

ARION

BENEDICT ROBINSON

2015

CHAPTER 1

ENDERBURY ISLAND, KIRIBATI, EARTH

24 AUGUST 2291

A warm equatorial breeze blew through the vast blue sky above the Pacific Ocean. It was a beautiful September afternoon; the sapphire ocean sparkled beneath a sky broken by just a few high wisps of cloud. A few miles long, the roughly rectangular form of Enderbury Island was the only land for miles around, an oasis of green in a world of blue. It would have been peaceful if not for the hundreds of people who lined the beach, crowded together sitting on blankets and plastic chairs, chatting excitedly. They were not there for the weather.

A few miles out to sea the *ISF Gordon* sat idly in the calm waters. What at first might have been assumed to be an oceanographic ship was dotted with a disproportionate number of aerials, radio dishes and radars. But it was the object floating alongside the vessel that was most curious; a long cylinder, almost as long as the *Gordon*, topped by a stubby cone rocked on the waves like a see-saw.

Back on the island, a Micronesian man in a colourful shirt spoke into a microphone, his voice

being blared out over the din of the crowd by speakers on tripods dotted along the beach. He was stood in front of a huge screen projected with his excited face.

“The *Gordon* is using power from its on-board fission reactor to generate liquid hydrogen and oxygen from the seawater around it, which is being pumped into the Pacific Sea Dragon through the pipes you can see near the back of the ship. As its fuel tanks fill over the next few hours the Sea Dragon will slowly tip into an upright position; only the nose cone will be above the waterline. Then we’ll be ready for launch...”

Below deck on the *Gordon*, five people were making final preparations for departure. Attendants milled around them, checking and adjusting seals and ports on the astronauts’ suits, pulling equipment from racks along the walls and working through checklists. Flight Commander Ogunleye, a short Biafran man, calmly twisted the seal on his glove, which clicked reassuringly. He was speaking to two others.

“...no last minute regrets then?”

The Bangladeshi woman shrugged, “Maybe a few...”

“Just don’t think about it. I need your full attention on the mission, Kapoor, at least for now.” He turned to the other person, “What about you?”

The Yakutian took off his glasses and handed it to one of the assistants, before scratching his balding head with a bony hand. He was only in his thirties, but his spindly build and premature balding almost gave him the look of a seventy year old.

“It’s too late for regrets.”

Ogunleye nodded, “Yes, but tell me if there are any problems. Humanity has never done anything like this before. We don’t fully know the psychological effects of something this profound. Okay, Yartsev?”

“Okay.”

Kapoor secured her hijab and tucked away some stray fabric inside her suit before a helmet was lowered onto her head. She opened the visor and looked at Ogunleye, “What about you? Are you ready for this?”

He chuckled and glanced back, “Your job is much more important than mine. You’re the ECM – you have to ensure we have food to eat and air to breathe. I just tell people what to do.”

She nodded slightly and pulled her visor down. There was no point in giving a reply; she had known Ogunleye long enough to know that when he avoided a question like that, there was no point in persevering. Yartsev, however, added one of his rare comments,

“You *lead*, Flight Commander. You know that.”

Ogunleye raised an eyebrow, but didn't reply as his own helmet was put on. They stood in apprehension for a while until a tall Californian woman barged between Yartsev and Kapoor, fiddling with the clip on her visor,

“What's the deal, huh? This boat is called *ISF Gordon*, as in 'International Space Fleet,' and it's a sea ship. How does that work? Also, what kind of name is 'Gordon'? It needs to be called something cool like *Skylark* or *Nova*!”

Her Mexican accent was distinct. A Chinese man appeared from behind her to reply, “All ISF naval vessels are named after astronauts who were 'left behind' on missions, so to speak. This vessel is named after Dick Gordon. He was one of three astronauts on the Apollo 12 mission three centuries ago, and the only one who didn't land on the moon. Don't walk away when I'm checking your suit.”

She turned to him, “Hey, I may only be Chief but I think I can do it myself.”

Ogunleye joined the conversation, “Perez, don't argue with my second in command. Lin, finish checking Perez's suit, please.”

Perez could be fiery sometimes, especially at times like this. She did it to cover up her apprehension.

Ogunleye knew it was all in jest, but he didn't want it distracting the crew at such a crucial moment.

"Are we all ready?"

"As ready as I'll ever be!"

"And everyone else?"

The others nodded. Through their open helmets, the Commander could tell they were all hiding nerves. He wasn't surprised, given how momentous an event this was; they were going to go down in history. He put on a smile "You will all do very well, just like in the sims."

The timekeeper's voice sounded over the ship's intercom, "T minus three hours and counting."

It was time to go.

Back on the beach, the crowd cheered; one by one they stood up, until it was practically a standing ovation at the image of the five astronauts walking out on the screen in front of them. The Pacific Sea Dragon was vertical now; most of it underwater, its nose cone pointed a few stories above the surface and was mated with the *Gordon* by a long gantry. The astronauts were walking down the gantry, all waving and smiling at a pair of drone cameras which followed them down. The International Space Fleet relied on footage like this to galvanise the public into swallowing the massive

funding contributions given to the organisation by the world's governments. Moments like this were especially important in this mission as, where they were going, nobody watching that day would live to see them get there. The last few months had been hectic as they travelled around the world, participating in countless interviews in front of countless people, before finishing with a huge leaving ceremony in Geneva. None of them had been chosen for their charisma in particular but that didn't matter; in the eyes of the world they were heroes.

As the astronauts climbed into their capsule the commentator continued to speak, excitement tangible in his voice,

“There they are! The faces we all know from the last few years! Flight Commander Ngozi Ogunleye, Integrated Communications Officer Fa Lin, Flight Engineer Josefina Perez, Environmental Consumables Manager Ayisa Kapoor and Payload Officer Pavel Yartsev. They'll be taking over command of the *Arion* from the current senior officers who've been overseeing the final stages of its construction. In fact, they're the last crew to be boarding the spacecraft before its departure.”

The hatch clunked shut on the capsule, leaving the astronauts sealed inside the cramped conical

interior. They lay on their acceleration couches with the controls above them, which they began to check and test with well-practiced efficiency after they had strapped themselves in. The only sounds in the capsule apart from the constant hum of the complex supporting machinery were Lin's voice checks with control centres across the globe,

"Gordon, come in."

"Five by. T minus three hours and counting."

"Kanton, come in."

"Five by."

"Vienna, come in."

"Five by."

"Geneva, come in."

"Five by."

"Reading you all loud and clear."

Lin nodded. They were in communication with the mobile launch control centre on the *Gordon*, backup launch control on Kanton Island, mission control in Vienna and ISF headquarters in Geneva.

