timing on the next transfer burn is non-critical so..." The radio clicked over to another channel. *"...I'm gonna lock the doors down here. Once you're repressurised, we can take it easy for an orbit or two. Maybe remember some of the good times."*

"I'd like that, Flight," said Richlin. "Reckon Ornie would have approved too."

"Pop-up manoeuvre complete, Flight," Jondun reported. "Leading target by two hundred kilometres."

"Good burn, Wilford. Target orientation confirmed for CTC approach."

"We have them on visual, Flight," said Richlin. "Although that's really not difficult. Docking cameras have them dead ahead."

"Understood. Please proceed to one hundred kilometres and stand by for hand-off."

"Copy, Flight." Jondun nudged her thruster controls. "Proceeding to hand-off distance, inbound at five dot two."

Richlin stared out of the rendezvous window. Already the gleaming star in the distance was expanding, becoming ever brighter as it did so. He squinted, trying to make out more detail. "Can't see the rings yet," he said. "Just a bigger blob."

"You'd be doing well to see anything else from here," said Wilford. "Take a look at the camera feed though."

"Oh wow!"

Behind them the thrusters rattled briefly. "Holding at one hundred," Jondun called. "Ready for hand-over, Flight."

"Handing over now, Wilford."

A familiar Wakiran accent filled the cabin. *"Wilford, Starseed Control. We see you at one hundred, cabin-to-cabin. Please close to ten kilometres and prepare for final approach."*

The former Moho pilots turned to one another and grinned. Jondun rolled her eyes at them before toggling her headset. "And a peaceful morning to you, Sigbin. Wilford proceeding to ten."

The blob in Richlin's rendezvous window grew steadily larger, acquiring shape and definition as it drew closer. At one kilometre the colony ship was impressive, at point one kilometre it was simply immense. The bridge module loomed in front of them; the four symmetrical petals of the docking port cover already open, strips of running lights on their undersides glowing brightly. Above the port, the ship's name was stencilled across one of the hull plates in neat Kerba script:

KSV 0001
Lodan Kerman

Richlin stared at the bridge crew silhouetted behind their windows and shook his head in amazement. "It still seems unbelievable. From kerbal-in-a-can Moho capsules to that!"

"It's something," Wilford agreed.

The edges of the Forward Crew Shelter were visible behind the bridge, hub for the eight great pressurised spokes linking it to the main habitation and cargo modules which ran the length of the ship. Amidships, the Rearward Crew Shelter and its spokes provided a second supporting hub, both shelters threaded on the great main truss that formed the spine of the ship and supported the propellant tanks and other vital systems. Aft of the shelters, a lattice of open girders secured the far ends of the habitation and cargo modules to the spine. Beyond that, at a carefully calculated distance from the rest of the ship, a convex disk blotted out the stars, the shadow shield slicing a dark oval from the blue glow of Kerbin's horizon.

And beyond the shadow shield...Wilford shivered. Wernher's masterpieces.

The LV-Ns.

As far from the bridge and crew compartments as the KSA engineers could put them and the reason why all docking operations with a colony ship were undertaken from a strictly cabin-to-cabin approach.

A muffled clang interrupted his thoughts followed by the familiar ripple-bang of docking latches snapping shut. Wilford unstrapped from his couch and picked up his helmet. Jondun tapped him on the shoulder. "I'll pass that through in a minute along with your EVA suit. Time you two were aboard." To Wilford's surprise she threw her arms around himself and Richlin. "Good luck boys - and for Kerm's sake be careful out there!"

"We will," said Wilford, hugging her back. "Keep an eye on Sherf for me - and don't let Jeb do anything that James wouldn't do."

Jondun snorted. "I'll let Gene take care of that. Now go on - or do I have to kick you through that hatch myself?"

The ring of lights turned green and the airlock door swung inward, settling into its wall recess with a soft thud. Richlin emerged, nodded at the waiting bridge crew lining the corridor and turned away. The airlock cycled. The airlock cycled again.

Wilford and Richlin drifted past their respectfully silent comrades in single file, carrying Ornie's casket between them. They stopped at the far end of the gangway where a grave-faced Camrie awaited them, a kerbal sized flag-of-all-Kerbin folded over her arm which she draped over the casket. "Welcome aboard, Commander. I'll take it from here."

Wilford looked at his partner and colony administrator. "Thank you," he said simply. "Richlin would like to lend you a hand." He nodded at his two crew-members, turned away and pushed off for the access way to the bridge.

The next morning Wilford floated out from the sanitation compartment and began making his way back to the bridge, listening to the sounds of the forward shelter crew stirring behind him. He pulled himself up the access tube, the lack of perspective change as he emerged still disorienting after the ingrained habits acquired from *Prospector* and *Pioneer* flights.

Shaking his head he eased himself over to the command station to find Camrie already strapped into her couch. He clasped her hand briefly, before turning to the bridge windows himself, both kerbals staring out at the blue sky and white clouds of home.

The last blue sky I'll be seeing for a long time.

The rest of the command crew began to file onto the bridge behind him, amidst the metallic clicks of restraint harnesses snapping into place and the tapping of keyboards. Out of the corners of his eyes he saw the shifting blurs of screens coming to life, displaying final system reports. Automatically, he glanced at the advisory panels, set just so by the arm of his acceleration couch, before strapping in himself. Outside, the familiar coastline of southern Kolus rolled past, the dusky western shores of the Great Tranquil Sea just coming into view. It seemed like a good omen.

Time to go.

He leaned forward and clicked a switch on the arm of his acceleration couch. "Barkton, Starseed. Requesting proximity check."

"Copy, Starseed. Your orbit is clear."

For a moment, Wilford stared at his comms panel, gathering himself. He glanced at Camrie, receiving a reassuring nod in reply. Then he cut in the ship-wide channel. "This is Wilford. All crew, secure for departure."

A frisson of anticipation rippled around the bridge, the command crew sitting ramrod straight at their stations.

"Bridge secure and ready, sir."

"Forward shelter ready."

"Rearward shelter ready!"

Wilford turned his head to one side and checked his advisory panels. "Systems?"

"Self-tests complete, Commander. Our board is green."

"Guidance?"

"RCS pressures right between the lines. SAS is in auto-one. Full thrust vector authority on all LV-Ns."

"Helm?"

"Orienting to departure attitude, sir. Burn program loaded for trans-Duna injection.

"Engineering?"

"We're all Go, Commander."

A trickle of sweat rolled down the back of his neck. "Very well. Take us out."

"Copy that, Commander!"

A cheer ran around the C7 ready room, now packed wall-to-wall with test pilots and engineers. Al Kerman stood by the door, the Special Projects director's eyes locked on the television screen and its view across the colony ship bridge as the camera zoomed in on The Book mounted in its receptacle above the forward windows; its pages containing the names of all the thousands of kerbals, past and present, who had made – and continued to make – Project Starseed a reality.

"Safety interlocks and thermal failsafes, Go."

"Locks and blocks are Go. Ejecting neutron dampers."

"Ejected."

At the flight director's console, Geneney sat upright, hands gripping the arms of his chair, Jeb, Lucan and Wernher standing behind him. The space around the other consoles was jammed with engineers and backup flight controllers, eyes locked on the flight readouts for their own particular speciality.

On the main screen, a cluster of rods drifted out from behind the shadow shield, gleaming in the setting sun; shrinking to mere pinpricks as the camera slowly zoomed out to keep them in view. The pinpricks flared brightly for a second, small solid rocket motors firing to push them out of orbit.

"Opening coolant valves to shadow shield."

"Open."

"Control drums to start-up."

"Confirmed. Initiating bootstrap sequence on secondary loops..."

A deadly silence descended in every conference room, meeting room and breakout room across the KNSA's manufacturing site. More than one of the hundreds of kerbals working on

the LV-N production line crossed their fingers behind their backs; their moment of truth fast approaching.

"Secondary loops are stable. Starting generators..."

"Generators online. Shield temperature holding, radiation output on the curve. We are Go for main engine start..."

Beyond Munar orbit, aboard *Prospector 5*, four kerbals floated by their habitation module windows aboard watching a dwindling blue dot and listening to their colleagues making the final preparations for the burn that would send them far beyond Kerbin and its moons.

"Synchronising control drums to primary turbopumps. Go for throttle-up on your mark, sir."

Wernher clenched his jaw, Hading's words racing round and round his head. *Thermal gradients...neutron moderator...interestingly non-linear feedback...* He shoved his suddenly trembling hands deep into his pockets.

At the back of the Barkton Mission Control Centre, Leland Kerman stood with his cameraman Don, the veteran broadcasters surrounded by a throng of senior KSA staff, all watching the view from the *Lodan Kerman* on the main display screen. Leland spotted Director Lodan himself standing off to one side, accompanied by Sambus Kerman, personal aide to President Obrick.

Someone behind him coughed, making Don jump. He glanced across at the KSA director, whose fists were balled by his sides. Sambus stared unseeingly at the main screen.

Trickles of sweat ran down Geneney's forehead, Jeb's hand squeezing his shoulder in a vice-like grip. Beside them, Lucan's eyes were screwed shut.

"Three...two...one...mark."

The image on the main screen shifted, replaced by a screenful of numbers before flicking back to a view along the colony ship. As Leland watched, a glowing fringe appeared around the shadow shield, like Kerbol eclipsed by the Mün. He crossed his fingers behind his back.

"LV-Ns at rated thrust, Commander. All drive cores stable."

Mission Control broke into a wild storm of applause. Leland saw Wernher mop his brow and turn to say something to Jeb. Lodan and Sambus made their way down to the flight director's console, the crowd of KSA managers parting around them. Geneney lifted his hands for silence and the applause abruptly died away, letting the steady stream of status reports from the *Lodan Kerman* fill the room.

"Approaching transfer velocity. Stand by for shutdown sequence..."

The jargon dense checklist rattled out of the control room speakers. There was a long silence and then Wilford's measured tones washed over them all.

"Barkton, this is Starseed. We're on our way. Repeat, we are on our way."

Don smiled up at the sky, only half-listening to Leland's broadcast. Crickets chirped in the warm night, the murmur of voices still drifted out of the Barkton Mission Control Centre behind him and all the lights shining from the Space Centre buildings couldn't obscure the constellations scattered across the velvet night. One of those constellations, he knew, was the colony ship and its attendant flotilla of shuttles and tanker craft, all setting out on the long voyage to Duna.

It would not be the last.

"And so the KSV Lodan Kerman - call sign Starseed I - sets out for Duna, its crew carrying with them the hopes and fears of our entire world. All we can do now is to wish them the strength to follow their course and the wisdom of the Awakened Kerm to guide them on their way."

Leland paused.

"We'll be back in the morning to report on the spin-up manoeuvre but for now we bid you all, Kerm and kerbal alike, a peaceful night. I am Leland Kerman and this is KBS News signing off."

Epilogue

Founding Father

*"The road to the stars is open."
- Sergei Pavlovich Korolev*

Jeb sipped from his glass of sapwood and watched the shepherdball sized orange disc spin out of sight. The tip of the northern - southern? - ice cap drifted past his window frame and vanished, leaving nothing but the gently wheeling stars behind. He turned his head and saw Bill staring raptly out of the next window round, a smile playing across his lips.

A ripping, scrunching sound broke the silence as Bob joined them, swinging his zero-g slippered feet up onto his couch. He tapped his watch face, studied the steadily shrinking green line around its periphery and nodded to himself. Jeb glanced over at him. "How much time we got, Bobcat?"

"Twenty minutes or so," Bob replied. "And plenty of behind time on the checklist."

Jeb took another sip of sapwood and held his glass up, admiring the surface of the translucent tan liquid inside. "This," he declared, "is the kind of thing we started the Interplanetary Society for. The three of us, sitting in an honest-to-Kerm spaceship, exploring the universe." He wedged the glass into its rubber-lined receptacle and gestured at Duna which was just rising again over the lip of the window frame. "Flying out to strange new worlds..."

"And joining everyone else there," said Bob dryly.

Jeb grinned. "Only until the next transfer window. Then it's onwards and outwards!"

Bill stirred in his seat. "I was thinking about a side trip to Ike," he said. "Get some holiday snaps of Duna-rise for the office wall, maybe pick some additions for the rock collection."

"We'll have time for that," said Jeb cheerfully. "We're still kerbonauts after all; picking up rocks is what we do."

"And eventually we'll be loading them into elevator cars," said Bill.

"Eventually," said Bob, "Just as soon as the R&D department get their extruder-spinner to work reliably in zero-g and somebody persuades KSA management that hauling shiploads of polyethylene gel to Munar orbit is a good idea."

Jeb shook his head. "Now *that* is a crazy idea," he said. "Landing on the Mün by sliding down a hundred thousand kilometres of plastic rope."

"Only half of that," said Bill quietly, his eyes losing their focus. "It would be a ribbon between worlds. A piece of pure mathematics made real."

"And a practical way of getting materiel off the Mün in bulk," said Bob. "Get that working and the Mün would be to construction materials what Minmus is for propellant! Besides," he added, "since when were we worried about crazy ideas."

"I didn't say I was worried," said Jeb. "And I reckon you'd still need some good old-fashioned rocket engines to get kerbals up and down from there. Fifty thousand kilometres is a..."

Bob's watch chimed.

"...a chat for another day!" finished Jeb. He leaned forward and tapped a button. "This is Jeb. All crew secure for spin-down and manoeuvring." He bounded to his feet and crossed the room to the food preparation area built into one wall. Decanting his half-finished drink into a squeeze bulb, he wiped his glass clean, stowed it in its locker, and pushed the sapwood stained cleaning wipe through the seal of the nearest waste chute. By the time he clipped himself into his couch harness, the last of the crew stations were reporting in.

Jeb flipped back the cage from a prominent red button on the arm of his couch. "Spinning down in three...two...one."

The button slid smoothly into its socket with a faint click. Immediately warning lights began to flash around the window frames. Jeb felt a lightness in the pit of his stomach as if he was in an elevator coming to a stop after a long fall. He watched the stars outside begin to slow, felt his limbs lifting from the couch. Finally, with a muted clunk of locking bolts, the warning lights went out and everything came to a stop.

Jeb promptly unstrapped from his couch and pushed off for the access tube in what had been the ceiling. He reached over his head, grabbed the topmost rung of the ladder fixed to the tube wall and pulled himself along it hand over hand. Casting a wary eye upward for descending crewmates he turned a cautious half somersault and planted his feet on the deck. Pausing a second to steady his head, he set off for the bridge.

"Ow! Kerm's sake, *Pioneer* had more legroom than this," Jeb grumbled, trying to ignore his throbbing toe. "Any closer to the hull and we'd be in vacuum."

"You would think he'd remember by now wouldn't you?" Bob said conversationally to Bill.
"With the amount of time he's spent down here."

Bill shrugged. "He's not wrong though."

"Damn right I'm not," said Jeb. "Remind me to have a word with the Steadler designers once we get this heap back to Kerbin."

"I already sent them a report."

Jeb opened his mouth then closed it again. Bob burst out laughing. Jeb eyed him for a moment then gave up and joined in. Bill just looked mildly bemused.

"Are you lot done in there?" Lucan called out from the lower deck. "Only some of us have got work to do. Systems to warm up, capture burns to make, that sort of thing."

"Better see if they're still expecting us then," Jeb called back, checking a display on the comms panel and punching up a copy of the burn program on a second screen. "Good signal strength on all antennas." He flipped a switch. "Duna Control, Dres Explorer inbound. How do you read?"

"Reading you loud and clear, Dres Explorer," came a familiar voice. *"Tracking you inbound, as near to zero inclination as makes no difference. I see Lucan hasn't lost his touch."*

"He's still the best in the business," agreed Jeb. "Optimal capture burn starts at fifty-two dot six degrees west, Gene. Does that get us in without toasting anything?"

"Concur fifty-two dot six west, Dres Explorer and you're on a clear trajectory."

"Copy, Control. Let's get to it then."

The star raced eastwards across the Duna sky, sailing from dusk to sunset then across the terminator and into the night. It slowed, a star turned comet, braking on sparkling trails of vapour hurled along its path. The vapour swiftly dispersed but the star carried on, sailing from night, through dawn to daylight. A second star leapt from the surface, carried aloft on plumes of fire, outrunning the first star then climbing. Slowing as it rose, matching speed, matching height until at last, the two became one.

Richlin's eyes flicked from his instruments to the docking window and back again. *Dres Explorer* hung in front of him, a gleaming silvery counterpoint to the dusty orange world below. Her bulbous bridge section tapered into a stubby cylindrical hull, bulging slightly at the centreline. For a moment, Richlin marvelled at the sedately spinning grav-wheel, its round-cornered viewing ports sparkling in the sunlight. Then the one-hundred metre light flashed on, dragging his attention back to his instruments.

The open comms link hissed softly in his ear, Duna Control maintaining a tactful - and welcome - silence. Richlin tapped the controls, edging his spacecraft into position; *Dres*

Explorer's running lights running straight and true along the sight lines scribed on his docking window. A soft chime from the navigation computer confirmed what he could already see as circle by circle, the running lights blinked out; thirty metres, twenty metres, ten metres...

The docking latches rattled shut. Richlin's hands raced over his control board, safing thrusters, setting the service module to standby, verifying cabin pressure and environmental systems. He grasped the airlock release lever, depressed the locking button on its top and pulled it firmly down. Then he clambered along the ladder connecting the cockpit to the passenger compartment and eased himself into the airlock. He thumbed the cycle button, waiting impatiently for the inner hatch to close and lock before the outer one swung open.

"Richlin!"

"Kerm but it's good to see you again!"

"Should have known it'd be you!"

Richlin waved at the beaming kerbals packed into *Dres Explorer's* docking bay, a huge grin lighting up his face. "Hey guys! Love the new ship - and that grav-wheel looks incredible from out there!"

"We'll give you the guided tour before we leave," Jeb called. "Get Wernher and Genie up here too - do you some fresh-baked *djan* - with Jorfurt's No.5 spice paste no less! And even Bob's coffee tastes pretty good in point three gee."

The rest of the *Dres Explorer* crew hung back at a respectful distance back as Jeb and Bob launched themselves towards their friend and former colleague, Lucan close behind them. Bill followed at a more sedate pace and was promptly snagged by Jeb and pulled into the general scrum. Presently the unwieldy knot of laughing, crying kerbals broke apart and assumed a more dignified disposition.

Jeb caught his communication officer's eye. "She's all yours, Aldny. As soon as we're down I'll get Gene to send up another shuttle."

"No hurry, boss," replied Aldny, "Any time in the next day or two will be fine."

Jeb laughed. "I'll see what I can do." He turned to Richlin, "Ready when you are, Commander."

Richlin grinned at him and disappeared back into the airlock. "Room for two in here if we both breathe in. Bob?"

Bob slipped deftly through the hatchway which thudded shut behind him and Richlin. No sooner had the airlock cycled than two of their crewmates eagerly took their place, until finally Jeb and Bill climbed in themselves. Inside the shuttle they found Richlin holding onto the cockpit ladder, waiting for them to find their feet. He pointed up at the pilot couches. "You want to drive, boss?"

Jeb smiled and shook his head. "Your ship. Happy to do ballast duty if you need it though."

"Wouldn't want an unbalanced craft," agreed Richlin. He scanned the passenger compartment, facing the ring of acceleration couches. "Everyone strapped in? No problems with the harnesses?" The circle of upraised thumbs was all the answer he needed. He pulled himself along the ladder and into his own couch, followed eagerly by Jeb.

The shuttle slid smoothly away from *Dres Explorer*. Jeb watched his ship recede into the distance, dwarfed by the immensities of a planet on one side and open space on the other. He listened to Richlin's running report to Duna control with half an ear, lulled by the familiar cadence and terminology of re-entry preparations. The star field wheeled past, Duna sliding out of view as Richlin oriented the shuttle for the first burn. Then the engines fired, pressing him briefly into his seat, before cutting out.

Re-entry was almost an anti-climax. The russet glow of Duna shine took on a ruddier hue; the shuttle vibrating gently as it plunged through the tenuous upper atmosphere. Jeb flicked a glance at the g-meter and saw its needle barely lifting from its stop. Another burn, longer this time, pressed him into his seat, the blackness of space outside gradually shrouded by a dusty orange sky as the shuttle raced onwards.

"Initiating powered descent."

Jeb's heart leapt in his chest. The engines lit for the last time, ramping up to full thrust, shoving him back into his couch with his full weight and then more. Slowly the shuttle pitched over, engines throttling back, until he found himself lying flat on his back as if ready to launch again. The landing gear unfolded with a clunk, the hull juddering this way and that as Richlin made the final corrections to their course. The outboard engines shut down, the centre one throttling back to minimum thrust, matching Duna's gravity and slowing the shuttle to a hover before shutting down. Jeb felt a familiar lurch in his stomach as the little vessel dropped away from underneath him before coming to rest with a thud.

"Just stay seated," Richlin called over the intercom. "Stairs and rover are on their way."

Jeb shuffled around in his seat, trying to get a better view out of the side windows until at last, he heard a hiss of pneumatics followed by a clank and a rattle of docking latches. He reached for his harness buckle but Richlin shook his head. "Rover's locking on, folks. Couple more minutes and you'll be out of this can." There was a second, fainter rattle and a light blinked on above his head. "After you, boss."

Jeb wriggled out of his harness and half clambered, half slid down the floor ladder, dropping nimbly onto what was now the shuttle floor by the airlock. Below him, Bob was hanging onto the opposite ladder leading down to the passenger couches. Jeb grinned at him and ducked into the already open airlock. The outer hatch cycled open and he bounded down the stairway, through a short connecting tube and into the waiting rover, to be met by a pair of beaming figures leaning over the back of their seats.

"Genie! Wernher! Great to see you guys!"

"Great to see you too, Jeb. You managed to find the place then?"

Jeb laughed. "No problem! I had Lucan on navigation, Richlin to get us down to the surface and a flight director on standby for the first time in months. Seriously though guys - we're getting the VIP treatment here. Chauffeured rover to the base and everything. Beats the Blight out of floating about on the Great Tranquil Sea waiting for Bob's boat!"

"You've not seen anything yet," Geneney promised him.

"I've seen the pictures. Looks pretty impressive."

"And how well did Bill's photographs match up to the real thing?" said Wernher.

"Good point," answered Bob, settling into his seat beside Jeb. "Hey Gene, hey Wernher." He turned to face Jeb. "And if you start knocking the boat again, I've got a story about a seasick kerbonaut to tell you."

Jeb affected an air of innocence. "You mean Dodgee?"

Geneney raised an eyebrow.

"Doddbree," said Lucan, emerging from the airlock. "You remember him, Gene - he was finishing his training about the time you left for Duna. Nice guy, flew a great Munar mission but wasn't ever allowed to forget the splashdown."

Bob grimaced. "That was one capsule we didn't bother to re-use."

"Anyway," Lucan said, "the rest of the intake started calling him Dodgee. He managed to get on the next flight to Munbase Three, has been there ever since."

"He calls himself the Munar Janitor," Jeb added. "Lives in the first production model Hitchhiker module - the one with all the labels superglued to the storage lockers." He shook his head. "Feel sorry for whoever did that when you catch up with them, Genie."

Geneney's reply was interrupted by the sound of the airlock opening and Bill making a slightly unsteady grab for the nearest seat. Bob shot Jeb a warning glance. "Speaking of living in a can," he said, "how're all the kermol adapting to living in caves?"

"Better than the kerman," said Wernher dryly. "Having a Kerm as an integral part of the air handling system has been interesting."

"That sounds like Jeb's definition of interesting," said Bob. "What happened?"

"They all turned kermol," said Wernher simply. "Or as good as. It turns out that pheromone release is an involuntary process in Kerm trees - we did ask Jendun to stop but we may as well have asked a kerbal to stop breathing. By the time we worked out what was going on, they'd spread through the village - and the air scrubbers can't seem to do much about them."

Lucan blinked. Jeb just grinned. "So when do we get to meet little Wernher then?"

Wernher snorted. "No lady in her right mind would want this old engineer."

"I think I could get used to that," said Bob quietly. "Everyone in the same capsule together."

"People are still adapting," said Geneney. "but I think it'll work out in the end. The agronomists have always pulled maintenance duty anyway and even the old engineers are learning new tricks from the Kerm. Everyone strapped in?"

The rover eased forward with a hum of electric motors. Conversation inside the crew cabin died away as everyone turned towards the nearest window. Wernher drove off the concrete apron marking the edge of the landing strip and headed for the first of a string of marker poles stretching into the distance. The rover rocked on its suspension as it trundled along, occasionally jolting over a larger than usual rock. The *Dres Explorer* crew stared raptly out at the desert landscape.

Jeb stirred. "You mentioned new tricks for an old engineer, Wernher?" he said.

Wernher's eyes lit up. "Kerm control networks. Absolutely fascinating - and so many applications! The older base systems are about what you'd expect. Most of the control systems are borrowed from ones we developed for the LV-Ns, interestingly non-linear feedback loops not being the best idea in your very first life-support systems. But the systems we're developing now? Twice as flexible with even more redundancy."

"You should send the schematics for latest versions back home" said Geneney.

"Oh I will," said Wernher, "and speaking of LV-Ns, *Dres Explorer* was going to be fitted with the Mark 3s wasn't it?"

"Yep," said Bob, "and they're beauties. Brand new materials, pebble bed reactors and enough thrust to double as a sustainer stage if we were allowed to fly them in-atmosphere."

"Pity the bridge isn't as well designed," muttered Jeb. Bill and Bob rolled their eyes.

"There's not much room upfront," Bob conceded. "Definitely not an old kerbonaut's rocket ship."

"Hey!"

"I heard that Steadler have a bigger model on the drawing board," said Geneney. "Working name is *Dres Prospector*. Whether they get round to building it..." He grinned. "That probably depends what you find out there." The rover crested a shallow rise and Wernher swung sharply left before parking on the edge of a shallow downward slope. Jeb stared out of the cabin window, trying to make sense of what he was seeing. Then his jaw dropped open.

In the distance a spike of mountains shouldered their way into the sky from the centre of a shallow bowl-like crater. Reflected sunlight twinkled from innumerable windows in the nearest cliff face - and from the thirty-eight great geodesic Domes scattered in front of it.

Slowly, Jeb began to pick out the details. The long central tube linking the cliff face to the central Dome. Twelve similar tubes, six to each side, fanning out from the central hub in a bow-tie arrangement, more Domes strung along them like gems on a silver wire. The thirty-eighth dome, connected directly to the hub, the flag of the new Duna Council flying high above it. The criss-crossing of other smaller tubes, stitching the Domes into a single

structure. And finally, the scalloped waves of smaller domes, like a frothy sea of green bubbles lapping against the tubes. Row after row of them, merging together into great canopies protecting the open spaces beneath, each supporting the whole in a way that would be startlingly familiar to any kerman - or kermol - architect back on Kerbin.

Jeb blinked back the sudden tears prickling the corners of his eyes. "Sweet Kerm above," he murmured to himself. Similar mumbled sentiments rippled around the inside of the rover cabin.

"It's something isn't it," said Geneney softly. "Bigger than even we dared to dream, old friend."

Jeb nodded dumbly. Then his eyes narrowed, staring into the distance. "Hold on - is that?"

"It is," said Geneney, "and the Western Grove is round the other side. Both of them with much younger Kerm though - I don't believe they've finished Knitting yet. We've only just started building the Domes for the Southern Grove - it'll be a while before we're ready to plant anything there. Anyway - we're heading to the Northern Grove." He smiled. "Jendun, our oldest Kerm has been very excited at the thought of meeting you all. And then, once we've attended to business in the central Dome, we'll give you the guided tour of the town."

...even though the physical scars are long gone, the medics say that I never really got over the psychological separation. Anyway, cutting a long story short, I'm putting all my affairs in order before going an-Kerm again at the end of the month. Besides, Elton could use a secretary - the First of Kolus needs his personal staff just like any kerbal president or chief ambassador does. Some people still remember the old Sage of Barkton, so I guess that will help.

Elton sends his regards by the way and asks that you pass on his best wishes to Jendun. Jonelle sends her love too.

The latest petition to bring the Firsts into a new Council of Eighteen Pillars was finally dropped last month having gained about as much popular support as its predecessors. If I'm being honest, I think both sides are happier with the old Council of Twelve Pillars and a new Council of Firsts.

You'll remember all the news about Tiviena of course? I still half-think of her as Tivie's Grove I'm afraid, which is one bad habit that I'll need to lose quickly. Elton humours his old Keeper in private but I suspect he won't be as forgiving to his secretary.

Anyway, Tiviena's first adopted seedlings knitted into a healthy Grove and Awakened into a charming young Kerm, even if she did give Elton and Tiviena absolute conniptions along the way. It seems that most Awakened Kerm are capable of tolerating (if not enjoying) a Seedling within their territory and in time they tend to get along fine with the newly awakened Kerm.

Of course that does make more than a few folks wonder why we're still pouring resources into Starseed. Reminding them about that command from the old One-Twenty to take their Children to Duna usually helps, as does pointing out the close calls with several Awakenings and the Awakened Kerm who couldn't tolerate intrusions into their territory. Luckily most folks seem to think that we were all too lucky with this Kerm crisis and that the Duna colony is our best insurance policy against another one.

Personally, I think the pictures of your North Grove project made all the difference but perhaps that's just a proud father talking.

What people don't know yet - and why I chose to upgrade our personal encryption for this letter - is that Tiviena's second group of adopted seedlings have been knitting much, much faster than expected, to the great excitement of all the local Kerm. We'll need to wait for the knitting to finish to be sure but Elton believes that they're taking over the abandoned fibre the mature Kerm left behind when they pulled back their territories. He's already talking about 'fused Groves', giant overlapping communities of Kerm, spreading across Kerbin. Jonelle calls it the Jonton Kermol Project. Which is flattering I suppose, although I suspect there's an obscure joke in there somewhere - I still haven't really got the hang of Kerm humour.

Personally, I wonder if fused Groves could be the start of something even bigger. Right now we replace old dead Kerm trees with new saplings grafted onto the stumps. What would happen if we planted a new Seedling by the stump instead? With enough overlap, might it be possible to support a Kerm mind on fewer than thirty-eight Kerm trees, perhaps a great many fewer? Perhaps one day there will be but one Kerm to a Kerm tree or even fewer. How many minds can a Grove support?

Needless to say, I haven't yet mentioned these speculations to Elton. Time enough for that once Tiviena's second child has Awoken. They also raise some uncomfortable questions. We have weathered this Kerm Crisis and, Pillars and Firsts willing, will weather many more Seedings to come. But one day, even with all our ingenuity, there will be no more planets to run to. With the stars beyond our reach, what do we do then?

For myself I am optimistic. The Age of Madness drove us to reshape our whole society for the better. I believe this Age of Fire will drive us to reshape it further for the sake of generations of Kerm and kerbals to come. And this time we have the Awakened Kerm themselves to help us.

Your loving Dad,

Jonton.

Joenie removed her wire-rimmed glasses and rubbed at the scar on her throat. Well, I'd better let Jendun know about Dad going an-Kerm again and she'll want to know about Tivienna's new one. But the rest...preserve me but that's going to be a long Communion. Not

to mention a lot of Kerm time on the transplanetary link. She saved a private copy of Jonton's letter and shut down her computer. I need some fresh air.

Donning her outdoor suit and boots, she lifted her emergency rebreather mask from its hook and checked the air cartridge valve and scrubber acidity. The indicator line was still a reassuring green from edge to edge. Satisfied, she clipped the mask onto the side of her belt, picked up her case of gardening tools and palmed her sleep room door open.

The sun-strips overhead lit the corridor with a simulated Kerbin noon. Deep in thought, Joenie let her feet carry her through the tunnels, their smoothed rock surfaces painted with brightly coloured murals of Groves and other landscapes from home. By the time she reached the main northward thoroughfare, dozens of kerbals were loping past on either side, some dressed in outdoor gear like herself, others in the distinctive yellow suits of the engineering and maintenance teams. Here and there poncho wearing figures threaded their way through the crowd, rebreathers hanging from their belts.