It would be almost three hours until they were to move onto the next stage of the launch procedure, time which they spent helping launch control check and recheck every system as thoroughly as possible. Sitting on top of over 3,000 tonnes of rocket fuel was not a good place to be if the slightest thing went

wrong. In the meantime, they had a few hours to speak freely until the flight recorders were switched on.

“T minus one hour and counting.”

“We’re going to space.”

They all turned and looked at Yartsev; in hearing no reply, they turned back in silence. He was quiet, a man of few words, but they sank in. Ogunleye and Lin had been in space before - it was their past experience that had secured them the two highest ranking positions on the mission - but it was everyone else’s first time. In a world low on resources and starved of innovation it was simply too wasteful to launch astronauts into space merely for training purposes.

“Yeah” replied Perez.

It crossed Kapoor’s mind at that moment that their short walk along the gantry to the capsule was the last time they would breathe open air in a very long time, perhaps for the rest of their lives. With dangerous free time to think after finishing the extensive pre-launch checks, no doubt the others were thinking the same.

“Pretty cool, huh?” Perez grinned like a maniac and looked around at the others. Liu was lying still, perfectly calm and collected from years of experience as an astronaut. Perez found it hard to take him

seriously; she may have never been to space before, but surely an experience like this isn't something you just... *get used to*. Below her, Yartsev was checking a notification that had appeared on his controls, while Kapoor just looked aloof, distracted; Ogunleye followed Perez's gaze,

"They chose us for this mission because they know we're the best people for the job. If there's anyone who can succeed, it's us. All that's left is for us to believe in ourselves, believe in each other."

Yartsev paused for a moment and let himself smile slightly. Perez turned to Ogunleye, "Nice speech, flight!" He merely raised an eyebrow in return.

"T minus twenty minutes and holding."

Mission Commander Hansel Grosser manoeuvred himself into the briefing room at mission control in Vienna. He wasn't exactly a slim man, more of a Father Christmas in a shirt if anything, beard and all; the reputation that preceded him, however, was sufficient to banish any preconceptions based on mere appearance. He surveyed the room; four people sat around a table in what could easily have been mistaken for a corporate board room, if not for the lack of suits and the huge window along the far wall, looking down onto the control centre itself. He slapped a folder

down on the desk, tapping the button of the clicker pen in his left hand on the table in a fluid motion as he sat down, “Okay, what do we have? Lachman, is the PSD good to go?”

The man to his left nodded. “All the systems have been checked and re-checked. Everything’s good. Gordon’s happy to send her up.”

“And the crew?”

The woman on his right looked up from a tablet with the expression of a building surveyor judging the cost of a job. “The crew seem to be showing higher levels of stress than during the launch sims. Especially Yartzev and Kapoor, though I’m less concerned about Yartsev. Everything taken into account, I’m happy for them to go up.”

“Good.” He nodded. Miriam Soros, Flight Surgeon, was the least experienced senior member of Grosser’s team at mission control. Her eye for detail and cautious stance when it came to even the tiniest discrepancies meant that she made some situations sound worse than was actually the case. She still hadn’t realised, he mused, that being over-cautious, too hesitant, could be just as bad as being reckless in some situations. People here relied on accurate, objective information; they could make their own judgements about what that meant. Still, he wouldn’t have anyone

else in her place. A professor of at the University of Tucupita for over two decades, she had joined the ISF just a few years ago. Her conformity meant he knew he could trust her with the crew in any situation; after all, for all the remote control facilities and automation in the world, the crew were still the most crucial component of the mission. Especially this one.

“Range? Kells, the range!?”

He regarded the woman at the end of the table with disapproval; slouched at the table like a bored school kid, she had grey patches under her eyes and hair was tied into a rough pony tail. “Weather’s great. Sea’s great. No big currents or winds. No obstructions. God, I wish I was there!” She took a swig from the mug in front of her. Lachman glanced at her self-consciously.

“And... safety?”

The woman sitting opposite Kells looked down on her condescendingly, then up at Grosser. “All is well. The authorities in Kiribati assure me that there is no chance of a physical attack on the launch site and I personally ensured that the firewalls are working correctly.” She looked back down at Kells, who rolled her eyes apathetically and took another gulp of coffee.

“Thank you, Traore. Am I right to assume we’re all clear for launch?”

Everyone nodded, except for Traore, “There’s just the issue of some... detractors. This is the last real chance to abort the mission, and there have been some serious suggestions concerning...”

Grosser rubbed his forehead, “The mission will go ahead as planned.”

“A simple delay will provide time to review rosters and crew lists. For the good of the mission I...”

Grosser’s voice hardened, “Traore, this is not the time...”

“But the member states...”

He raised his voice to a shout, “I am *not* a politician, Traore! It is my job to see this mission start today and that is what I’ll damned well do! If you have a problem with that then, hell, go speak to the Director-General because this is *not* my issue!”

Traore pursed her lips, “Very well.”

Grosser looked at the others. He was the best Mission Commander in the ISF, no doubt about that, but part of that reputation involved getting his way, and he could boil up a ferocious temper when he needed to.

“Then we shall resume countdown.”

They all stood and left the room.

In the capsule, the crew waited patiently as the timekeeper's voice was heard over the communication system, "T minus twenty minutes and counting."

"Roger, Gordon." Liu replied.

Perez sighed. They had been sitting in the cramped capsule for hours now as final checks were made and the people at mission control had their final briefings. She'd complain, but she'd rather be sitting on top of thousands of tonnes of liquid oxygen and hydrogen when everyone was *absolutely sure* that everything would work properly when they lit the bottom. Anyway, a few hours was nothing compared with what they'd been through; during a training sim they once had to spend several days in one of these capsules. Turns out there is such a thing as being 'too close'.

A low rumble reverberated through the structure around them as the *Gordon* pulled away, causing the Sea Dragon to bob up and down in its wake. Ogunleye chuckled, "Everyone taken their sea sickness tablets?"

Yartsev groaned in response, "ISF launches from sea so it doesn't need to pay for launch pads. I'm beginning to question whether the savings are enough to outweigh the discomfort."

Kapoor smiled and took consolation in the fact that she wasn't the only one who was outwardly uncomfortable about all of this, "You never really were one for the sea, were you?"

"Water wasn't exactly an abundant commodity back in Yakutia."

"T minus ten minutes and holding."

The voice of the Mission Commander, Hansel Grosser, was heard over the communications system, "Polling: are we clear for launch?"

Ogunleye stirred into action, "Inco, are you clear?"

"Inco is clear," replied Liu.

"Chief, are you clear?"

"Chief is clear," replied Perez.

"ECM, are you clear?"

"ECM is clear," replied Kapoor.

"Payload, are you clear?"

"Payload is clear," replied Yartsev.

"Flight is clear." Ogunleye nodded, "Cap is clear."

There was a pause of a few seconds as, across the world, various control rooms made similar checks; everyone had their responsibilities over different aspects of the launch, and if all was well, they could finally proceed.

“PSD is clear...”

“Gordon is clear...”

“Geneva is clear...”

“Kanton is clear...”

“Vienna is clear...”

“We are clear and ready for launch!” said the Mission Commander.

“T minus ten minutes and counting. The clock is running,” said the timekeeper.

The clock is running. The mission flight recorders had been turned on and the crew knew that henceforth almost everything they said and did would be recorded.

Long shadows stretched across Enderbury Island as the sun touched the horizon, illuminating the faces of the hundreds of people on the beach with an idyllic orange glow. The crowd was quiet now. Binoculars and telescopes were trained intently on the rocket floating vertically out at sea. It was solitary now; the *ISF Gordon* was miles away, connected to the Sea Dragon by a bundle of tubes and wires illuminated like a great string of white Christmas lights. The Micronesian man was standing with his microphone again; his eyes betrayed drowsiness, but he was still smiling,

“The *ISF Arion* is the culmination of over 25 years of research and development, planning and construction, mobilising over 320 million bancors’ worth of resources from hundreds of countries across the world. It will allow Space Fleet to travel farther and faster than it ever has before. The ISF’s Central African member states provided the Arion Programme with an especially vast amount of funding over the past few decades; Flight Commander Ogunleye, who will be taking over from Commander Hammoud tomorrow as the programme transitions from the testing to the launch phase, is from Central Africa himself.

“But we should remember that we shouldn’t just be cheering for the five officers who are launching today, but all 1,000 crewmembers who’ll be taking part in the epic voyage ahead; not to mention the hundreds of thousands whose hard work and commitment made the whole undertaking possible in the first place.”

Out at sea, the Christmas-light string of wires was reeled in to the *Gordon*; its umbilical-like connection with the ship severed, the Sea Dragon was now running on its own internal power. Everything was in place for the imminent launch.

“T minus two minutes and counting.”

As one, the crew slid the visors down on their suits and locked them in a series of clicks which sounded through the confines of the capsule. None of them spoke a word, so as not to fill the communications system with unnecessary chatter. Their lives were in launch control's hands; it would be inadvisable to distract them.

"T minus thirty seconds and counting."

"Launch sequence start."

These were their last few minutes in the comfortable embrace of planet Earth.

"T minus fifteen seconds and counting."

"Primary engine is clear."

If everything went to plan, they would never return.

"T minus ten... nine... eight..."

"Primary engine start."

A rumble sounded out from deep within the bowels of the rocket. Cryogenically cooled liquid hydrogen and oxygen combined into an explosive mix in the combustion chamber deep underwater. The sea bubbled and welled up with increasing ferocity around the rocket in anticipation of the mighty forces which were about to be unleashed.

"... seven... six... five... four..."

The nose cone of the rocket above was enveloped in the steam from gallons of water being vaporised beneath the ocean's surface.

“... three... two... one... zero.”

The whole of Enderbury Island gasped. An explosion of white spray and steam erupted from the sea like a watery hand being thrust up from the depths to engulf the rocket in its grasp. Seconds later, the Pacific Sea Dragon roared upward out of the maelstrom. A missile committed to the skies. The crowd cheered. The sight was surreal; a pillar of metal the height of a small skyscraper rising into the air on an explosive, almost blinding burst of fire. They were left to no doubt as to the energies that were doing this, however. Half a minute later, large waves thrown up by the launch crashed along the beach. Even this far away, people's faces glowed in the heat of the rocket's exhaust. The whole atmosphere seemed to be pervaded by the inescapable roar of the most powerful engine on Earth. The crowd cheered, the announcer laughed ecstatically,

“... and there they go! This is a defining moment in history, ladies and gentlemen! The human race has travelled the Earth, reached the Moon, Mars and even

further afield; but today, ladies and gentlemen, today
we go to the stars!”

CHAPTER 2

VIENNA, AUSTRIA, EARTH

24 AUGUST 2291

For the second time that morning Grosser sat at the head of the briefing room at mission control. The launch had been successful, as usual; the Sea Dragons were one of the safest classes of heavy lift rocket available to the International Space Fleet, but in any launch there was always the slightest niggling possibility of failure. It was unavoidable. There were so many components, so many checks, so many people involved across the world, so many opportunities for something to go wrong. For someone with a reputation like his, failure could be disastrous; it was something that always stayed in the back of his mind.

Grosser surveyed the four people around the table with him, then glanced down at his tablet and scratched his double-chin absent-mindedly as he scanned a report that had just been sent to him. The four others waited quietly. He looked up,

“Lachman, what’s the condition of the PSD?”

“Stage separation was acceptable. One of the explosive bolts failed and was torn out, but that’s not

too unusual for this type of rocket. Everything else went as expected."

Grosser nodded, "Soros, the crew?"

"All the crew's vitals are within acceptable parameters."

He turned to Kells; she seemed to have made an attempt to smarten herself up, but she still wasn't in the condition he expected from a senior member of his team, "Kells, the range?"

She blinked a few times then lolled her head toward her tablet, "Oh, yeah. Erm... the primary stage splashed down about 294 kilometres downrange, *Gordon* has moved to retrieve it to be taken to the ISF dry dock in the Galapagos Islands to be refitted and reconnected to the second stage after it splashes down tomorrow. Current orbital inclination for the second stage is..."

She tapped her tablet, scrunched up her nose, then tapped and swiped at the screen in annoyance for a couple of seconds. Lachman sighed and rolled his eyes as everyone waited. Finding what she needed, Kells slumped back in her seat and dropped the tablet on the table, "Orbital inclination is 7.45 degrees, about point-two degrees off what we intended. Some course corrections should solve that."

Grosser nodded, "Hmm... safety?"

“No need for concern, Mission Commander,” shrugged Traore. “Though I would like to offer my sincere apologies for...”

“Yes, yes...” interrupted Grosser, but Traore persevered,

“...my sincere apologies for my behaviour half an hour ago. I forgot my place and I hope you can forgive me so that we can work together in the future.”

The Mission Commander nodded with an edge of annoyance, “Are we finished, Traore?”

“Of course, sir.” She spoke softly, calmly. Kells thought she was *too nice* to Grosser. A suck up. She needed taking down a peg.

“Okay,” said Grosser as he pulled himself up from his seat. “There’ll be another briefing after docking with *Arion* is complete. Thank you.”

Everyone stood to leave. As he turned, Grosser gestured to Kells, “Kells, come with me; I want to talk to you for a moment.” Kells sighed and glanced at Traore, who returned a dispassionate smile.

Grosser strode into his office behind Kells and slammed the door shut behind him. “Sit down,” he snapped, before himself sitting behind his desk.