Suddenly, Joenie felt something rebound off her legs, followed almost instantly by an indignant wail. Startled she looked down at a bundle of fabric and gangling limbs from which a small but very noisy head emerged. The wail became a string of hiccups as the kerblet stared back at her inquisitively. Smiling, Joenie dropped to one knee and helped her to her feet. "Up you get little one. Wiggle your fingers? There you see - all better. Now where's your Mummy or Daddy?"

"Right here, Doctor," came a slightly embarrassed, male voice above her. "Please excuse my wandering daughter. And you, Valentina Almkerm," he added, scooping the kerblet onto one arm, "need to stop running away before somebody squashes you!" Valentina giggled and poked him on the nose.

"No harm done," said Joenie. She smiled, ruffling Valentina's tousled black hair. "Walking is tricky business here - just you ask your daddy when you get a bit older."

Valentina's father laughed. "Oh she certainly will. But we must be going - a pleasure to meet you Dr. Joenie."

"And you too," said Joenie. She waved at Valentina over her father's shoulder before turning and heading up the thoroughfare.

Both doors of the main airlock were open, the better to let kerbals out and fresh air in. Joenie inhaled deeply, savouring the smells of damp earth and living plants as she stepped outside and followed the main access tube to the Grove proper. Around her, gardeners and agronomists were hard at work in the greenhouse modules, tending to stacked towers of plants. The ochres and russets of the Dunan landscape outside made a stark background to the greenery.

Joenie reached the entrance to the main Grove dome and stopped short. A group of figures stood under Jendun's branches, talking quietly amongst themselves. One of them stepped forward and placed something on the ground. She caught a glimpse of pleasantly rugged

features topped with kerbonaut short hair. Kerbonauts were hardly unknown on Duna of course but...

Jebediah Kerman? Joenie blinked, taking a good look at the group for the first time. *Geneney Kerman? And Bob Kerman too and Bi...oh. Oh of course.* She stepped back against the dome wall, head bowed respectfully, then knelt, busying herself with the flower bed planted around its perimeter. Presently, she heard the crunch of footsteps on gravel and the murmur of voices passing by as the kerbonauts filed out. Joenie got to her feet and walked over to Jendun.

As with every other Kerm tree in the North Grove, a plaque stood at the foot of Jendun's main trunk, painstakingly carved from local stone and standing as a silent memorial to a kerbonaut on leave amongst the stars. An old photograph encased in a transparent block rested on a low plinth by the plaque. It showed the view from a small round window, a curved line down the middle of the picture separating inky blackness from, much faded, blues, browns and greens. In the distance, the battered grey ball of the Mün rose over Kerbin.

For a moment, Joenie studied the photograph in awe, then ran her finger gently over the plaque, re-reading the familiar words.

Here rests the body of Dr Lodan Kerman
Visionary
Kerbonaut
Beloved Friend
And a Founding Father
Of the Kerbal Space Program

---- The End ----

Last Words

On the 1st June 2013, I posted a short story about a handful of kerbals making a last-ditch attempt to launch a crewed suborbital rocket. In a fit of wild originality, I called it First Flight.

Seven years and over 450,000 words later, we're finally done. That's a long time and a lot of words and it wouldn't have been possible without the hard work, support, encouragement, and enthusiasm of an awful lot of people along the way.

Thank you. Thank you all.

Thank you to [@HarvesteR](#) and [@Moach](#) for giving us the Kerbals, to the Kerbal Space Program development team, past, present, and future for writing the game that inspired me to start writing, and to Squad for letting them do it. Without you, none of this would have happened.

Thank you to my dear wife for really *grokking* my very first Mün landing way back when, and for putting up with my seven-year obsession with the Kerbals and their adventures.

And, in no particular order:

A very special thanks to [@Ten Key](#) and particularly to [@CatastrophicFailure](#) for so many things. Encouragement, friendship, mentoring, ideas, patience, and a lot more besides. Without you, this story would have been very much shorter, very much poorer and, in all probability, would not have been finished.

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[tyx2y](#), [@\[Jeremy \]](#), [@SpaceSphereOfDeath](#), [@BostLabs](#), [@Apollo1391](#), [@The Jedi](#)
[Master](#), [@Commander](#)
[Zoom](#), [@squirtgun1234](#), [@Exsmelliarmus](#), [@GDJ](#), [@Warriorbulb99](#), [@bellino](#), [@Patupi](#), [@ATRM93](#), [@Th](#)
[eCosmonaut](#), [@musicpenguin](#), [@skykooler](#), [@briansun1](#), [@Weegee](#), [@Brody](#)
[Peffley](#), [@theonegalen](#), [@Will Fawkes](#), Guest
[links123](#), [@Nessus](#), [@ASTRO alec106](#), [@Lazro](#), [@OrtwinS](#), [@Danish Savage](#), [@Deadpangod3](#), [@Cor](#)
[nHuskerKenny](#), [@Wahgineer](#), [@wminsing](#), [@Manfredatee](#), [@lindemherz](#), [@Tripside](#), [@TheDataMiner](#), [@](#)
[ElJugador](#), [@Lightning22](#), [@Jack](#)
[Redmen](#), [@123nick](#), [@celerystick009](#), [@kmMango](#), [@JebThePilot](#), [@Creature](#), [@mstachowsky](#), [@Andre](#)
[wBCrisp](#), [@VelocityPolaris](#), [@Bean9914](#), [@Engineer of](#)
[Stuff](#), [@Cerebrate](#), [@KerbMav](#), [@marysinco](#), [@sardaukar11](#), [@Coga19000](#), [@Chuck U.](#)
[Farley](#), [@Excalibur](#), [@fire219](#), [@Armchair Rocket](#)
[Scientist](#), [@GluttonyReaper](#), [@meve12](#), [@BurningLegion](#), [@Kagame](#), [@Navy](#)
[Airforce](#), [@Ekken](#), [@0111narwhalz](#), [@Bev7787](#), [@scy](#), [@Daelkyr](#), [@Ravens cry](#), [@Thalamask](#), [@MaxL](#)
[1023](#), [@Elrond Cupboard](#), [@VelociraptorsofSkyrim](#), [@Verkio](#), [@Adam](#)
[White](#), [@GKSP](#), [@Atlas2342](#), [@SCE2AUX2](#), [@AviosAdku](#), [@SilverlightPony](#), [@TwinKerbal](#), [@vsully](#), [@K](#)
[AL 9000](#), [@Garrett](#)
[Kerman](#), [@DarkOwl57](#), [@CSE](#), [@TheKosanianMethod](#), [@AshleyBB](#), [@NISKEPCSIM](#), [@notrealDannyD](#)
[eVito](#), [@The Grand Teki](#), [@KerBlitz](#)
[Kerman](#), [@Spacenoob](#), [@IncongruousGoat](#), [@roboslacker](#), [@aeroeng14](#), [@MinimalMinmus](#), [@Garibaldi2](#)
[257](#), [@DualDesertEagle](#), [@Lo Var Lachland](#), [@qzgy](#), [@AVaughan](#), [@Bottle Rocketeer](#)
[500](#), [@GalFisk](#), [@fulgur](#), [@TonedMite133805](#), [@LordOfTheNorth](#), [@EnderKid2](#), [@Geschosskopf](#), [@Kerb](#)
[alling \(Got Dunked On\)](#), [@έκ νίλλάιή](#), [@Misguided Kerbal](#), [@soundnfury](#), [@Tetragramm](#), [@Mr.](#)
[Peabody](#), [@PoisonBLX](#), [@\[insert name here\]](#), [@RandomGuy1824](#), [@TheEpicSquared](#), [@UnusualAttitud](#)
[e](#), [@Quijote](#), [@Shamus6200](#), [@The Space Dino](#), [@Confused](#)
[Scientist](#), [@Pretorian28715](#), [@Kosmonaut](#), [@PoisonBL](#), [@MailletC](#), [@davidy12](#), [@NotAgain](#), [@Spacecep](#)
[tion](#), [@Tiberion](#), [@Ozymandias the Goat](#), [@IronCretin](#), [@AquaAlmond](#)
[Productions](#), [@Dres](#), [@RyanRising](#), [@Orion1500](#), [@Alpha](#)
[360](#), [@FlyingCola](#), [@RocketSquid](#), [@WintericeUK](#), [@Readerty2007](#), [@Mods o joy](#), [@SmartS=true](#), [@Th](#)
[atguywholikesionengines](#), [@TimothyC](#), [@mattssheep4](#), [@The](#)
[Error](#), [@FlamingPotatoes](#), [@Scout1218](#), [@SchwinnTropius](#), [@Nils277](#), [@Zucal](#), [@Gameslinx](#), [@Kiwa](#), [@I](#)
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[3001](#), [@Dirkidirk](#) and [@GuessingEveryDay](#)

for all the comments, discussions, kind words, enthusiasm, likes and rep.

Thank you – and apologies – to any other readers of *First Flight* whom I may have missed out.

And last, but certainly not least, thanks to [@Needles 10](#) who, in response to that original short story, posted a reply with the immortal words: “It’s beautiful. Make more.”

Beauty, as always, is in the eye of the beholder but I think I eventually made good on that second part.

KSK.

3rd May 2020

Appendices

Appendix A: Maps

Political Map of Kerbin



Key

1. The Capital	9. Cabaralb
2. Olbinad / The Berelgan Institute	10. Iskenar
3. Barkton	11. Nordham Bay
4. Foxham	12. Toralba
5. Balcabar	13. KSA Alpha Station
6. Bolanerbat	14. KSA Beta Station
7. Boladakhat	15. KSA Gamma Station
8. Bolfactad	

Map of Kerbin (Based on original by KSP forum user cardgame)

<https://forum.kerbalspaceprogram.com/index.php?/topic/12645-invention-kgss-continent-naming-committee/&do=findComment&comment=184503>

Notes by KSK:

I use a modified version of this map. Young Kolus is of course, Wakira, named to go with the ocean it borders. Old Kolus is simply Kolus. The border between Firesvar, Kolus and Wakira is slightly different, such that there is a point where both borders meet - which is where Val is currently commanding the Kolus air border patrols [*as of Ch. 58 A Thin Red Line*]. The yellow peninsula doesn't exist as a separate regionality but is part of Kolus. There are probably a couple of other discrepancies too but those are the main ones.

The KSC is in Kolus and the Capital and Berelgan Institute are on the Itaalic Isthmus. And yeah - that's no longer a part of the in-game map, although I believe it's been replaced by a handful of islands.

Foxham is another coastal 'Rocket Town'. It's at 4. and is where Rockomax's headquarters and main launch site is based.

Iskenar is at 10. and it's located at the end of the valley created by that C shaped mountain range. The older parts of the town are actually built into the mountain caves.

Located at 6. and 7., nestled in those two large bays on the coast, lie the twin jewels of Bolanerbat and Boladakhat. They've been wealthy trading cities since the Age of Sail.

Cabaralb is at 9. and is a moderately sized fishing town, now largely abandoned due to the Kerm Conflict.

Balcabar is at 5. (not too far from the desert launch complex) and it's the nearest town to the Kerbin Space Agency's Site D, where the LV-N development program is based.

Toralba is at 12. and the name is derived from the Old Kerba for 'two waters' though, which is fitting because it's located by a pair of lakes.

Incidentally, apart from Iskenar and Foxham, all the other city names are based on Old Kerba words and can be consistently translated [*see the last section of Appendix D*].

KIS Launch Site

The actual KIS launch site is at KSC, Barkton is further west i.e. close enough to provide a feasible population centre but safely distant from the rocket launches. However, the KIS facilities aren't quite what you see in-game (at any tech level). The launch pad and VAB are out of town but all the admin buildings are back at Barkton as are the manufacturing facilities. This may change eventually but at the moment, all the KIS hardware is built at what used to be Jeb's junkyard on the outskirts of town and then hauled out to the VAB for assembly, systems testing etc.

Humilisa

Humilisa is a sizeable island between Doren and Kolus (east coast of the continent that the KSC is on in-game). The Kolans grabbed it early on when the Kerm crisis was just becoming a thing and there was a bit of a race to secure any nearby habitable (even if barely) land and plant Groves on it. The thinking at the time was that the taboo against deliberately harming Kerm would give de-facto control of whatever land was grabbed.

It's fair to say that the Doreni were less than impressed with this and there have been at least two battles for Humilisa as the Kerm crisis developed. (Two shown in-story anyhow). I haven't really gone into this but strategically, Humilisa is also quite handy as a staging area for striking at either Doren or Kolus, hence the fighting over it. In-story it's been a

convenient plot thread to show the escalation of kerbal military capacity, from Val's racing plane-converted to-torpedo bomber, to dedicated warships.

The Kolans first float the idea of establishing Groves on Humilisia way back in Chapter 33 (Uncharted) which, alarmingly, was written nearly five years ago. There's a brief glimpse of the Kolans covertly supplying their new outpost a couple of chapters later in Stormclouds [Ch. 38]. In Pre-emptive [Ch. 45], we meet Val for the first time and see the Kolans gearing up for eventual war in a 'trust but cut the cards' kind of way. The midden hits the impeller in Lightning [Ch. 48], which is the first battle for Humilisia. Val distinguishes herself in combat, torpedoing the Doreni flagship. We get a glimpse of the second (on-page) battle for Humilisia much, much later in Chapter 81 (Shattered), at which point the Kerm Crisis has escalated into full-blown war.

Geographic Map of Kerbin



Key	
1. River Wak	6. Scorpa Range
2. Koluclaw Mountains	7. Bouldertops
3. Guardian Peaks	8. Northern Range
4. Hartock Mountains	9. Kenar Vale
5. Trencher Mountains	

Appendix B: Cast and Crew

[*Minor characters in italics*]

The Kerbin Interplanetary Society

Jebediah Kerman:	Founder, flew on <i>Kerbal 1</i> , <i>Moho 1</i> , and <i>Pioneer 4</i> .
Bob Kerman:	Founder, flew on <i>Kerbal 1</i> , <i>Pioneer 6</i> , <i>Tenacity</i> .
Bill Kerman:	Founder, flew on <i>Kerbal 1</i> and <i>Eve 3</i> .
Geneney Kerman:	Founder and chief Flight Director. Flew on <i>Kerbal 2</i> .
Lucan Kerman:	Founder, flew on <i>Kerbal 2</i> , <i>Pioneer 5</i> .
Wernher Kerman:	Founder and Chief Engineer. Flew on <i>Kerbal 2</i> and <i>Pioneer 1</i> .
Camrie Kerman:	Machinist, flew on <i>Moho 2</i> , <i>Starseed 1</i> .
Wilford Kerman:	Flew on <i>Moho 3</i> , <i>Prospector 2</i> , <i>Tenacity</i> , <i>Starseed 1</i> .
Adelan Kerman:	Machinist, flew on <i>Moho 4</i> .
Richlin Kerman	Engineer, pilot, flew on <i>Moho 5</i> , <i>Starseed 1</i> .
Joemy Kerman:	Engineer, flew on <i>Moho 6</i> .
Ribory Kerman:	Flight control and spacecraft systems engineer. Flew on <i>Eve 1</i> , <i>Pioneer 6</i> .
Roncott Kerman:	Engineer, flew on <i>Eve 1</i> .
Calzer Kerman:	Kerbonaut training, simulation supervisor. Flew on <i>Eve 1</i> , <i>Pioneer 2</i> , <i>Tenacity</i> .
Ornie Kerman	Propulsion engineer, pilot, flew on <i>Eve 2</i> .
Edsen Kerman:	Flight controller (flight dynamics), electronics engineer, flew on <i>Eve 2</i> .
Ordrie Kerman:	Engineer. Flew on <i>Eve 2</i> .
Neling Kerman:	Flight controller (guidance), electronics engineer. Flew on <i>Pioneer 2</i> .
Seanan Kerman:	Life support engineer, flew on <i>Pioneer 3</i> .
Malmy Kerman:	Propulsion engineer. Flew on <i>Pioneer 4</i> , <i>Tenacity</i> .
Seelan Kerman:	Structural engineer. Flew on <i>Prospector 1</i> .
Hando Kerman:	Test stand engineer.
Ordun Kerman:	Engineer.
Tomcas Kerman:	Head of Kerbonaut Training, simulation supervisor.
Lodan Kerman:	Kerbonaut training, simulation supervisor.