“Your recent behaviour has been simply unacceptable. Your appearance in the pre-launch

briefing was unbecoming of what I expect from a senior member of my team; and on the day of launch! The crew are relying on us to do our jobs and any failure on our part could put the whole mission in jeopardy! Do you know how much investment has gone into this project, how much exposure there is in every aspect!? You need..."

"Sir, you're ranting."

"No Kells, this is not how we're going to do this! I don't think you understand the seriousness of what I'm talking about here. Vigilance is of the utmost importance in this job, and if anyone takes their eye off the ball the consequences could be disastrous!"

Kells folded her arms like a naughty pupil being told off by her headmaster. Grosser was always talking about cooperation and teamwork like some sort of workplace teambuilding consultant. No, worse. It was as if even the slightest conflict was going to bring the world crashing down on around everyone's ears! It was time to butt in, "With all due respect, sir, I was up all night personally checking satellite images from around the launch range."

Grosser hesitated, his anger encroached by caution, "You have a whole department to help you do that. There's no need."

Kells picked up her tablet and worked on it for a few seconds, “I was being *vigilant*, okay? It’s good I was, too, because when I rechecked the images, I found *this...*” She turned the screen around to show her boss. It displayed the undulating blue of the sea as seen from above; in the centre, however, was what appeared to be a small grey rectangle with a pointed end. Grosser’s eyebrows furrowed as he realised what he was looking at, “A boat?”

Kells nodded confidently, “Over forty kilometres within the sixty kilometre exclusion zone around the launch site.”

He rubbed his forehead, “Why didn’t you bring this up in the pre-launch briefing, Kells? This is serious!”

Kells shrugged nonchalantly, “I gave it to Traore – she’s in charge of that kind of stuff after all – working as a team, see? She just said she’d sort it out and, lo and behold, she never brought it up in the briefing.”

“And you didn’t think to give her a nudge, maybe? Or even just bring it up for yourself? For the sake of the crew, if anything!?” Grosser’s face began to redden as his frustration built up again.

She folded her arms and wrinkled her nose, then turned away. The Mission Commander’s office was small, tucked right beside the briefing room and

behind the control centre. There was one small window shrouded by a venetian blind, a few wooden bookshelves and three office chairs arranged around a metal desk bearing a plastic model of the *ISF Arion*. Other than these few adornments, and like every office in Mission Control, the place was a showroom of beige. With a huff, she turned back to Grosser and dropped her arms, “Okay, that was my fault. Yes, I could have mentioned it, but I... I guess I was just tired... distracted, that’s all. I’ve never been on a programme this big and I just want to get it right. I’ll try to get my time management straight in the future.”

Grosser nodded. Maybe he was getting soft in his years, but he was reasonably satisfied with Kells’ excuse; nevertheless, he shouldn’t need to be having conversations like this at all, especially on launch day. He rubbed his forehead, and lowered the tone of his voice, “I understand now, but I’m still quite annoyed. Yes, you’re one of the best people at your job in Space Fleet, otherwise you wouldn’t be on the team; and yes, you have fourteen years of experience at this – this boat you spotted proves it! But that can only get you so far. If I don’t think you’re working well on this programme then steps will be taken, if you get my meaning.”

She bit her lip, refolded her arms, then nodded, but didn't make eye contact, "Okay. I get your meaning. But what about Traore..."

The Mission Commander raised his hand, "That's none of your business, thank you, Kells. Now I'm sure there's plenty you can be getting on with, such as seeing if your department's satellites are tracking the PSD on its approach to *Arion*, for example?"

She nodded, "Yes, of course." Picking up her tablet, she left.

Grosser pulled himself up from his chair and looked out of his office window through the slats in the blind. The sun had just risen over Vienna, bathing the multitude of tall buildings of mission control in its light, back dropped by the city skyline. It seemed he needed to pay a visit to Traore...

The control centre was a cavern of computer screens and control panels lined row on row; dozens of people sat among the rows monitoring every aspect of the mission between them. The centre of attention was a great wall-screen at the front of the room displaying a live feed of the crew inside their capsule. To the right of this was a map tracking their orbit 160 kilometres over Africa, and to the left was a constant stream of telemetry and other information being fed through

mission control. Grosser looked at the feed of the crew for a moment; Perez was flicking a pen to make it spin dizzyingly fast as it floated in front of her face, before Lin reached out and snipped it out of the air, stowing it in a secure pocket on the wall. Good. Kells mentioned that they were slightly off the intended orbit; if they needed to make a burn of the second stage thrusters to correct this, the acceleration could see gravity make an unwelcome temporary return to the capsule. Whilst unfixed objects which were being 'handled' were permitted, it would be an added complication if the crew had to secure every loose memo and pen.

Grosser spotted Traore talking to someone at a computer,

"Traore! Can I speak to you for a moment?"

A few heads turned as he shouted over the quiet din of the control centre; Traore nodded and walked over.

"Come with me, please. This shouldn't take long."

He led her down one of the narrow adjoining corridors, a usual place for quick discussions outside the earshot of the other controllers. Grosser turned and showed her Kells' satellite image on his tablet, "What is this?"

Traore shrugged, "A boat?"

“And you’ve seen this image before?”

“Of course. Is there a problem, Commander?”

Grosser sometimes felt uneasy with Traore; yes, she ticked all the boxes, in fact she was one of Space Fleet’s best, but there was something about her that he couldn’t put his finger on. Something about her mannerisms, her way of talking, which made him think there was something else going on below the surface. It was probably just him. Fatima Traore had been one of the candidates for *Arion*’s senior crew – it could easily have been her being launched into space today. Grosser had the sneaking suspicion that the only reason she didn’t make the final selection was the fact that she was Katangan. Flight Commander Ogunleye, meanwhile, was Biafran. Two Central Africans in the senior crew of a mission funded primarily by the Central African Space Commission could have raised awkward questions of the ‘independent’ selection process of the Arion Programme.

“Yes, there is a problem. This is an unauthorised vehicle deep within the exclusion zone around the PSD. Why didn’t you inform me of this during the pre-launch briefing?”

“I dealt with the situation. As I said during the briefing, all is well. I didn’t want to waste your time by

concerning you with problems that were already solved.”

Grosser harrumphed, “You seemed eager enough...!” He paused as someone came down the corridor; he smiled politely and pressed himself against the wall while they squeezed past his belly. Once they were gone he turned back to Traore and lowered his voice, “You seemed eager enough to concern me with the programme’s political detractors.”

She sighed, “As Safety Controller it’s my responsibility to assess any risks to this programme. Sending the senior crew up is the last abort opportunity before the *Arion* leaves orbit, the last opportunity to get everything right before we reach the point of no return. A single faulty component, a single badly chosen crewperson, could mean the end of the mission. There are people who would be a lot happier if there was time for a final review of the mission parameters.”

Grosser sighed. Though what she said was true, he couldn’t help but think he wasn’t hearing the full story.

“May I go now, sir? The PSD is due to begin the docking procedure with *Arion* shortly.”

He nodded, “Yes, you may go.” But as she turned to leave, something else came to mind, “Wait!

Kells spotted this herself; why didn't the pattern recognition systems find it automatically?"

She turned back, "The boat was small and grey; perhaps the computers couldn't distinguish it from the ocean?"

Grosser was unconvinced, "This has never happened before..."

Traore spread her hands, "Kells is Flight Dynamics Controller. Ask her." Then walked back into the control centre. The Mission Commander rubbed his forehead. He didn't need this; the Arion Programme was one of the most high profile, and most controversial, programmes the International Space Fleet had ever undertaken. The ISF had sent people to the Moon, Mars, Venus, Mercury, even Jupiter and Saturn; but to launch a starship, to travel to another solar system entirely? There were more than a few who thought the ISF had bitten off more than it could chew, that the benefits were not worth the costs. Those people would take any opportunity to see the *ISF Arion* scrapped before more of the world's precious tax money was wasted. He didn't do politics, but Grosser knew he couldn't risk giving them that opportunity.

CHAPTER 3

VIENNA, AUSTRIA, EARTH

24 AUGUST 2291

“Shit” Kells slumped back in her office chair and shook a fist at the computer screen. It was late afternoon in Vienna now; her shift had ended hours ago. The crew had successfully docked with the *ISF Arion* and were now fast asleep in preparation for taking over command from the previous crew the next day. Kells, however, was still wide awake.

Lachman walked into her office with a box of coffee under his arm, “Hey, June. Something wrong?” She lolled her head back and looked up at him, “Hey, Aakash. Just running through the pattern recognition programs in the range computer. It’s really buggy.”

Interest flashed across Lachman’s face and he walked around her desk to look at the screen, “‘Buggy’? Grosser mentioned something about that to me just after the final briefing. Something about the computer not picking up an unauthorised boat?”

Kells nodded, “That’s right. I keep running the program under different parameters, on different settings, and it just isn’t picking it up. No idea why.”

Lachman noticed the bags under his colleague's eyes; he'd been so busy all day he hadn't noticed how tired she was. He'd never looked to Kells as the person with the best work ethic, but sometimes he thought she didn't know how bad she was getting. Doubtless Grosser had already had words with her. "Maybe you should sleep on it. How long have you been working for, 14 hours now? You shouldn't really be in work this late, maximum working hours and such."

She raised an eyebrow, "You're still here, aren't you?"

A mischievous grin broke across Lachman's face, "Alright! You've caught me!"

"What?"

"You know how the staff kitchen gets restocked every Friday evening; tea, coffee, milk sugar..." Kells glanced down at the box of coffee under his arm as she joined the dots in her sleep-deprived mind, "No...!"

"Why let it go to waste? This stuff's expensive."

"Do Saraikistanis even drink coffee?"

"Hey..." he patted the box with one hand, "... I didn't rise to the rank of Avionics Controller by *not* scavenging supplies from staff kitchens, did I?"

She laughed for a moment, then sighed as her attention returned to her computer. Lachman looked on with concern, "Have you been taking modafinil?"

“Hell, no. I’m not that desperate.”

Relenting, Lachman put his box down and sat by her desk to take a proper look, “Okay, so the pattern recognition software isn’t picking things up under certain circumstances, yes?”

“If by ‘certain circumstances’ you mean that damned boat, then yes!”

“Have you tried resetting the range computers, in case they picked up any bugs?”

“It was only the first thing I tried! The computers are reset every launch anyway.”

“No, I mean *really* reset them.”

“You’ve lost me.”

“Give me a moment.” With that, Lachman jumped out of his seat and hurried out of her office, his footsteps thumping along the carpet down the corridor. Kells waited. What was he up to? She had the basic level of IT training required for a senior member of mission control just like everyone else apart from stupid Traore, who was more skilled by necessity, her job as Safety Controller involving keeping an eye out for potential cyberattacks. Lachman had worked here a lot longer than her, though, so maybe he had a few tricks up his sleeve. For now, she might as well rest her eyes for a second...

“June? June!” Slumped in her office chair, she woke up with a start, “How long have I been out for?” Lachman stood over her with concern, “I’ve just been gone for a few minutes – we can do this tomorrow, you know?”

“No!” She banged the palms of her hands on the edge of the desk to shock herself awake, “I want to see what you’ve been up to.”

He nodded and began working on her computer, “I went down to the IT room and linked up the LPO cartridge from a few weeks ago to your terminal; I found out a while back that the reset we do each launch is just from the latest versions of the programs on Mission Control’s mainframe. The tape I just inserted, on the other hand, contains a copy of all the programs from several weeks ago, when the pattern recognition system was working fine.” Selecting a file on the computer, he leaned back in his seat, “There’s the old program. Do your stuff.”

It only took a moment for Kells to run the program on the satellite imagery from the exclusion zone around the launch site twelve hours before launch. A fine grid appeared over a satellite image of the Pacific Ocean and each grid square flashed in quick succession as the program searched for anything that

looked out of the ordinary. She glanced up at Lachman, who did nothing to hide his fatigue,

“Maybe you should go home, Aakash. This scan is designed to be done every ten minutes under normal circumstances, and I have nowhere near the computing resources available here that I have before a launch.”

Lachman nodded, “Yeah. It’s been a long day. I need sleep.” He picked up the box of coffee and made for the door, “You need sleep too. Go home soon.” Then he left.

Kells pinched herself awake. She probably should leave soon. While the Mission Controllers were asleep it was the job of the less experienced Provisional Controllers to keep the mission ticking over. If her night-shift counterpart found her working overtime word could get through to Grosser, and he’d already made sure his opinion on her work ethic was well known. Just as she was about to turn the computer off, a notification appeared on the screen: ‘ATTENTION: UNAUTHORISED OBJECT DETECTED’. On selecting the notification, the satellite image she had been running zoomed in. As she leaned closer, Kells already knew what she was looking at; the very boat that countless other runs of the current pattern recognition system had failed to identify.

Voices echoed down the corridor. She checked her watch. 5:04 PM. The Provisional Controllers arrived two hours ago. By now they would have finished checking their systems and sitting through briefings and be on their way to their offices. Hurriedly, she switched off the computer, grabbed her bag and made for the door. Her bag caught her model of the *ISF Arion* on her desk, which clattered onto the floor. She turned to pick it up, then heard voices in the corridor again and made a quick exit. She could explain in the morning. Now it really was time to go. But first she needed to pay a quick visit to the IT room...