Sigbin Kermol:	Tracking network engineer.
Doodlie Kermol:	Tracking network engineer.
Derny Kerman:	Chef, Head of Kerbonaut Nutrition.

Rockomax Corporation

Ademone Kerman:	Founder and company manager.
Nelton Kerman:	Chief Flight Director.
Danfen Kerman:	Head of Structural Engineering.
Hanbal Kerman:	Head of Propulsion.
Joebal Kerman:	Head of Electrical and Environmental Systems.
Melvey Kerman:	Flight controller, scientist.
<i>Lemgan Kerman:</i>	<i>Flight controller.</i>
<i>Orbald Kerman:</i>	<i>Flight controller.</i>
<i>Obler Kerman:</i>	<i>Flight controller.</i>
James Kerman:	Kerbonaut. Flew on <i>Endurance, Pioneer 1, Eve 3.</i>
Sherfel Kerman:	Kerbonaut. Flew on <i>Endurance, Pioneer 1.</i>
Tommal Kerman:	Kerbonaut. Flew on <i>Pioneer 2, Pioneer 5, Tenacity.</i>
Kerke Kerman:	Kerbonaut. Flew on <i>Next Step, Pioneer 3, Tenacity.</i>
Barrie Kerman:	Kerbonaut. Flew on <i>Pioneer 3, Prospector 2, Tenacity.</i>
Jondun Kerman:	Kerbonaut. Flew on <i>Next Step, Pioneer 4, Tenacity, Wilford.</i>
Fredner Kerman:	Kerbonaut. Flew on <i>Pioneer 5.</i>
Chad Kerman:	Kerbonaut. Flew on <i>Pioneer 6, Tenacity.</i>
Milden Kerman:	Kerbonaut. Flew on <i>Prospector 2, Tenacity.</i>
Calley Kerman:	Kerbonaut. Flew on <i>Eve 3.</i>

Stratus Ltd

Thomplin Kerman:	Sales manager.
Halnie Kerman:	R&D team lead.
Shervin Kerman:	Director of Engineering.

C7

Enley Kerman:	Test pilot.
Al Kerman:	Director of Special Projects.

The Kerbin Space Agency

Lodan Kerman:	Director.
Tomass Kerman:	Aide to Director Lodan.
Fercan Kerman:	Tracking, telecoms systems engineer.
Corvan Kerman:	Tracking, telecoms systems engineer.
<i>Sheldun Kerman:</i>	<i>Engineer.</i>
Aldsen Kerman:	Scientist, imaging and data management.
Dunney Kerman:	Head of Probodyne Inc.
Jernie Kerman	Scientist, Probodyne Inc.
Sidbo Kerman	Scientist, Probodyne Inc.
Germore Kerman:	Flight Director, Probodyne Inc.
Bobrie Kerman:	Flight controller, Probodyne Inc.
Ferlan Kerman:	Flight controller, Probodyne Inc.
Hading Kerman:	Project manager and nuclear safety officer: LV-N project.
<i>Rod Kerman:</i>	<i>Receptionist, Site D: LV-N project.</i>
Macbus Kerman:	Senior scientist, Site D: <i>LV-N project.</i>
<i>Desden Kerman:</i>	<i>Senior engineer, Site D: LV-N project.</i>
<i>Jorgun Kerman:</i>	<i>Engineer, Site D: LV-N project.</i>
<i>Will Kerman:</i>	<i>Scientist, Site D: LV-N project.</i>

The Twelve Pillars

Obrick Kerman:	President of the Regionality of Kolus.
Donman Kermol:	Chief Ambassador of the Regionality of Kolus.
Lanrick Kerman:	President of the Regionality of Wakira.
Burvis Kermol:	Chief Ambassador of the Regionality of Wakira.
Chadlin Kerman:	President of the Regionality of Doren.
Enemone Kerman:	President of the Regionality of Firesvar.
Maller Kerman:	President of the Regionality of Veiid.
Obmy Kermol:	Chief Ambassador of the Regionality of Veiid.
Chadwick Kerman:	President of the Forseti-Spierkan Confederacy.
Aldwell Kermol:	Chief Ambassador of the Forseti-Spierkan Confederacy.

The Berelgan Institute

Erlin Kermol:	Director
Halsy Kermol:	Principal Investigator
Mallas Kermol:	Senior Scientist

The Kermol

Jonton Kermol:	Keeper and an-Kerm
Gerselle Kermol:	Keeper, married to Jonton
Joenie Kermol:	daughter of Jonton and Gerselle.
Meleny Kermol:	friend of Gerselle and Jonton
Thombal Kermol:	married to Meleny
Adbas Kermol:	son of Meleny and Thombal
<i>Katisa Kermol:</i>	<i>daughter of Meleny and Thombal</i>
Fredlorf Kermol:	friend of Jonton and Gerselle
<i>Ennie Kermol:</i>	<i>married to Fredlorf</i>
<i>Alemy Kermol:</i>	<i>son of Fredlorf and Ennie</i>
<i>Jenrie Kermol:</i>	<i>married to Alemy</i>
Ferry Kermol:	friend of Jonton and Gerselle
Anlie Kermol:	married to Ferry
Gildas Kermol:	son of Ferry and Anlie
<i>Jerdin Kermol</i>	<i>Archivist</i>
Enely Kermol	Keeper, Regionality of Wakira
Patbro Kermol:	friend of Jonton and Gerselle
<i>Tivie Kermol:</i>	<i>daughter of Patbro</i>
Obrett Kermol:	Keeper, investigator, Kerbin Accident Investigation Board
Gusemy Kermol:	Ambassador, Regionality of Kulus.

The Kerm

Guardian Elton
Guardian Jonelle
Guardian Obrinn
Guardian Enedred

Others

Jerdo Kerman:	Ham radio enthusiast, friend of Ademone Kerman.
Leland Kerman:	News anchor, KBS News
Don Kerman:	Camerakerb, KBS News
Tom Kerman:	Presenter, <i>Engines and Engineers</i> TV show
<i>Jonbo Kerman:</i>	<i>Editor, KBS News.</i>
Jorfurt Kerman:	Bartender and brewer.
Sambus Kerman:	Aide to President Obrick
Corsen Kerman:	Aide to Chief Ambassador Donman
Gusden Kerman:	Naval commander, Regionality of Kolus.
Valentina Kerman:	Test pilot, Commander of Border Security (airborne), Regionality of Kolus.
Cal Kerman:	Pilot, Border Security (airborne), Regionality of Kolus.
Gil Kerman:	Pilot, Border Security (airborne), Regionality of Kolus.
Ferl Kerman:	Pilot, Border Security (airborne), Regionality of Kolus.
Chadmore Kerman:	Flight sergeant, Border Security (airborne), Regionality of Kolus.
<i>Sigrin Kerman:</i>	<i>Navigator, Border Security (airborne), Regionality of Kolus.</i>
<i>Harsen Kerman:</i>	<i>Bodyguard to President Obrick</i>
<i>Lemdan Kerman:</i>	<i>Sailor</i>
<i>Edbur Kerman:</i>	<i>Coastguard, Regionality of Wakira</i>
<i>Gilbin Kerman:</i>	<i>Coastguard, Regionality of Wakira</i>
<i>Halby Kermol:</i>	<i>Lumberkerb</i>
<i>Kirman Kermol:</i>	<i>Investigator, Kerbin Accident Investigation Board</i>
<i>Jonburry Kermol:</i>	<i>Investigator, Kerbin Accident Investigation Board</i>
<i>Gerrigh Kermol:</i>	<i>Investigator, Kerbin Accident Investigation Board</i>
<i>Neilbin Kerman:</i>	<i>Envoy, Regionality of Kolus.</i>
Eldrin Kerman:	Rocket Spotter
Jerfun Kermol:	Ambassador, Regionality of Wakira
<i>Dondrin Kerman:</i>	<i>Anchor, Capital News</i>
<i>Corrod Kermol:</i>	<i>Truck driver</i>
<i>Calfrey Kermol:</i>	<i>Pilgrim</i>

<i>Tivie Kermol:</i>	<i>Married to Calfrey</i>
<i>Lukin Kerman:</i>	<i>Sergeant, Border Security Force, Regionality of Wakira.</i>
<i>Lemke Kerman:</i>	<i>Soldier, Border Security Force, Regionality of Wakira.</i>
<i>Altop Kermol:</i>	<i>Medic.</i>
<i>Len Kerman:</i>	<i>Truck driver</i>
<i>Landorf Kerman:</i>	<i>Lieutenant, Regionality of Kolus Navy.</i>
<i>Lant:</i>	<i>Neo-kerman</i>

Appendix C: Random Worldbuilding

Kerbals and Kerm

Origin of Kerbal-Kerm Relations

They evolved together but to begin with the kerbals were just aggressive seed carriers for the Kerm, more slaves than symbiotes. The symbiosis came later after prehistoric kerbals discovered that planting Kerm cuttings made smarter Kerm that they could communicate with (after a fashion) and persuade to use their ecological control abilities (evolved for fighting off other Kerm) to help with kerbal agriculture.

[In response to a forum question about which came first? Kerm or Kerbal?]

It's a good question and one that's still hotly debated in the kerbal scientific literature. Kerm Groves (that is, sentient beings arising from the neurological merging of multiple Kerm trees) are indeed very old and date back at least as far as kerbal prehistory. Logic dictates that the individual Kerm trees must be even older as a species and on that much there is consensus. On the evolutionary origins of the kerbals themselves, there is much less consensus and likewise on the evolutionary history of the Kerm. Fossilised Kerm leaves have been discovered but key parts of the Kerm, such as the interfacing leaf hairs and the subterranean nerve balls don't survive fossilisation. Or at least, no fossil record has been found to date.

One school of thought holds that the kerbals were originally a sessile Kerm symbiont that evolved motility. Some radical thinkers even postulate that kerbals were originally dwarf Kerm that were ensnared by their larger parents. Supporters of that theory point to the unusually diverse nature of kerbal biochemistry compared to many other lifeforms on Kerbin. Carbohydrate chemistry (glycoproteins and various other saccharide polymers) play a much greater role in kerbal cell biology, than in other species (and certainly when compared to Terran biochemistry). The modern day neural interface between Kerm and kerbal is thought to be an evolutionary development of a posited subterranean nerve and fibre network between Kerm and symbiont, which has also been co-opted by the modern system of clonally propagated sets of Kerm trees.

Opponents point out that kerbals are unusual but by no means unique. Other species are clearly related, for example the four-legged, two armed luffa. [Aside, Terran geneticists would clearly recognise this as a homeobox mutation - somewhere in their evolutionary history, the lower torso and limbs of the luffa body plan were duplicated resulting in a pelvic girdle that is essentially two kerbal pelvises fused together.]

A competing theory posits that early Kerm were carnivorous and that the leaf-hair neural interface evolved as a way of immobilising their prey which was then consumed by their vines - which have since evolved into the modern day healing vines. Proponents of this theory hold that the relatively unusual kerbal biochemistry was the serendipitous key to them becoming symbionts/servants of the Kerm rather than prey.

Kerm

The normal sequence of events for growing a new Kerm is: plant seed, wait for sapling to develop to the point (normally a year minimum) where cuttings can safely be taken, take and plant cuttings, wait for Kerm to Knit (normally around 4 months)*. At the cutting stage, the original sapling will already have quite a well developed fibre network and during Knitting that network makes sufficient contact with the developing networks from the new cuttings that the resultant whole is sufficient to sustain a Kerm mind. That mind develops through 'childhood' as the network increases in complexity.

If you're going to move a Kerm, move it as early as possible, ideally before taking cuttings. The less time that first network has to develop, the easier (and less traumatic to the Kerm) it is to move. Even then, there is always going to be some damage with (as yet) unknown effects on the developing Kerm mind - successfully uprooting the entire network would be akin to surgically extracting an artery complete with attendant arterioles and capillaries. Trying to transplant after Knitting will almost certainly be fatal and if not fatal leave you with a criminally brain-damaged Kerm. This would be more akin to removing your brain, chopping it into 37 pieces, dropping those pieces back into your skull and hoping that everything is gonna work afterwards.

* KSK: yeah, this is nothing like my original description of planting a Kerm in which all the saplings were planted at once. Retconning required here since in my original description the Kerm sapling growing from seed would have encountered a bunch of foreign Kerm, which as described later leads to Very Bad Things.

[In response to a forum question about what happens to Kerm in winter?]

Best guess? They're evergreen and somewhat cold resistant although that resistance does have an upper limit. They don't go dormant but (and I rather like this so thanks for bringing this up!), fibre growth is probably inhibited by the cold, for self-protection. That implies, that if you're planting a new Kerm for Awakening, you're probably best to do it in summer so that Knitting of the individual trees can proceed as quickly as possible. In turn, that means that each tree is as young as possible (with fewer memories and life experience to integrate) when they cross the sapience threshold, thus not making the Awakening process any harder than it needs to be.

We haven't seen this in-story because all the Kerm we've met so far have been growing in equatorial climes or not too far removed from them.

Origin of Kerbals

Kerbal: n. contraction of *Kerm-bal*. Translates to 'thing by which the Kerm does not carry out an action.'

Or in other words, a (very) ancient name given to themselves by a species who had declared that they would no longer be slaves to the Kerm. They hadn't quite got a sense of identity at

this stage, since they were not declaring themselves 'persons by which the Kerm does not carry out an action', but that works too. After all, to all intents and purposes they *didn't* have an identity at that point in history.

Prehistoric kerbals were essentially slaves to their Kerm, used as soldiers and seed carriers. As such, it's not too far-fetched to imagine that they didn't have much sense (if any) of individual identity, so as they started to grow apart from the Kerm, having them start out by referring to themselves as things rather than persons isn't too much of a stretch.

Until the events set out in *First Flight*, it's probably fair to say that most modern kerbals (certainly most modern kerman) didn't really think too much about their historical connection to the Kerm. It was still there in various forms, most notably in their funeral rites where the deceased is generally referred to as a child of the Kerm, but most kerbals paid lip service to the concept at best.

But deep within their psyche, at the very back of their subconscious along with all their basic instincts and darkest fears, the kerbals *know* that they are still children of the Kerm...

And when their gods come calling, they will obey.

If their gods call loudly enough, they have no *choice* but to obey.

Which is what happened with Elton [*in Ch. 83*]. He saw the Dunan desert, realized that Duna was no real place to be planting Kerm but made up his mind that, like Geneney's flight controllers, he would *not* give in, that he would *work* this problem for the kerbals.

But for deep rooted historical reasons, when a Kerm decides something needs to happen - its kerbals ask no questions, indeed the very idea of asking questions is inconceivable. For his part, Elton's immediate response to triggering that eons-old imperative was *shame*. From everything that he'd just experienced about the Space Program, it was clear that modern kerbals were not just disposable tools of the Kerm. He had also been an-Kerbal with Jonton for long enough to have 'gone native' to an extent and to have developed very definite pro-kerbal sympathies.

Kerblings

[*In response to a forum question from forum user CatastrophicFailure*]

As for what neonates are called, if you don't mind, I'd like to take a leaf out of your book and call them kerblings. And yes, neonatal care is a definite medical speciality. Kermol mothers are (understandably) extremely careful to avoid injuries to, or falling on their pouches (and the pouches themselves are fairly resilient and shock absorbing) but accidents do happen. Sadly, the Kerm aren't a lot of help for the very smallest kerblings - healing vines are simply too clumsy at that scale and are likely to cause more damage than they mend. They start being useful about the time a kerbling is transitioning to a kerblet but even then it can be touch and go for very young kerblets.

History

Pre-First Flight History

[See Ch. 30 for more detail on the history of Kerbin]

The Age of Prosperity (although there's an argument for calling it the First Age of Prosperity) was the *direct* precursor to the Age of Sail. In any case, it was an Age in which the new institutions and social structures created in the aftermath of the Age of Madness became thoroughly embedded in kerbal society - so much so in fact, that they're very largely what present day kerbal society is based on. A wave of Groves spread across the land, driven by the more or less peaceful expansion of Kerm, kerman and kermol populations. The last great Seeding of the Age nearly led to a Second Age of Madness due to a shortage of land for planting new Groves but fortunately for the kerbals there was new land a plenty across the seas.