Rain hammered down from grey, late evening skies over Vienna. It was rush hour and the roads were filled with trams, cyclists and the occasional car swarming through the forest of buildings that made up the city centre. Among the furore, Kells waited at a tram stop in a florescent green hooded overcoat which she pulled tightly around herself like a lifeline. Of course, the weather had to turn when *she* left the office.

A tram glided to a halt by the stop and the commuters flowed around her in a race to jam their thumbs against the 'Offnen' buttons on the doors. She let herself get pulled along as people poured into the vehicle, part of the regular tide of the twice-daily rush.

Despite being packed in like a sardine, she was grateful to be out of the downpour. People grabbed onto handles and bars as the vehicle accelerated out of the city. It used to be that Europe was one of the wealthiest regions on the planet, but in the modern world there was only so much economic power a large peninsula on the western edge of Asia could wield. At least now that the rest of the world had climbed to match the living standards previously enjoyed only by the wealthiest nations of the world. Indeed, much the Europe's influence was political today – the political establishments of Brussels, Vienna, Geneva, The Hague – legacy of a past at the centre of the world.

She looked down the length of the tram; people tipped from side to side in unison as the vehicle wound around corners, their eyes fixed to books and phones. The patter of the rain on the windows and the hum of the tram's motors was punctuated by the incessant clicks of people messaging friends, colleagues and loved ones. It was a sight that wouldn't be three centuries ago. Things were a lot more expensive now, after innovation failed to keep pace with the rising scarcity of energy and the rare resources that complex modern technology relied on. Only the wealthiest interests could afford the most advanced things. It was as if progress had petered out, given up. It was like

living in preindustrial times; people's lifestyles changed little from generation to generation.

“Jetzt ankunft in West-Deutsch-Wagram” the electronic voice echoed through the carriages. Kells looked up. What she was about to do could get her into a whole heap of trouble; Grosser would surely remove her from the program.

The tram slowed to a stop and the doors slid open as passengers filtered through to get off. There was still time to change her mind; she could continue home and forget all about it.

She stepped toward the door closest to her, then hesitated. Her right hand wandered into her satchel to feel the cold, hard surface of the LPO cartridge stuffed among files and books. It could end her whole career. She would be prosecuted.

Kells strode onto the platform. What the heck; if anyone found her with that tape she was screwed anyway.

The apartment block wasn't particularly ostentatious. The tiled red carpeting of the corridor was reasonably new, the cream textured wallpaper that lined the walls was reasonably clean and the door handles were reasonably well polished. Kells wandered along the top-floor corridor cautiously, giving every impression

that she wasn't meant to be there. Reaching the end of the corridor, she found what she was looking for: apartment 1729. She raised her knuckles, hesitated one last time, then knocked.

Glancing up, she noticed there was a small black circle on the wooden door at about eye level. Curious, she placed her thumb over it. A few seconds passed, before an angry, heavily accented Austrian voice emanated from within the apartment, "Nehmen sie den finger wieder aus meiner kamera!"

She pulled her hand back as footsteps approached the door.

A lock clicked and the door opened a crack; a balding old man with glasses and a cardigan looked at her for a moment. She smiled back sheepishly before recognition flashed across his face, "June! It's you!" The door slammed shut again; she heard the rattle of a chain before it swung open invitingly.

"June Kells, my friend! Please, come in, come in! You were the last person I expected to see on my doorstep tonight!"

"Hey, Mister Brunner." She stepped into the apartment as the door automatically swung shut behind her. The apartment she entered was luxuriously fitted out with expensive furniture, baroque wallpaper and crystal chandeliers; all the fittings associated with

a person with too much money for taste. At the end of the room was a polished marble desk crowded with what appeared to be the screens of a state-of-the-art computer system even more sophisticated than what they had at mission control. Behind the desk was a floor-to-ceiling window which stretched the full length of the wall, facing the towering cityscape of Vienna in the distance.

“Please, call me Marco; I’d like to think that after all these years we’re still on a first name basis.” He glided over to a mahogany drinks cabinet and began to pour himself something, “What’s your poison? Are you still find of rosé? I’ve just opened a bottle from Georgia, 2258 vintage, would you believe? It cost me a few thousand euros, but it was definitely worth it.” He sipped on his own glass appreciatively, before turning to Kells, realising she hadn’t replied, “Something on your mind?”

Kells stood apprehensively in the centre of the room, her hand wandering into her satchel again to feel the LPO cartridge, “Erm... not tonight. Not while *Arion* is about to be launched...”

“Ah, yes!” he interrupted. “The *ISF Arion*! Humanity’s steed to the stars! I’ve been following the programme very closely. Even made an anonymous donation myself. I think the whole thing is a brilliant

idea, true ambition! Not like those measly *interplanetary* missions we've been bothering ourselves with for the past few centuries."

Kells nodded, "About that... I need your help with something. There's something strange going on with the range computer's pattern recognition system and I wondering if you could help me."

He put down his glass and turned to her inquisitively, "Really? Interesting... to really be of any help I'd have to have some way to access the system..." Before he could continue, Kells took the LPO cartridge out of her satchel and held it in view. It took a few seconds for him to realise what he was looking at, "Is that... is that..." Lost for words, he strode up to her and took it carefully out of her hand, as if it was some delicate parchment bearing the drawings of Leonardo da Vinci. On closer viewing, his expectations were confirmed, "168 millimetres long, 106 millimetres wide, 22 millimetres thick, capacity 256 terabytes... this is one of Mission Control's backup tapes!"

She nodded, "Today's actually. It contains a copy of the exact system configuration up to 3 PM today."

Brunner grinned like a child holding a month's supply of chocolate as he turned the plastic box over in his hand, "Oh, Kells, you haven't changed a bit since we

parted ways all those years ago back in the Vermont Republic!" He ran over toward his desk, "It must be fate, you know, both of us turning up in Vienna after all this time!" On turning on his computer, the screens lit up with a detailed computerised image of what appeared to be a shipwreck on the ocean floor. Kells walked over, "What's that?"

Brunner flapped, "Oh, that? It's just... erm... a salvage operation I've been working on. Yes, it's an unregistered cargo ship which sank off the coast of South America back in 2196. Turns out it was carrying several tonnes of dysprosium; it'll be worth a fortune!"

Kells eyed him sceptically, "And I assume your fellow salvagers are conforming fully with the international regulations when it comes to profiting from operations such as this?"

He sighed and looked up at her sincerely, "Look, even before we went our separate ways all those years ago I knew you had reservations about the kind of things we did, and I respect that. But it doesn't mean that I won't carry on. It's just what I do. It's like my occupation. I don't know what I'd do if I didn't do this."

Kells shrugged and nodded, not quite able to meet his eye, "Okay, let's just get this over with."

Silently, Brunner inserted the cartridge into one of the many ports under his desk. "The pattern

recognition system in the range computers, you say? I'll need passwords, authorisation codes." Kells nodded, "I'll tell you. They change them daily, anyway."

As she guided him through the intricacies of Mission Control's computer network, disclosing codes and passwords - each of which could land her in jail if given to somebody below her rank in the ISF, never mind a computer genius who didn't quite stay on the right side of the law – she could help feel a slight rush of adrenaline. She kept half expecting a squad of Interpol officers to burst in through the door and drag them both away. The unique kind of excitement that could only be found in breaking the rules. The kind of excitement that she hadn't felt in a long time, and had hoped she wouldn't feel again. It was like a guilty freedom.

"So let me get this straight." He said as his fingers glided across the keyboard, "You use a pattern recognition program to search for any intruders within a certain radius of the launch site, to save checking by eye. But for some reason the program wasn't able to detect this particular object before the launch?"

Kells nodded, "That's right. I ran a copy of the program from a few weeks ago and that found the boat just fine..."

Brunner latched on to her train of thought, "...so you think the program must have gained a bug sometime in the last few weeks. The question is..." He stopped typing and swivelled his chair around to face her, "... why did you come to me?"

She bit her lip and looked at her feet awkwardly, "Well that's just it. I *should* have told Traore, the Safety Controller. She's the expert with computers. But I just don't trust her."

Brunner chuckled and turned back to the computer, "So you asked the guy involved in the illegal salvage operation. That's some distrust! I mean surely..." He trailed off and leaned closer to the screen, "That's odd..."

She leaned in too see what he was looking at. It all looked like nonsense to her; the screen was filled with boxes connected together with lines and labelled with reference numbers or what seemed to be random lines of code, "What am I meant to be looking at?"

Brunner stroked his chin thoughtfully and slowly leaned back into his seat, "The program is able to recognise and label things it finds, yes? Cars, boats, aircraft..."

"That's right."

"... and it disregards things that are meant to be there, such as the *ISF Gordon*?"

“That’s right, but I checked myself and...”

Brunner interrupted, “It doesn’t matter whether you’ve checked or not. Deep within the code there’s an instruction to treat that boat as an authorised object, and not to say anything about it. Only by reading the program’s coding directly was I able to find it myself.” He continued with fascination, “It’s quite ingenious, actually. By taking advantage of the subroutine that makes the program disregard authorised objects, whoever did this was able to make the additional piece of code incredibly short. Almost unnoticeable.”

Kells perked up like a jolt of electricity had just been sent up her spine, “‘Whoever’? You mean this was done deliberately!?” Brunner folded his arms and nodded nonchalantly, “Of course. This is no mere fault or bug. From what you’ve told me, my guess is that someone inserted the code into Mission Control’s mainframe before the launch. When the range computer was reset in preparation for launch, the new code was copied over.”

She couldn’t believe what she was hearing. Somebody had actively sabotaged *her* department’s computer system, and for what? To try to make them overlook one measly boat? What was it for? Why was it there? What had she uncovered in finding it and reporting it to Traore?

It crossed Kells' mind then that Traore had said very little about that boat after it had been reported to her. She would have thought that if someone had gone to so much trouble to try to cover it up, it must be important in one way or another, and if it was so important it must have turned up some interesting things when Traore had it apprehended.

Unless...

"Traore!" Kells balled her fists, "It must be!"

Brunner seemed sceptical, "Now, now, June. If I knew anything about you at all all those years ago, it was that you could hold a grudge. Are you sure you're not jumping to conclusions here?" She shook her head, "It must be her. Only she has the expertise and the authorisation to be able to do this." It dawned on her that whatever Traore was up to could put the mission in real jeopardy. Lives could be at stake.

"I've got to go." She grabbed her satchel and headed for the door. This was no mere grudge any more. Grosser needed to be told. Now.

"Wait!" Her exit was postponed at the sound of Brunner's bellowing voice. She spun round to face him. He looked her straight in the eye, "Think about this, Kells."

"What is there to think about!? People could be in danger!"

Realising she wouldn't stay for much longer, he quickly blurted out his argument, emphasised by hurried, involuntary hand movements, "Look, if I was doing this I'd want to remove any evidence of this incriminating piece of code from the system as soon as it had done – or failed to do – its job. That means removing it from the mainframe..." he took the LPO cartridge from the computer, walked across the room and handed it to her, "... and removing it from this."

Realisation dawned. She leant back on the wall and closed her eyes, "Shit. She'll be looking for the tape."

"Have you done anything to implicate yourself?"

"Oh, I found that boat she was covering up. Literally put it right in front of her face. She'll know I'm on to me. How could I be so stupid!?"

Brunner nodded and stroked his chin thoughtfully, "If it is this Traore, you could be in danger. If you return the LPO cartridge, she could delete the evidence against her. If you don't, she could use that to point the finger at you."

"Shit."

He nodded solemnly. "This is no easy situation. I know it's extreme, but if you want, I could have you disappear. You could even work with me again, under a new identity! All it would take is..."

“... I’m sorry.” Kells interrupted, raising a hand. “I’m sorry, I just... back in Vermont I decided I wasn’t going to do that anymore. Illegal salvaging, smuggling, swindling, hacking, selling insider information... it’s just not me. I don’t want it to be.”

Tiredly, he raised his hands in defeat, “I’m sorry. I know you better. I should have respected that...” She looked around the apartment; Marco Brenner was quite an untidy man, but also a very private one; he didn’t like hiring cleaners or maids. The spotlessly tidy apartment, though fitted with all the frivolous, high-tech fittings the man endeared himself with, did not reflect this. “You said it was fate that caused us to meet again in Vienna. It wasn’t anything so romantic, was it?”

He sighed, “No.”

“When you contacted me, I bet you’d just got here.”

Brenner made no reply, so she continued softly, “I don’t want this anymore. I’ve started a new life now. I had over fourteen years ago. Stop following me, move on.”

“We were brilliant together, you know. But I guess we’ll never meet again.”

“That would be best. That is a dark chapter of my life I want closed for good.”

He nodded. She could have been mistaken, but he might have even looked upset.

“Stay safe, June.”

“Goodbye.”

And so she left.

CHAPTER 4

ISF ARION, 160 KILOMETRES ABOVE EARTH

25 AUGUST 2291

“A toast to exploration! The essence of the human spirit!” The nine others cheered at Commander Hammoud’s comment and raised cups of grape juice into the air before drinking from them in unison. Ogunleye, Lin, Perez, Kapoor and Yartsev were crowded into one of the docking corridors of the *ISF Arion*; a narrow tunnel which terminated at the door to the Pacific Sea Dragon capsule which had successfully delivered them to *Arion* the day before. Facing them were their counterparts who had manned the starship during its final twelve months of construction and testing, headed by Flight Commander Noufal Hammoud, who were about to enter the capsule to return to Earth.