Driven by dire need, the Age of Sail began with an explosion of technical and scientific progress in seafaring, navigation, astronomy and any number of related disciplines. However the resultant land grab race by the proto-nations of Kerbin, nearly ended in open warfare. It took the founding of the Council of Twelve Pillars (led by a visionary leader named Jebediah Kerman) and the signing of the Bill of Land to stave off disaster.

The Age of Sail segued into the Second Age of Prosperity - which once again seemed set to end in Kerm overpopulation and another Age of Madness. Once again dire need drove an outpouring of scientific and technical progress and the so-called Age of Fire began with another great leap for kerbal society - the development of spaceflight and the founding of the Kerbal Space Program.

Only time will tell whether this Age will be a second Age of Sail across the new oceans of space - or a descent into the Second Age of Madness.

The War

Ultimately, the Kerm Crisis embroiled all six Regionalities of Kolus. As a practical matter, the main fronts in the war were between Kolus and Doren, and between Kolus, Firesvar and Wakira. There was also an uneasy truce between Veiid and the Spierkan-Forseti Confederacy. Both of them are relatively minor powers which were desperately trying to avoid getting into a shooting war with Doren. For their part, the Doreni were more concerned with Kolus and had no real desire to open up a second front with Veiid.

It was also an atypical war, in that all the participants were equally responsible and equally to blame with no single aggressor who kicked the whole thing off. It all started with the most recent Kerm Seeding.

Kerm only seed every few centuries, and each seeding has, historically, driven a wave of kerbal expansion. This time around there was almost nowhere left to expand into (on Kerbin at least) which triggered a bit of a crisis.

The war itself began with a series of border skirmishes as each Regionality tried to grab whatever uninhabited land it could to plant new Kerm Groves on. Those skirmishes grew steadily more acrimonious but the two tipping points that escalated them into all out war were down to the pro-Kerm group, the Children of Kerbin.

One solution to the Kerm crisis that had been tried was simply to put any new Kerm seeds in cold storage until a place could be found for them, on or off Kerbin. The Children were violently opposed to this and broke into the cold storage facility on Veiid to liberate the seeds. They then proceeded to plant unauthorised Groves wherever they could, including Firesvar. Somewhat understandably, Firesvar blamed Wakira for failing to stop the Children's incursions and, eventually, declared formal war on them.

Even then, the situation may have been retrievable were it not for a second incident in Veiid. Following a strategy from the previous Kerm seeding, the Veiidans were in the process of planting a chain of lightly overlapping Groves around their eastern seaboard. Since deliberately uprooting a Kerm was traditionally anathema to any kerbal, the Veiidans reasoned that their chain of Groves would provide a de-facto barrier, blocking access to the rest of their continent.

Unfortunately, the Children, or at least the more fanatical Children didn't get the memo. They attempted to uproot a Veiidan Kerm to make room to plant one of their own seeds - and found out the hard way that the Kerm are not merely defenseless trees. It was well known that the Kerm possess an array of sub-surface vines or tendrils - the kerbals had made medical use of those so-called 'healing vines' for centuries. What had been forgotten was that the healing vines also provided a lethally effective defense against predators.

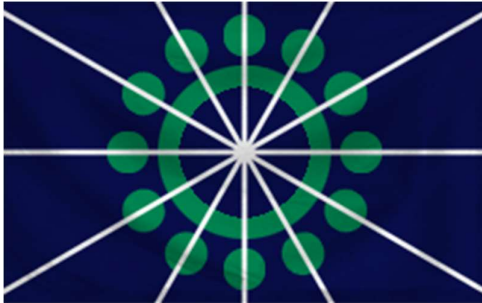
The combination of breaching the ultimate taboo (uprooting Kerm) and outright fear of the rediscovered Kerm defenses (the images of dead kerbals impaled on 'healing' vines were fairly effective at stoking that fear), proved to be the final tipping point that escalated the various Kerm conflicts into all-out war.

Society

Kerbal Santa

KSK: I had considered some kind of kerbal-Santa, mainly to fit in a reference to Jim Lovell's 'Please be advised - there is a Santa Claus' from Apollo 8.

Flag of all Kerbin



Flag of all Kerbin (Courtesy of KSP forum user MadHorse)

From *All the Proof They Needed* [Ch. 13], way back in Part 1:

"Picked out in white and green on a blue background, the flag was a stylised plan view of the Capital building itself. The twelve smaller circles around the centre green circle formed a flower motif symbolising Kerbin and each of the six white bars crossing at the centre of the flower, represented the people of one of its six major regionalities."

To that you could add that each of the bars connects two of the smaller circles, symbolising the ties between kerman and kermol in each Regionality. The more cynical kerbals would also add that the crossed bars are also a rather apt symbol of Governmental departments working at cross-purposes... 🤖

Government

Kerbin has a world government. The top tier of that government is referred to as the Council of Twelve Pillars, and comprises an elected President and an appointed Chief Ambassador from each of the six Regionalities of Kerbin. Governance of each Regionality is handled by a Conclave of appointed Ambassadors representing the kermol and an Enclave of elected Envoys representing the kermam, although in practice, the Conclave and/or Enclave only meet a limited number of times per year or in response to extraordinary circumstances, with day-to-day governance being devolved down to the lowest practicable local level. For the most part, Kerbin governance tends to be fairly light touch but its many layers does make for ponderous decision making on major questions. This is normally viewed by the government itself as ensuring a properly thought out response to those questions, although the kerbal on the street may take a rather different view.

Right of Conclave

The Right of Conclave is the twice yearly right of any kербal at all, to be heard in person by the Council of Twelve Pillars (the effective ruling council of Kerbin).

One can use one's Right of Conclave for *anything*, so theoretically you could use it to grumble about noisy neighbours, or the outrageous price of sapwood at your local pub. In practice, a) most kербals treat their Right seriously and only invoke it for suitably big reasons, and b) after a while, a kербal who blatantly abuses their Right, will be *heard* (since they have to be) but not necessarily ever *heeded*.

It's also quite possible for groups of kербals with a common complaint to invoke their Right jointly, which is helpful for making sure that the Twelve don't spend their entire time in Conclave.

In addition, there are various factors that keep the number of kербals requesting their Right within reasonable bounds in any given year.

Firstly, most kербals are quite civic minded (and pragmatic), so tend to treat their Right with respect rather than 'wasting' it on trivia. Invoking it can also be quite a daunting concept - if you were given a private audience with your President, Prime Minister or other head of state, what would *you* talk about? For many kербals, the idea that they have this right is more important than actually using it regularly.

Finally, kербal bureaucracy is fairly adept at filtering requests for Conclave and diplomatically handing them off to be dealt with at a more appropriate level of government. Ultimately of course, they're obliged to respect the Right of their citizens, but simply being listened to and taken seriously by government is enough to pacify most kербals.

Economics

Kербals in *First Flight* are not terribly acquisitive and their global economy is fairly socialist.

Kerm controlled agriculture is tremendously efficient and almost entirely green. Night soil is used as fertiliser but otherwise there's no real need for pesticides, herbicides or artificial fertilisers. As a result, food production is not a problem and much of the environmental degradation associated with intensive agriculture is avoided too, so clean water isn't so much of an issue either. (KSK: I've also tried to paint the kербals as being pretty environmentally aware (again because of their history with the Kerm), so kербal overpopulation is at least implied to be a non-issue.)

Social mobility between kerman and kermol is high, not least because all kербals necessarily go kermol for a short time if they wish to reproduce and (as touched on in chapter 30: Echoes of Time) relationships between the two castes are cordial, which makes food distribution quite fair and efficient. So any individual kербal will normally have easy access to the basics of civilised life - food, water, shelter, the company of other kербals - and any kerman who's seriously down on his or her luck can go kermol without fear of stigma.

So Kerbin is a nice place to live but it's also far from perfect. The various Regionalities are at peace but operate on a 'trust but cut the cards' level. I recall mentioning in one chapter that the Doreni in particular had something of a political reputation. The kerbal government (as mentioned on a number of occasions) is seen as slow and bureaucratic, which leads to frustrations and ill-advised courses of action arising from those frustrations.

Anything other than the basics needs to be paid for of course and so the kerbals do have companies, corporations and a market economy. However the social safety net provided by the Kerm tends to moderate the gross excesses of a market economy. At the end of the day, kerbals choose to work to buy nice things - they don't *have* to work to put bread on the table.

So they have a lot more free time to volunteer for 'rule of cool' projects such as a junkyard space program. 🤖

It also means that any kerbal captains of industry who consistently pay themselves a large and undeserved bonus are likely to come in the next morning and find that half of their workforce have gone kermol overnight. As a result, the kerbal economy includes a much higher percentage of non-profits and partnerships than the human economy - if a company is paying it's bills and paying its employees it's seen as doing well. If it's making a modest profit on top of that, it's doing very well. And remember that good pay for a kerbal can be relatively low since it doesn't have to be a *living* wage.

Net result, wage costs on Kerbin are a lot lower and so the cost of doing business on Kerbin is also lot lower. Combine that with modest profit expectations (and relatively restrained shareholder expectations (if such exist)) and kerbal companies can be much more a vehicle for organising large numbers of kerbals to do something amazing rather than a vehicle for making vast amounts of money.

Even so, the KIS and Rockomax needed funding.

Rockomax funding largely came from their satellite business, where they had government and corporate customers. In-story this was implied through I tried to imply references to new communication satellites, in particular, during the CORDS negotiations, Ademone revealed that they'd received a government contract to launch a Melvey Belt mapping probe.

KIS funding was more precarious and came from a grab bag of sponsorship deals, Space Centre rents (it made for an extremely prestigious conference centre, especially when the KIS provided a couple of tame kerbonauts for your event), entry fees on launch days, commercial rents on launch days, sundry other enterprises such as their spaceflight museum, and private donations. They also enjoyed a high level of public support (which helped to generate those private donations), the kerbals in general have sustained a much higher interest in their space program than humans managed to - witness the kermol village gathering around its TV set to see the first images of the Mün, and all the KIS pennants etc. on display when James and Sherfel came to Barkton.

Kerblet Schooling

A brief recap first.

There are two basic castes (for want of a better word) of kerbals on my version of Kerbin. The kerman are typically urban with lifestyles and occupations that would be broadly familiar to a human observer, once you've accounted for the somewhat different social structures and priorities. The kermol are typically rural, responsible for most of the agriculture on Kerbin and - crucially - tend to the Kerm trees. The Kerm have a long and convoluted history with the kerbals but at a very basic level, they're required for kermal reproduction.

Hence, if they want to raise a family, a pair of kerbals will need to 'go kermol' at some point in their lives. It therefore follows that all young kerbals (or kerblets) start off as kermol, although there are no social barriers that prevent them going kerman when they come of age, staying as kermol if they choose, or indeed switching back and forth as suits them over the course of their life. Geographically, each kerman town or city tends to be associated with a reasonably large number of neighbouring Kerm Groves and attendant kermol villages.

So - education and schooling. There are three stages - primary education, secondary education and tertiary education.

Primary education

The first few years are mostly given over to homeschooling, with formal schooling being worked in gradually. By the time they're ready to start secondary school, a kerblet will be spending three days a week at school, with homeschooling on the other days. Homeschooling is a mix of basic 'reading, writing and arithmetic' level education combined with more practical lessons in agriculture or one or more trade skills. It's very common for kerblets to be swapped around between different kermol parents in order to match up kerblet interests with the adult who can best teach them.

Formal schooling is almost entirely devoted to soft skills at this stage. This starts off with 'learning to play nicely with others' and progresses to teambuilding exercises, puzzles (solo or team), and team games, along with lessons on citizenship and social responsibilities. Academically, a kerblet leaving primary education will be quite a way behind their human counterpart but they're typically better equipped to deal with the world around them and have a much better grounding in learning how to learn.

Secondary education

This is marked by a greater emphasis on formal learning and covers most of the subjects you'd expect to see in a human school curriculum. Secondary schools are almost invariably located in kerman towns (as opposed to primary schools - most Groves will have a primary school of their own or be neighbours with a larger Grove which has one), and the very wide catchment area of those schools would make the daily school run very time consuming and inefficient. As a result, most secondary schools are boarding schools with their pupils

attending on a 'two weeks at school, one week at home' basis, at least to start with. The week at home is for acquiring and/or developing practical skills.

The final two years of secondary education are entirely spent at school. Those years are not compulsory but any kerblet hoping to go into tertiary education, especially at one of the highly prestigious Institutes such as the Berelgan Institute or the Kerbin Aeronautical Institute, will attend them. On a slightly different educational note, it's about now that adolescent kerblets start discovering those all-important differences between boys and girls, and most parents are very glad for them to make those discoveries when safely out of the way of any Kerm trees. It tends to save a lot of unplanned grandparenthood and promising kerman careers postponed by the need to 'go kermol' at rather short notice.

The end result is that a kerblet leaving secondary education will be well equipped and able to 'go kerman' or 'go kermol' as they choose.

Tertiary education

Very similar to human university or college education.

Alcohol

Background

Ethanol has a broadly similar effect on kerbal physiology as it does on human physiology although for the most part kerbals make for happy or (occasionally) melancholy inebriates rather than fighting angry ones. Like humans, kerbals also have a creative attitude towards alcoholic drinks. If something can be fermented, it's a safe bet that somewhere, somewhere, an inventive kerbal brewer has experimented with it. As such, many of the drinks available on Kerbin would be recognisable to humans and are produced in much the same way. Kerbals generally prefer lighter drinks and are particularly fond of fruit based beverages of all kinds.

RT-5

As on Earth, Kerbal beer is produced from fermented malted grains. However, kerbal brewers tend to be more varied with the range and types of botanicals that they add to their beer, mainly because kerbals aren't as fond of bitter flavours as humans - plants similar to hops do grow on Kerbin but they're rarely used as the sole flavouring agent in kerbal beer.

RT-5 is a local craft beer peculiar to the town of Barkton and inspired by the RT-5 'Trashcan' solid rocket booster used to launch the famous *Kerbal 1* and *Kerbal 2* suborbital spacecraft. Brewer, Jorfurt Kerman's new marketing slogan; 'One will give you a lift, four will put you in orbit' is technically inaccurate since the RT-5 SRB doesn't offer anywhere near the performance required to reach orbit and any kerbal consuming four glasses of RT-5 beer will be extremely lucky to reach an altitude higher than floor level. Fortunately, the crossover

between 'kerbals who are pedantic enough to point this out' and 'kerbals who might seriously contemplate drinking four RT-5s' is vanishingly small.

RT-5 is a powerful IPA style of beer, with plenty of hopping (for a kerbal brew) and interesting herbal overtones.

905

Also brewed in Barkton and named after the LV-905 liquid fueled, pressure fed rocket engine, Jorfurt Kerman describes his 905 ale as 'slower, smoother and not as punchy as the RT-5.' 905 is a gentle 'session beer' of which the drinker can consume several glasses over the course of an evening and still be entirely capable of unassisted mobility and coherent speech at the end of it. Taste-wise it would be familiar to any Scottish drinker as a light ale, somewhat akin to a very good quality 60 or perhaps 70 shilling.

Citrus wine.

The craft of making citrus wines has a very long history on Kerbin and is one which is practiced by commercial companies and keen amateurs alike. Local 'citrus clubs' are common and competition between clubs can be intense. Traditionally, a citrus wine is produced solely from a blend of citrus juices with no added sugar or flavouring agents. Developing a blend that combines acidity, balance and flavour with sufficient natural sugar for adequate fermentation is regarded as a real skill. One exceptionally well known citrus club releases its produce by batch number (not to be confused with date of production) and their '78 batch is very highly regarded by connoisseurs.

Latterly, a number of clubs have also begun to experiment with sugared blends. Historically, 'adding more sugar' has been frowned upon as being against the spirit of the craft but proponents of the practice argue that it allows for much more creativity and the accommodation of a far wider range of palettes. The commercial success of heavily lemon based citrus wines does seem to have lent credence to this school of thought.

Bill Kerman is an amateur blender of the traditional school, although these days he doesn't have much time to devote to the craft.

Prickleberry cider

One of the less imaginatively named fruits to be found on Kerbin, pricklerberries resemble the Terran lychee, although with darker flesh and a somewhat stronger flavour. Pricklerberries are a versatile crop which can be eaten as a fresh fruit, made into preserves (pricklerberry jam is an excellent accompaniment to many cold meats and cheeses) or processed into a number of alcoholic and non-alcoholic beverages. First pressing pricklerberry juice is normally consumed as a fresh juice, whilst the second pressing is laid down in specially prepared wooden barrels for up to a year. The juice absorbs tannins and other phytochemicals from the barrels, which act both as flavourings and natural preservatives. Third pressing juice and pomace is typically used to make pricklerberry cider, a light, sparkling drink of no more than 3% abv.

Sapwood

Wild sapwood trees originated in the Kerbin rainforest and Kerbal scientists believe that they became insectivorous as an evolutionary adaptation to wet, nutrient leached soils. Long parallel grooves in their trunks exude a sweet viscous sap which traps insects and gradually carries them down to the base of the tree where they decompose and are absorbed by a network of near-surface roots. Sapwoods have long been cultivated by kerbals and in the equatorial and mid-latitudes of Kerbin they are very nearly as ubiquitous as the Kerm. Domesticated sapwoods are larger than their wild cousins and less dependent on insect consumption. This is partly due to centuries of selective breeding but mostly because they are grown in Kerm enhanced soils.

Although sapwood sap can be fermented and then distilled into a strong liquor, similar to a Terran rum, this is not a particularly popular drink on Kerbin. The vast bulk of harvested sap is cleaned of insects and then dried to make a sticky, toffee like substance, beloved of kerbals and kerblets alike. The dried sap is also used to make a number of extremely popular non-alcoholic cordials, which are consumed with water, sparkling water or milk. Two notable specialist cordials are smoky sapwood (produced in old-fashioned wood fired evaporating pans) and wild sapwood (colloquially referred to as 'crunchy sapwood') which is harvested, insects and all, from wild sapwood trees.

LV1

LV1 is a craft root beer, sold as a non-alcoholic beverage. It probably has trace quantities of alcohol, although not enough to mar the taste for those kerbals that don't like it.

KSK: That fits nicely with the rest of my kerbal drinks headcanon - in general they're not a terribly boozy lot and social drinking on Kerbin is usually somewhat similar to European cafe culture.

Science

Kerbal Navigation

Kerbals use both compass and stars.

Medicine - Kerm

Kerm medicine is not a well developed branch of kerbal science - for the most part Kerm bend the local ecosystem around themselves and that normally includes pathogens. In effect they have a massively overdeveloped external immune system which deals with pretty much any threat.

Medicine - Kerbals

Healing, or as the more cynical kerbal scientist might term it 'repair', has always been a vital part of the Kerm-kerbal symbiosis. The Kerm extends one or more subsurface tendrils or vines (commonly known as healing vines) which can burrow through kerbal skin and tissue in much the same way that its leaf hairs can extend through the kerbal skull to effect a neural interface. Biochemically, the two processes are not dissimilar. Where appropriate and necessary, the vines may also enter through natural bodily orifices. The most striking example of this was in the case of the first recorded an-Kerm, Jonton Kermol, whose Kerm effectively became a life-support system, able to remove his wastes and feed him enterally.

Once in place, the healing vines primary function is to disinfect wound sites and then accelerate tissue repair and wound healing. From an evolutionary biology perspective, this makes sense; kerbals were originally seed carriers and de-facto soldiers for the Kerm and the ability to repair those carriers and press them back into service would have offered an important advantage. The associated benefit to the kerbals was probably largely incidental.

Early kerbal medicine (as on Earth) relied largely on identifying and cultivating beneficial plants, herbs and other natural products. As kerbal science developed, it became clear that the extensive battery of compounds exuded by the Kerm for pest control could have medical implications, particularly for treating bacterial and fungal diseases. By this time of course, the modern system of Kerm, kermol and kerman had been long established and with it, the ability of kerbal Keepers to communicate with their Kerm. Just as Kerm could be persuaded to help with kerbal agriculture, so too could they learn to treat an increased range of kerbal maladies. Typically, Kerm tend to be a measure of last resort for treating bacterial infections, since successful treatment requires extensive and invasive use of the healing vines.

However, Kerm healing has some significant limitations, most notably in treating degenerative diseases, autoimmune diseases and proliferative diseases such as cancer. Kerm mediated tissue repair relies on very tight control over cellular proliferation, differentiation and migration - in effect these processes are carefully accelerated in order to rebuild and regrow various tissues. Unfortunately, the cell signaling pathways for all three processes are precisely those which are inactivated or aberrantly regulated in, for example, cancer. Tumours therefore present a welter of conflicting and confusing biochemical cues which the Kerm is simply unable to deal with. At best, it is unable to treat the tumour, at worst, it actually accelerates that tumour's growth or ability to metastasize.

Oscilloscopes

[In response to a forum question about whether oscilloscopes in Ch. 101 old ones (with CRT screen) or modern ones (LCD screen)?]

KSK: I confess that I hadn't thought that far but from a quick check on Wikipedia, it seems that digital oscilloscopes started becoming common in the early 90s. Assuming that a digital oscilloscope is what you had in mind when you're talking about a modern LCD one (bear with me here, I'm not familiar with the terminology) then, in-story, they're probably just starting to appear on Kerbin but they're pretty cutting edge and expensive.

Given that the Berelgan is an agricultural / ecological research institute, they're unlikely to have the latest and greatest electronic gear. As seen in-story, they're also heavily focused on Kerm micro-ecology and trying to figure out the chemical signals that the Kerm use to control their environment. On that basis, most of their tech budget was probably going to be spent on analytical equipment such as mass spectrometers, gas chromatographs and the like.

Therefore, I'm thinking that Halsy and his team were probably using an older model (but decent quality) analogue oscilloscope with a CRT screen.

Spaceflight

Moho 1 Snacks

None sadly, although this will clearly need to be remedied for future missions.

Early Rocket Engines

In general, the KIS and Rockomax drew to US style boosters with fewer but more powerful engines, rather than Soviet style multiple combustion chambers and nozzles on what is effectively a single engine.

The LV-15 engine was pretty crude with most of its internal workings visible at the base of the rocket. Like all early KIS engines it was ablatively cooled. The LV-10 was Wernher's first attempt at a regeneratively cooled engine but his first design (which relied on a coiled tube around the combustion chamber) never worked and resulted in a number of costly failures before he abandoned the idea. Much later on the invention of a double walled combustion chamber, paved the way for development of the LVT series of regeneratively cooled engines, most notably the LVT-20 which powered Jebediah Kerman's first orbital flight aboard the Moho 1.

Rockomax made extensive use of SRB's in the early days because of their heritage as the Speciality Fireworks Company. However, their SRB's were a lot more sophisticated than the KIS 'Trashcan' boosters. In particular, they developed shaped propellant loads which gave them some degree of (pre planned) throttling and also experimented with steering by liquid

injection into the exhaust stream. Rockomax were fairly late to the party when it came to gimbals, their first proper gimballed engines were the breakthrough SK1 series.

The [LV-] 905s are pressure fed - there's a bit in 'Project Moho' after the crew selection scene, where Wernher and a couple of the propulsion team are testing the 905 prototype, that gives some background. The 903 was the original pressure fed version of the 902 (with upgraded combustion chamber) but it suffered from pogo problems. Wernher had to redesign the fuel lines to get rid of an unwanted resonance mode and after a couple of iterations that redesign was given the 905 version number.

Pressure fed engines are used extensively in real-world spacecraft. They're great for reliability because they have very few moving parts. Open a couple of valves and whoosh - hypergolics mix and engine fires. (KSK: I think all the on-orbit engines for Apollo were pressure fed for that reason.) The downside is that they - unsurprisingly - need quite a bit of pressurised gas to force the propellants out of their tanks, and that pressurised gas needs to be stored in a relatively heavy tank of its own.

They're also limited by mass flow - turbopumps tend to be better at shifting large amounts of propellant than pressurised gas. So I think they tend to have relatively low performance compared to pump fed engines.

They have been used a couple of times as atmospheric engines (so Wernher isn't completely crazy) but their weight and performance makes them an outsider choice for that role.

[In response to a forum question about the LV-1 being turbopump driven and where these miniature turbopumps came from]

Short answer - Wernher made them, albeit with the resources of Kerbin's premier aeronautical research institute to draw on. He was a jet engine designer originally so would have been used to working with turbomachinery. KSK: I confess that I didn't think too deeply about this at the time, but if you want a little retrospective justification:

Wernher's background with jets probably coloured his thinking about rocket propulsion, his early engines were all turbopump driven, he never really trusted solid fuels (that much we do see early in the story) and the idea of pressure-feeding the propellants never really occurred to him. Even if it had, he probably wouldn't have had time to do much work on them at the Institute before he, Jeb and the rest of the fledgling KIS got kicked out. Outside of the Institute, the KIS were more concerned with building something that worked rather than research for research sake. What worked for them at the time was turbopumps.

The LV-1 was more of a technology demonstrator than a flight-worthy engine, simply because it was too small and its thrust-to-weight ratio was too low. The larger LV-2 and LV-3 engines, developed by Wernher and Jeb as part of Jeb's final year project, were enough (barely) to get a couple of sounding rockets off the ground. The early KIS engines were all plagued by power issues to a greater or lesser extent, right up to the LV-15 used on the *Kerbal* and *Kerbin* boosters.

Early KIS Rockets

The Kerbal 1 was powered by a single LV-15 and four RT-5 'Trashcan' SRBs (KSK: coined before the official RT-5 'Flea' was a thing.). That combination was enough to push a three kerbal capsule (intended as a primitive version of the original 3-kerbal Mk1 capsule now found as an in-game museum piece at KSC) to 35 km.

That figure was taken as a plausible sounding altitude from the Kerbal Space Program game, although in hindsight it could and maybe should be revised. The in-story Kerbin system is scaled to our Earth-Moon system - mainly for ease of research since most of the spaceflight facts and figures are borrowed from NASA. 🤖 The trajectory details for Rockomax's *Endurance* launch, for example, are based on the real values for the Saturn V. Incidentally, Minmus would almost work in that context, using scaled up distances it's just about within Earth's Hill Sphere, although I took some liberties with its in-game appearance and made it a slightly more plausible captured 'dirty snowball' comet.

The Kerbin 1 (Kerbalkind's first artificial satellite) was launched on a two stage booster consisting of an LV15 powered 1st stage and an LV-902 powered second stage. The LV-902 was basically a smaller derivative of the '15 and still used turbo pumps (a re-engineered version of the less than satisfactory LV-9 pumps.).

The Kerbin 2 (heavier advanced satellite and re-entry test vehicle) was launched to orbit using a slightly updated version of the Kerbin 1 booster. Basically the same '902 powered upper stage but with the improved turbo pump technology that enabled the 902 applied to the LV-15. (KSK: I don't think I said as much in story but you could call that the LV-20.)

The Moho series of single crewed capsules were intended to be analogous to the in-game Mk-1 capsule and were launched on a massively upgraded version of the Kerbal 1 booster consisting of an LV-T20 powered main stage, augmented by four pressure fed LV-905 powered strap-on boosters and a 905 powered upper stage.

The Eve series 3-kerbal capsule and accompanying service module was based on the Apollo CSM (although, in-game, the Mk1-3 capsule plus a suitable command module would work) and was launched on a vastly more powerful booster. The Eve booster was based on a core stage powered by three LV-T30 engines, with an LV-T20 powered upper stage and three LV-T20 powered strap-on boosters. The service module main engine is an LV-909, basically the vacuum version of the 905. In practice, there's not a great deal of difference between the LV-905 and the LV-909 - think Space-X's Merlin C vs Merlin-Vac.

MACE Engine

My version of MACE is fairly blatantly cribbed from the Reaction Engines SABRE design. It's a rocket engine in both modes, or at least it uses the same combustion chamber in both. In 'rocket' mode, the combustion chamber is fed from the onboard LOX tank, whilst in 'airbreathing' mode, the chamber is fed with cold but not quite liquid air. Avoiding liquefaction makes the plumbing a lot simpler (you don't need an air condenser) and

significantly reduces the amount of LH2 required in your cooler, since you're not having to deal with all that pesky latent heat.

To be honest, I'm not sure how the switchover is intended to happen in real life, so all this is largely based on gut feeling, but it seems like the place where things are likely to go wrong and story-wise it provides a convenient roadblock which I can use to spin out the spaceplane story thread a bit.

Stopping a rocket engine in mid-flight and then restarting it using effectively a different oxidiser (and a liquid rather than a gas to boot) doesn't sound straightforward and doing a genuinely smooth transition whereby the engine doesn't stop at all, seems even less straightforward.

If nothing else, the pre-burner is driving the compressor + LH2 pump in air-breathing mode, whereas it's driving the LH2 and LOX pumps in rocket mode. Managing that handover without spraying bits of gearbox, clutch (since I presume all three are driven on a common shaft) or impeller blade all over the inside of the engine sounds challenging all by itself. Then you either need to have an injector which can handle near-liquid air or LOX (and plumbing that can switch between the two) or a combustion chamber fitted with two injectors which can handle the (presumably) different flow patterns and flow rates from each. I'm actually thinking that a pintle injector (conical impingement injector in-universe) might be the way forward, although the idea of using one in such a high performance engine would probably make Wernher choke on his sandwiches.

Miscellaneous

Gronneks

Gronneks are small wolverine like creatures native to the northern reaches of Kerbin. They can be kept as pets, although attempts to domesticate them have only been partially successful and on Earth, gronneks would usually be used as guard dogs or bird dogs rather than house pets.

The easiest way to catch a gronnek is to place a sack over the exits to its burrow and then set off some kind of commotion at the entrance. Finding all the exits of course is a skill all of its own, since they tend to be fairly well concealed. Once in the bag, gronneks are reasonably docile (for certain definitions of 'docile') much after the fashion of a hooded hawk here on Earth. Until the gronnek is adequately trained however, letting it out of the bag without due precautions is usually a bad idea, hence the well known Kerbal saying 🤪.

Joenie's Schooling

Joenie's schooling was highly atypical due to the events she was caught up in over the course of the story. Right now she's a bit of a Kerm savant - as seen when she visited the Berelgan, she's probably at advanced undergraduate level when it comes to Kerm micro-ecology, but the rest of her schooling has suffered somewhat.

Partly this was due to her not being very welcome at her local primary and then secondary school, which meant that she fell behind in several classes. (KSK: I did wonder about putting this in the main story somewhere but it never seemed to fit). Essentially, the Sage of Barkton saga with it's breaking of the Law of 37 and her being allowed to Commune with a Kerm, didn't go down particularly well with the more conservative side of mainstream kerbal society. These are the ordinary people on the streets mind - they're certainly not Children of Kerbin levels of pro-Kerm, traditionalist crazy, but still, the events depicted in *First Flight* overturned some very long social conventions and traditions and such things take time to be assimilated.

End result, Joenie was excluded from school as a bad influence somewhere along the line. She's a smart cookie though - she'll cope.

Quotes

[For more such quotes have a look at KSK's Narrative Technology Tree Mod]

<https://forum.kerbalspaceprogram.com/index.php?/topic/167325-wip-narrative-technology-tree/>

The Kerbin Interplanetary Society was founded on enthusiasm, dreams and no shortage of wild ideas. The hard realities of building any kind of working spacecraft forced us to shelve most of those ideas - but we didn't forget about them...

- Jebediah Kerman: "*KIS - a history of kerballed spaceflight.*"

The Space Program became a dream come true for the astronomy community. Far away worlds barely visible through our telescopes could be studied in unprecedented detail through an increasingly sophisticated array of scientific instruments - and sometimes visited in person.

- Dunney Kerman: "*Principles of Planetary Geology.*"

The original Mystery Goo was a sample of experimental hull sealant that Bob took up on one of our early flights. On opening the sample container he discovered that a clear polymer gel had transformed into a 'viscous black goop.' This was later traced to a combination of a slight leak in the container, greater than expected vibration during flight and a trace contaminant reacting with the container wall.

At Gene's insistence, Bill's team rigged up a small external monitoring pod to let us run subsequent experiments outside the capsule. We ended up taking all sorts of materials to orbit, including tubes of algae and other marine life. Whatever we packed into that pod though was always dubbed Mystery Goo, in honour of Bob's first sample.

- Jebediah Kerman: *"KIS - A History of Kerballed Spaceflight."*

The HECS probe core was the first one to use our Modular Equipment Drivers. The concept is simple - standard interface modules, power sockets on one end, data and command and control ports on the other. Plug one end into the probe core, plug your science instrument into the other end and you're good to go.

Unless you plug them in the wrong way round. That just gets you a bang, a couple of crispy circuit boards and about two weeks work sent straight down the Wak. We learned that one the hard way - and redesigned the power couplings shortly afterwards.

- Germore Kerman: *"Probodobodyne - the Early Years."*

Once the popular press found out that we were designing a barometer for our next generation of spacecraft they never seemed to tire of reminding us that there is no air in space. When we landed the Hope 2 probe on Duna, guess which instrument we didn't forget to include with the science payload?

- Germore Kerman: *"Probodobodyne - the Early Years."*

I flew onboard our second sub-orbital rocket. Booster separation to main chute deployment felt like an impossibly long wait from inside the capsule. But sitting in the flight director's chair? Listening to static on the radio and hoping to Kerm its just re-entry blackout? Waiting for the drogues, then the mains then the "we're in the water - blunt end down!" call from the crew?

That's the longest wait of all. And it never gets any shorter.

- Geneney "Gene" Kerman: *"Tales from the Trenches - a flight director's journal."*

I'm told that high precision accelerometers are a critical component of spacecraft guidance systems. They also make excellent seismometers. I always rather liked the idea that a piece of equipment which helped us navigate to other worlds would help us to study them once we got there.

- Dunney Kerman: "Principles of Planetary Geology."

To be perfectly honest, I remain unconvinced by gravioli theory. Dubious theoretical underpinnings aside though, gravimetry is a real science and a very useful one at that. One can tell a surprising amount about a planet from a detailed consideration of its gravitational field.

- Dunney Kerman: "Principles of Planetary Geology."

Appendix D: Old Kerba Dictionary

[Old Kerba Dictionary, based on original dictionary by KSP forum user superstrijder15]

https://docs.google.com/document/d/1r0eDcf2dWf6_HwHZTgiDGwFXxOZ7Qxv-LyD2Jgpi8u0/edit?usp=sharing

Learn everything there is about Old Kerba here. Old Kerba is the original language of the Kerbals in the universe of *First Flight* by KSK.

Nouns

alba	-	water
aliant	-	creature, animal
calab	-	sand
erb(a)	-	word(s)
fac(a)	-	item(s)
kat	-	forest
pill(a)	-	truth(s)
mus	-	a speck or particle
sath(a)	-	deed(s)
soa	-	air
talek(a)	-	ties, bond(s)

-a suffix is used to signify the plural form of the noun

Verbs

akhat	-	to trade
albantat	-	to float
binat	-	to understand
cabarat	-	to shelter
cordat	-	to agree
djalat	-	to watch
ebat	-	to be
erbat	-	to talk/speak
factat	-	to make/build
mahomat	-	to go
orbat	-	to name
skilat	-	to cut
skirnat	-	to dig
soathat	-	to fly
taklathat	-	to fear

Case markers

an	-	signifies inclusion
bal	-	signifies a thing used to accomplish an action
bar	-	signifies possession
bel	-	signifies a person used to accomplish an action
bol	-	signifies a place where an action is accomplished
olia	-	signifies fighting/disputing (prefix: attacker of ..., suffix: defender of ...)
on	-	signifies dependence

Inflections

-	-	1st person singular
a	-	2nd person singular*
r	-	3rd person singular
ad	-	1st person plural
da	-	3rd person plural

*also used as a suffix for nouns to signify the plural form

Auxiliaries

ar	-	dummy subject, equivalent to it.
dja	-	and
af	-	any (prefix), no (suffix)
afa	-	many (prefix), none (suffix)
afal	-	all
abrathal	-	would
abrath	-	I would
abratha	-	You would
abrathr	-	he/she/it would
abrathda	-	we would
abrathad	-	they would

Comparators

min	-	smallest
man	-	largest
alm	-	new

Examples:

manalba	-	the biggest water, or the ocean
manaliant	-	the biggest creature
minmus	-	the smallest speck

Tense marker

aban

Grammar

Both verb stems and case markers can take inflections. For example:

Soathat	-	to fly
soath	-	I fly
soatha	-	You fly
soathr	-	he/she/it flies
soathad	-	we fly
soathda	-	they fly
bal	-	a thing I use to accomplish an action
bala	-	a thing you use to accomplish an action
balr	-	a thing he/she/it uses to accomplish an action
balad	-	a thing we use to accomplish an action
balda	-	a thing they use to accomplish an action

An exception to this general conjugation is the irregular verb *ebat* - to be. Here the same inflection is used for first and third-person singular forms, with the difference normally made apparent through the use of names.

eb - I am
eba - You are
eb - he/she is
ebad - we are
ebda - they are

Word order is used to denote a positive or negative.

Subject – Verb – Object	-	positive action carried out on object by subject.
Subject – Object – Verb	-	negative action carried out on object by subject
Case markers used as prefixes	-	meanings as described above
Case markers used as suffixes	-	opposite meanings to those described above*
Tense marker used as a prefix	-	future tense
Tense marker used as a suffix	-	past tense

For example:

Soathat	-	to fly
Soath	-	I fly
Abansoath	-	I'm going to fly
Soathaban	-	I flew

* Unknown how prefixes with long translation of which different parts can be inverted react, use cautiously, or use on purpose to be ambiguous

Compound nouns

The case markers and word order rules used in Old Kerba lend themselves to creating compound nouns.

Kerba	-	contraction of kerbalerba: literally 'kerbal words'
Kerbal	-	contraction of Kerm-bal: literally thing which the Kerm does not use to accomplish an action.
balskirn	-	spade. From bal-skirn: literally 'thing that I use to accomplish digging'.
balskila	-	knife. From bak-skila: literally 'thing which I use to accomplish cutting'.
baldaoncorda	-	contracts or agreements: literally 'things which we depend on to agree'
Beloncorda:	-	a party to a contract. From bel-on-corda : literally 'person on whom you depend to accomplish agreement.'
bel-oncordaana	-	outwith the parties to a contract. From bel-on-corda-an-a, where: <i>bel</i> signifies a person used to accomplish an action, <i>on</i> signifies dependence, <i>corda</i> is the second person singular form of <i>cordat</i> – to agree, <i>an</i> is used as a suffix and so denotes exclusion rather than inclusion and <i>a</i> denotes a plural
bolad-binat	-	university: literally 'thing we use to accomplish learning'
beldasathona	-	pejorative term for bureaucrat: literally 'persons who they do not depend on to accomplish deeds'
beldaonerba	-	diplomat: literally 'persons who they depend on to accomplish words'

Numbers

am	-	one
ber	-	two
tor	-	three
draf	-	four
ferf	-	five
bertor	-	six
lob	-	seven
berdraf	-	eight
tort	-	nine
saben	-	ten

Larger numbers up to one hundred are constructed in tens and units, for example:

bersaben-am - twenty-one (lit. two-tens-one)

Fractions are denoted by the *-ot* suffix, for example:

berot	-	a half
torot	-	one third
draf lobot	-	four sevenths.

Town and city names

Barkton	-	contraction of Bar-Katon, or Freedom-from-the-Forest. (lit. possessing independence from the forest)
Balcabar	-	translates either to 'thing that you use to shelter' or is a contraction of bal-calabbara or 'shelter from the sands' (lit. things which I use to not possess sand.)
Boladakhat	-	translates to 'place which we use to trade'
Bolanerbat	-	contraction of Boladanerbat or 'place which we all use to talk'
Bolfactad	-	contraction of Boladfactad or 'place where we accomplish making'.
Cabaralb	-	contraction of Cabarad-alba or 'we shelter from water'.
Olbinad	-	contraction of Bolbinad or 'place which we use for understanding'.
Toralba	-	translates to 'three waters'

Regionality names

Doren, Wakira, Kolus, Veiid, Firesvar, Foresti, Spierka*

* Although the Forseti-Spierkan Confederacy has existed as a single regionality since the end of the Age of Sail

Kerbals from these places are indicated with either the -ol (formal) or -ad (colloquial) suffix. So Kerbals from Veiid are Veiidol (lit. defenders of Veiid) or Veiidad (lit. we Veiid). This gives:

Dorenol, Wakirol, Kolusol, Veiidol, Firesvarol, Forsetiol, Spierkaol (*formal*)

and

Dorenad, Wakirad, Kolusad, Veiidad, Firesvarad, Forsetiad, Spierkaad (*colloquial*)

-ol came into use in the Age of Sail and comes from *olia* in the same way that kermolia truncated to kermol at some point in history. *olia* here is used in the general sense of defending an idea, opinion or principle. So calling a citizen of the newly formed nation of Wakira, a Wakirol, would have rather patriotic overtones, as in 'upholder of the values and principles on which Wakira was founded'. Truth, Justice and the Wakirol way if you like. This sort of patriotism was an important part of Kerbal culture in the Age of Sail.

-ad came into use later as a colloquial term for citizens of these nations. Kerbals felt that calling themselves a 'defender of' their nation was too formal for everyday situations and so the 'citizen of' term was adopted. A kerbal may also choose to refer to himself as *kerbinad* which would loosely translate to 'citizen of Kerbin' (lit. we Kerbin) although using *kerbinad* is generally regarded as rather pretentious.

N.B. With the transition of Old Kerba into Modern Kerba even the colloquial term -ad came to be considered too old-fashioned for everyday use. This led to the rise of the -an suffix, used predominately in *First Flight* (although the exact form varies from regionality to regionality). This gives:

Kolans, Wakirans, Doreni, Veiidan, Firesvarn, Spierkan

It should also be noted that in Old Kerba, the -an suffix signifies 'independence from' or 'exclusion from' so a kerbal from Kolus calling themselves a Kolan (contraction of *Kolus-an*) is actually saying that they are 'independent from Kolus'. This lack of logic is a detail which still annoys modern scholars of Old Kerba.

Proverbs, sayings, and example sentences

Bar-beldaonerba erba ebda berot pilla - Words possessed by diplomats they are half-truths (*beldaonerba* meaning diplomat, lit: persons who they depend on to accomplish words)

Belonfactada faca-factda binda - Creators do not understand the things they create. (lit: the people we depend on for making do not understand the things that they make.)

Skilda baldaoncorda bar-onkerbal - They cut agreements possessed by all kerbals

Skilda taleka bar-onkerbal dja bar-onKerm - They cut ties possessed by all kerbals and all Kerm

or more simply

Skilda taleka bar-on - They cut ties possessed by all.

Abrath af kerbal akhad - I would not trade with any kerbal.

Abrath akhad kerbal af - I would trade with no kerbal.

Jebediah eb belad-onmansatha - Jebediah is a person we depend on to accomplish the greatest deeds. Colloquially: Jeb is a badS

Veiidol ebda balsathona - Kerbals of Veiid are useless things

Veiidol ebda *beldasathona* - Kerbals of Veiid are *beldasathona* (pejorative term for bureaucrat, lit. persons who they do not depend on to accomplish deeds)

Pilla! Bar manaliant manalba!
Onkerbal taklathdaban ar
dja orbdaban manaliant
Leviathan - Truth! The great beast of the waves
All the people feared it
And they named the beast Leviathan

Pilla! manaliant soathraban!
Onkerbal djaldaban mahomr
dja orbdaban manaliant,
Leviathan - Truth! A great beast took flight!
All the people watched it go
And they named the beast, Leviathan.

Appendix E: More Old Kerba

KSK: A more structured compendium of Old Kerba notes can be found elsewhere in these appendices but this is the 'thinking aloud' version, taken from various helpful discussions on the KSP forums.

Kerman, Kermol

In Old Kerba, *an* is a case marker indicating belonging or inclusion and, when used as a prefix, roughly translates to 'of the' or 'within the'. When used as a suffix (and this is quite a general feature of Old Kerba), it translates to the opposite, so. 'not of the' or 'outside of'. So a *Kerm-an* (or *kerman* for short) is somebody outside of, or apart from, the Kerm whereas an *an-Kerm* is somebody within or a part of, the Kerm.

Similarly *olia* is a general term for fighting or disputing. When used as a prefix it translates to 'attacker of something', when used as a suffix it becomes 'defender of something'. That 'something' doesn't have to be a physical object in the same way that you can attack somebody's opinion in English. So an *olia-Kerm* is an attacker of the Kerm, conversely a *Kerm-olia* (or *kermol* for short) is a defender or protector of the Kerm.

Expanding on this a little (fresh from the department of extemporaneous worldbuilding 🧐), we can examine the word *bar-katon* (or *Barkton* for short) in more detail.

Kat is the noun for 'forest', *bar* is a case marker that roughly translates to 'possession of' and *on* is (yet another marker) signifying dependence. So *on-kat* signifies some kind of dependence on the forest, whereas *kat-on* signifies independence from the same. Thus, *bar-katon* (by convention only the first hyphen is included) translates to 'possessing an independence from the forest', or more simply 'freedom from the forest'.

Note that one might equally well write *on-katbar*, or literally 'not possessing a dependence on the forest.' Grammatically, that would be perfectly correct, although *bar-katon* is more emphatic.

Balcabar

About the only other Old Kerba we've come across in the story so far is *Balcabar* - explained by Hading as a contraction of *Bal-cabara* or 'homes on the sand'. Whoever told Hading that was correct but there's a bit more to it than that and kerbal linguists are still debating the precise etymology.

bal in Old Kerba is a case marker (Old Kerba is a pretty case-heavy language as you may have noticed 🧐) denoting the 'means by which I accomplish an action'. In that sense it's somewhat similar to the instrumental* case in certain Terran languages.

*https://en.wikipedia.org/wiki/Instrumental_case

A great many nouns in Old Kerba are compound words of the form *bal*+infinitive. This is less common in Modern Kerba, but even so, *bal* is a common starting syllable for nouns, especially historically important ones, and usually indicates that the word is derived from Old Kerba. So for example:

balskirn - spade. Contraction of *bal-skirn*, literally 'thing which I use to dig'.

balskila - knife. Contraction of *bal-skila*, literally 'thing which I use to cut'.

Cutting and digging of course are basic to Kerm husbandry, amongst other things.

Bal-cabara is a rather poetic word. Depending on how you parse it, it has two possible meanings. Writing them out longhand with all the (normally omitted by convention) hyphens:

1. *bal-cabara* - *bal* = thing which I use; *cabara* is a verb meaning to shelter, so *balcabara* translates to 'thing which I use to shelter.' Now some scholars of Old Kerba believe that *cabara* is a very old compound word of *ca-bar-a*. Here *ca* = fear; *bar* is a case marker for possession but in its suffix form so here it signifies dispossession; and finally *a* which simply denotes a plural. Put all that together and *cabara* translates to 'dispossession of fears' or 'freedom from fears'.

2. Contraction of *bal-calab-bar-a*. *Calab* is the word for sand, so *bal-calabbara* translates literally to 'thing which gives me freedom from sands'.

Put both of those together and 'homes on the sand' isn't a bad translation. 🤪

Kerbal: n. contraction of *Kerm-bal*. Translates to 'thing by which the Kerm does not carry out an action.'

Or in other words, a (very) ancient name given to themselves by a species who have declared that they will no longer be slaves to the Kerm. They haven't quite got a sense of identity yet either, since they are not declaring themselves 'persons by which the Kerm does not carry out an action', but that works too. After all, to all intents and purposes they *don't* have an identity at that point in history.

Prehistoric kerbals were essentially slaves to their Kerm, used as soldiers and seed carriers. I don't think it's too far-fetched to say that they didn't have much sense (if any) of individual identity, so as they started to grow apart from the Kerm, having them start out by referring to themselves as things rather than persons isn't too much of a stretch.

Until the events set out in *First Flight*, it's probably fair to say that most modern kerbals (certainly most modern kerman) didn't really think too much about their historical connection to the Kerm. It's still there in various forms, most notably in their funeral rites

where the deceased is generally referred to as a child of the Kerm, but most kerbals paid lip service to the concept at best.

But deep within their psyche, at the very back of their subconscious along with all their basic instincts and darkest fears, the kerbals *know* that they are still children of the Kerm...

And when their gods come calling, they will obey.

If their gods call loudly enough, they have no *choice* but to obey.

Which is what happened with Elton [*in Ch. 83*]. He saw the Dunan desert, realized that Duna was no real place to be planting Kerm but made up his mind that, like Geneney's flight controllers, he would *not* give in, that he would *work* this problem for the kerbals.

But for the deep rooted historical reasons we just discussed, when a Kerm decides something needs to happen - its kerbals ask no questions, indeed the very idea of asking questions is inconceivable. For his part, Elton's immediate response to triggering that eons-old imperative was *shame*. From everything that he'd just experienced about the Space Program, it was clear that modern kerbals were not just disposable tools of the Kerm. He's also been an-Kerbal with Jonton for long enough to have 'gone native' to an extent and to have developed very definite pro-kerbal sympathies.

Bal

In the meantime, whilst we're on a roll with this, it occurs to me that we need some case inflections. So far we have *bal* as a case marker in its first person singular form, signifying 'the means by which *I* accomplish an action. So, keeping all digits firmly crossed that I'm not overreaching here, lets expand that:

bal - 1st person singular - the means by which *I* accomplish an action.

bala - 2nd person singular - the means by which *you** accomplish an action.

balr - 3rd person singular - the means by which *he/she/it* accomplishes an action.

balad - 1st person plural - the means by which *we* accomplish an action.

balda - 3rd person plural - the means by which *they* accomplish an action.

* Kerbals are a relatively informal bunch so lets not have formal and informal versions of *you* as found in French (tu/vous) or German (du/Sie).

Next, taking inspiration from the etymology of kerbal, lets have another case marker *bel* denoting a *person* by which an action is accomplished. *Bel* can also be inflected as shown above.

Abrathal, Af, Afa

So, for those that like such things, have a smidgen more Old Kerba grammar and vocab to play with. 🤖

abrathal - modal verb (hence the 'al' ending to distinguish it from the more usual 'at' ending for infinitives). Translates to 'would'. Conjugated as normal so:

- *abrath* - I would
- *abratha* - You would
- *abrathr* - he/she/it would
- *abrathda* - we would
- *abrathad* - they would

af - any (prefix form) or no (suffix form)

afa - many (prefix form) or none (suffix form)

All of which lets me construct sentences such as:

Afa Doreni erb! - I don't speak to any Doreni! [*erb* (first person singular of *erbat* - to speak) is used in suffix form indicating a negative.

Alternatively, if you wanted to be rude about it, you would use the double negative form: *Doreni afa erbda*. Here, both *afa* and *erb* (in the first person plural) are used as negatives, so the literal translation (add local accent to taste) would be 'we don't talk to no Doreni.'

Abrath af kerbal akh - I wouldn't trade with any kerbal. [literal translation - I would with any kerbal not trade.] Usually taken to be a positive statement, as opposed to the more emphatic form shown above, or the pithier: *akh kerbal afa*. [I trade with no kerbals.]

Akhat

Negation is in the word order again.

Subject-verb-object = positive action

Subject-object-verb = negative action.

Akhat is the verb 'to trade' (the Veiidan port city of Boladakhat literally translates to 'place which we use to trade*')

* As previously mentioned, my kerbals are not an imaginative lot, although even the most banal name looks better in Old Kerba. 🤖 Depending which theory you subscribe to, the sister city of Boladakhat, Boladanerbat, is a slightly mangled version of boladerbat or 'place which we use to talk (probably for historical reasons to do with ease of pronunciation). Or, alternatively, its literal translation is 'place which we *all* use to talk, the *an* signifying inclusion as usual.)

Bel, Bal, On

bel, *bal* and *on* aren't verbs so much as case markers. I may have the terminology a bit muddled (I'm not a real linguist) but they signify a property of the noun they're attached to, rather than an action performed on that noun. So *belad-onmansatha* unpacks into *belad-on-mansatha*, or even further into *belad-on-man-satha*.

Satha - noun(plural) - deeds

man - adjective - biggest, largest, greatest

on - case marker signifying dependence or reliance on the noun.

bel - case marker signifying that the subject is being used by a third party to perform the noun.

belad - third person singular version of *bel*, signifying that the subject is being used by us to perform the noun.

Aban

Oh - while we're on the topic, I'm thinking *aban* would be a suitable verb affix denoting tense. Word order applies (borrowing your idea!) - so when used as a prefix it denotes the future tense, when used as a suffix it denotes the past tense. (Which says something about my kerbals, I think - the future is positive whereas the past is negative) So, for example:

Jeb binr Elton - Jeb understands Elton.

Jeb aban-erbr Bill- Jeb is going to speak to Bill.

And some time later... 🤖

Jeb Bill binr-aban - Jeb did not understand Bill.

It's a bit 'See Spot. See Spot run. Run, Spot, run.' but it's starting to get to the point where we can string some actual sentences together here.

Min, Man

The only adjectives we've seen so far (I think) are the comparators *min* and *man* for smallest and biggest (roughly speaking - in English that could translate to various similar words depending on context). Usual prefix/suffix rules apply and add shades of meaning:

min-satha - smallest deeds

man-satha - greatest deeds

balskila-man - not the biggest knife

The last is slightly pejorative in the same way that one might describe a person as 'not the sharpest tool in the box'.

So, all we have so far is that adjectives are modifiers that attach to the noun. I guess adverbs could be modifiers that attach to the verb, although I haven't really played with that to see whether it makes verbs too cumbersome to parse. Adverbs might need to be a separate word, and where an adverb is capable of an opposite, its placement relative to the verb would indicate whether that opposite applies. Adverbs will also need a very clear marker syllable I think (similar to the *ly* suffix in English, so that they can be easily picked out).

Oh - and a new noun has just occurred to me. *Mus* - which translates to dot or speck.

As in: "That's not a mun - that's a minmus of <redacted> on your emulsion!"

For better or for worse, the nickname stuck. 🤪

Prefix-Noun-Suffix

[In response to the following forum question:

In Old Kerba grammar the order of prefix-noun-suffix is strictly ambiguous. To take an example from the end of the last chapter [Ch. 109] (though it's a word we've seen before), "minsathona" (we'll drop the pluralising 'a' from the end, to simplify matters): this could parse as either (min-sath)-on = independence from (the smallest deeds), i.e. "not depended on for the smallest deeds" or as min-(sath-on) = the smallest (independence from deeds), i.e. "of all those not depended on for deeds, the smallest".

Is this (a) resolved by context, (b) resolved by an as yet unstated rule of the grammar (e.g. prefixes always bind tighter than suffixes, or there is a precedence order of the various affixes), or (c) left ambiguous, allowing for all kinds of double meanings and erudite puns?

For instance, both meanings could simultaneously be in use in the CotK's remark: "that which is not a tool of the Kerm is not/cannot be depended on for the smallest deeds" and "of all the useless things in this world, kerbals are the puniest" both seem like things a Children leader spoiling for a fight might say :-)]

To answer your question, my original idea was that the word order could be decided by use of hyphens (*minsath-on* vs *min-sathon*) but I probably haven't been terribly rigorous with that concept and it kind of falls apart when you get into long compound words anyway. It's also not terribly useful for the spoken word but we can handwave that away by assuming a different inflection to mark where the hyphen would be.

So as a practical matter I'm going with a mix of a) and c). There's always been a reasonable amount of scope in Old Kerba for expressing the same thing in different ways, both of which are grammatically correct, which lends itself well to gradated shades of meaning and/or erudite puns. 🤪 As an example:

"...accomplisher of big deeds' (i.e. some kind of hero or respected person) is easily done. Either *belda-sathmina* (accomplisher of the not small deeds) or, if you wanted to be more emphatic *belda-mansatha* (accomplisher of the biggest deeds)"

And your own example is a particularly good one! Same word, parsed in two ways, both different but both contextually appropriate!

Bin

[In response to a forum question about that there doesn't seem to be a 'bin-' affix yet, but 'binat' appeared in 'bolad-binat', "university", so could 'Kerbin' be a corruption of 'Kerm-binat'? "That which the Kerm understands"?]

As for *bolad-binat*, the literal translation would be 'place which we use to understand' or, as you say, 'university'. [*bol* - place where I accomplish an action, *bolad* - first person plural of *bol*, and *binat* - to understand or comprehend.]

So I don't think *Kerm-binat* quite works (Kerm to understand?) which is a real shame because having a good in-universe etymology for Kerbin would be awesome!

We *can* get to a 'bin' suffix using the first person singular of *binat*. For example:

Bin balsoathada - 'I understand the things we use to fly', or 'I understand aircraft' (or spacecraft, although I don't think they were ever contemplated back when Old Kerba was in widespread use 🤪) But that doesn't really work. *Kerm-bin* would translate to 'Kerm I don't understand'. I suppose you could have the four-letter word version, *Kerm! Bin!* in which the speaker expresses frustration with their inability to grasp a concept but that doesn't really work either. 🤪

Jeb

"Bob - *factr balsoathada*. Wernher dja Bill? Binda ara."

"Dja Jeb?"

"Jeb? Jeb soathr *balsoathada*."

Or...

"Bob - he builds the rockets. Wernher and Bill? They *understand* them."

"And Jeb?"

"Jeb? Jeb *flies* the rockets."

Appendix F: Music/Poetry

[Comments on various First Flight related lyrics/music/poetry/video from KSK]

Jeb's Theme. Well not really but it's how I'll always think of it now:

<https://youtu.be/M6bumUQwQIU>

This video was posted on the Spacebattles forum in response to chapter 55 – The Days the World Stood Still, in which we see the first kerballed Mün landing. Someone also commented on the KSP forums that the chapter gave them chills (of the good sort!) and I have to admit that I did too. It doesn't matter how often I hear them, I still get misty eyed at those immortal words: "Tranquillity Base here – the Eagle has landed", and I get a little of the same from Jeb's 'On this day' speech.

I'm not sure if this is a good thing, a bad thing or just a wee bit of authorial self-indulgence, but there you have it. Especially when listening to *Faith of the Heart* - yeah it definitely gives me chills. Those opening lines - they really, really work for chapters 55 and 56 but especially for the Pioneer 4 launch. Maybe one day, once I put the keyboard down on *First Flight*, I'll set a video to it, although most likely, I'll only get as far as drafting a script. Something like this maybe:

<Camera opens on a pair of kerbal eyes, seen behind a window; pulls back to reveal a kerbal face in a space helmet>

It's been a long road...

<Camera pulls back further to reveal the whole helmet with 'JEB' stencilled on the front.>

Getting from there to here

<Camera pulls back to reveal three kerbonauts strapped into their couches. Brief side to side pan to show details of the capsule around them>

It's been a long time...

<Cut to Mission Control. Camera focuses on the Flight Director, who has GENENEY written on his name badge>

But my time is finally near.

<Camera follows Geneney's POV as he turns to look at a rocket on a large monitor screen. Starts a zoom towards the monitor>

And I can see my dreams come alive at night.

<Zooms through the monitor to an outside POV of the rocket on its pad.

I will touch the sky.

<Zoom continues back into the capsule. JEB holds out his hands, palm up...
And they're not gonna hold me down no more... (music starts to build and keeps going)

<Other kerbonauts slap their hands into JEB's>
No they're not gonna hold me down!

<Cut to main engine start. POV at the base of the rocket looking up...>
Cause I've got faith of the heart...!

Another, post chapter 55 video posted by the good folks at Spacebattles - and if Bob ever decided to do folk music, it would probably go something like this...

<https://youtu.be/bqL7Yllgeew>

Myself, I think this is more *Fire in the Sky*'s sort of thing. Shamelessly borrowing the same music and verse structure led to this: 🤖

*The Kerm, or so they say, were the start of Kerbalkind
And we've used them, tamed them, feared them, since time long out of mind
Now the Kerm are running out of room. My friends - it's time to do or die.
Hear our thunder 'cross the land! See our fire in the sky!*

*Now Jeb and Bill and Bob were first; back aboard the Kerbal 1.
When like all the 'kerbs that followed them, they climbed towards the sun.
And they knew they might not make it - for it's never hard to die...
But they lifted off that launchpad; rode their fire in the sky!*

*Yet another goal was calling even midst the doom and gloom
And the world turned out to watch us put our fire on the moon
Pioneer told the world we can do it if we try...
There was one small step and a fire in the sky!*

And finally, I took a crack at writing the lyrics for 'You Never Know', as sung by Fire in the Sky before the Pioneer 4 launch [Ch. 45]. I'm not much of a lyricist, so this should probably come with a cornball warning:

*Will I make it?
Will I live all of my dreams?
I see those mountains to climb and I'm sure
They'll be harder than they seem.
But there's one thing I know
Though it might make me cry*

I'll never know

Never know till I try

Will we reach for the stars?

Will we live out all of our dreams

We look up at the night and we know

They're further than they seem

But there's one thing for sure

We can all learn to fly

But we'll never know

Never know till we try

So they flew past the sky

Never let go of their dreams

Found all their mountains to climb

Weren't as hard as they seemed

Now they'll take the next step

But first they will fly.

And we say to them all.

You'll never know till you try.

Try to walk.

Ohhhh they're gonna walk.

Gonna walk.

Gonna walk on the Mün.

More generally, music has often helped set the tone for various *First Flight* chapters including, I'm not too proud to say, the *Top Gun* anthem for Val's sortie in chapter 48 (Lightning) and Kenny Loggins' *Danger Zone*, for the air combat in chapter 72 (Hot and Cold)! Sometimes though, the music was rather more sombre with lyrics that could be tweaked to fit the story:

"What we've got here... is failure to communicate.

Some kerbals you just can't reach...

I don't like it any more than you do..."

"Look at your kerman fighting

Look at your kermol crying

Look at your Kerm trees dying

The way they've never done before."

"My hands are tied.

For all I've seen has changed my mind

But still the war goes on as the years go by

*With no hope for the Kerm or kerbal rights
'Cause the dreams of flight are swept aside
By bloody hands and desperate minds
Who carry the cross of homicide
And history bears the scars of our civil war."*

Guns N' Roses – Civil War

On a more poetic note, these words from Dylan Thomas always seemed to suit the end of chapter 82 (The Two Jebediahs). The final section of that chapter was intended to be a 'back in the fight' ending, in which Lodan remembers his old KSA mandate, realises that he still has the authority to act on it and decides to act. All of which put me in mind of the President's Speech from (of all things) Independence Day and its closing lines: "Do not go gentle into that good night. Rage, rage, against the dying of the light." To make sure that I was remembering the quotation correctly, I looked up the original poem and the more I thought about it, the more the whole poem fitted the story. Which says far more about Thomas's words than my own.

*"Do not go gentle into that good night,
"Old age should burn and rave at close of day;
"Rage, rage against the dying of the light."*

There's Elton. One of the oldest living beings on the planet, witnessing the end of days for Kerm and kerbal alike.

*"Though wise men at their end know dark is right,
"Because their words had forked no lightning they
"Do not go gentle into that good night."*

And there's the Council of Twelve Pillars and the government in general. All their bold words about colonizing new worlds have fallen on deaf ears.

*"Good men, the last wave by, crying how bright
"Their frail deeds might have danced in a green bay,
"Rage, rage against the dying of the light."*

There's the Space Program. If only they had had more time, they may have been able to do something...

*"Wild men who caught and sang the sun in flight,
And learn, too late, they grieved it on its way,
Do not go gentle into that good night."*

And if Jeb isn't a 'wild man who caught and sang the sun in flight', I don't know who is.

*"Grave men, near death, who see with blinding sight
Blind eyes could blaze like meteors and be gay,
Rage, rage against the dying of the light."*

*"And you, my father, there on the sad height,
Curse, bless, me now with your fierce tears, I pray.
Do not go gentle into that good night.
Rage, rage against the dying of the light."*

As I said at the time:

'They will not go gentle. And, in their own ways, they will rage.
It's time.
Time for the quiet heroes to rise.
Time for kerbals across the world to stand and be counted.'