“Very poetic.” Commented Flight Commander Ogunleye, sipping from his teardrop-shaped space cup, “Did you make that up yourself?”

“Of course not! It was a twentieth century astronaut called Frank Borman. I’m far too uncreative to think of something like that!” Everyone laughed. The atmosphere was jubilant. Kapoor was using a small

camera to film images which would be broadcast across the world. Still unaccustomed to life in space, every now and again her grip on a handhold would slip and she would spin in the freefall conditions of orbit, before repositioning herself. All the time, however, her face bore a warm smile as the others shook hands and chatted excitedly.

“But really, let’s be serious now...” Hammoud held up a hand and everyone quietened down, “Today my officers and I end a year in space on this magnificent starship, though we never got this thing more than 160 kilometres!” Everyone laughed at that, before he continued, “But that is nothing compared with what my colleagues are about to achieve. Throughout our time here, we had our return to Earth to look forward to; a return to the human civilisation, to our homes and our work.”

“But you...” Hammoud pointed at the Ogunleye’s crew theatrically, “... you people will never see Earth again. A harsh reality, I know. But I do not feel guilt when I say this, because I know I am looking at strong people who know the risks, who know exactly what there is to lose and what there is to gain...” They began to cheer again, but he suppressed it with another raise of his hand, “... and you have so much to gain! You may not have Earth to look forward to, but an alien world,

where you will build your own civilisation, construct your own homes and work extraterrestrial soils!”

They gave a final cheer and Hammoud nodded appreciatively.

“Now that didn’t seem very ‘uncreative’, Commander!” said Ogunleye.

“What do you think I’ve been working on for the past year!?” chuckled Hammoud, “Now take out this rubbish, this is your place now!” He threw his empty space cup at Ogunleye’s crew and the others followed his lead.

“Hey! This starship needs to be as light as possible to achieve maximum delta-vee!” shouted Perez as she collected the cups and threw them back at Hammoud’s crew, “Take them back to that shoddy planet of yours. What was it called? Earth! Yeah, that’s right, we’re jumping ship!”

Everyone laughed as Hammoud’s crew opened the hatch to enter the capsule.

The *ISF Arion* was the largest object ever to be constructed in space. Much of the length of its long, thin profile was occupied by the sixteen immense cylindrical fuel tanks, each five times the volume of the Great Pyramid. These were arranged in four columns around the rod-like main engine, which fanned out at

the end with a cone-shaped wire nozzle. The main engine was topped by the payload section – a boxy, angular octagonal prism concealing hundreds of cryopreserved astronauts and hundreds of tonnes of equipment and supplies. Straddling the top of the main engine and the payload section were what appeared to be two dart-shaped aircraft with stubby wings; they hugged the *Arion* closely and were attached to the central spine of the starship by short tubes protruding from their bellies. After the payload section came the habitat modules – four bulbous cylinders pointing outwards in a radial configuration built into a scaffolding which held them out from the axis of the starship. They rotated sluggishly about a central axle. Ahead of these was what appeared to be a giant spindle of tightly coiled wire; the magsail. Five octagonal panels (like squares with the corners cut off) were layered several metres apart from each other on front of the starship. The whole body of the starship lay within the shadow of these impact shields, with the exception of a great pair of heat radiators which extended out from the main engine like the delicate wings of some great mechanical butterfly.

Lin surveyed the scene from the cockpit of one of the aircraft. The cockpit protruded slightly from the body of the vehicle, its windows forming a cupola

which provided an all-round view up and down the *Arion*. He'd been to space several times before and had come across much of the standard equipment which was used in missions. From this he knew that much of the *Arion* was made from spare parts. The starship's two 'cockpits' were the most obvious evidence of this; two Buran Nuclear Scramjets used to deliver payloads into space for a short time before they were scrapped for being too expensive almost a century ago. Their control systems had been reprogrammed and hard-wired into the *Arion*, while their cargo holds had been filled with capacitor banks so that their fission reactors could be used as 'starter motors' for the starship's main engine.

The four habitation modules appeared to be inflatable habitats often used in missions on the Moon and Mars that were too far from bases on the planets to receive quick support. As for the payload section, the thin ceramic panelling was barely airtight! It was basically a box designed to hold together the tightly-packed lightweight polymer and Kevlar bags and modules which contained the various equipment required for the mission. In fact, the only major thing that had been built specifically for the mission seemed to be the main engine; everything else was stock components. Lin had made a point of asking about

this when he first saw the design several years ago. He had been assured that it was much safer to use tried-and-tested components rather than try to develop new ones. Much cheaper, too. As the projected cost of the *ISF Arion* had crept upwards over the years, so had the spare parts crept into the design. ‘Frankenrocket’! a disgruntled designer had called it when she spoke out just a few months ago. Such misgivings had been quickly swept away by the excitement of launch day.

“Are you okay?”

Lin looked across to Kapoor, who had just finished checking the secondary cockpit’s environmental controls. He barely turned to her, “Of course. Why wouldn’t I be?” She shrugged as she unbuckled herself from her seat and pushed herself so that she floated through the open circular hatch in the back wall of the cockpit into a room full of controls and equipment racks.

“No reason. You just seemed distracted. I guess you’re used to working in space, anyway.

“I don’t think you can get used to working in space. Each mission brings new surprises. New challenges.”

On hearing no reply from Kapoor, he leaned forward and began checking the communications and astrogation systems. Each of the five crew had their

responsibilities, their areas of expertise; as second in command, the responsibilities of the INCO were especially diverse. Lin had to maintain discipline among the crew, approve rosters and maintenance timetables made by the senior crew, help plot course corrections, oversee internal and external communications and ensure the Mission Commander Grosser on Earth and Flight Commander Ogunleye were up-to-date with everything that was going on. Of course, the other senior crew had similarly diverse roles.

He heard the tap of a small cage door being handled behind him. A moment later, Kapoor floated alongside him and manoeuvred herself back into her seat. Glancing over, he noticed she was only using her left arm; she was concealing something on the other side of her body.

“What are you hiding?” he asked, less suspicious than intrigued. Kapoor gave her warm, quiet smile and turned to him to reveal a lanky brown tabby cat she was holding against her chest. He almost flinched. Almost. It wasn’t in his nature to give a reaction when it wasn’t absolutely necessary. Space exploration by its very nature was full of surprises, but an animal among the clinical surroundings of a space vehicle was something else entirely.

“Kapoor, why is there a cat in the cockpit?”

She gave that warm smile of hers, always serene, always genuine, never mischievous, “The previous ECM, Spencer, took me aside and explained just before he left yesterday. The Medical Controller at Mission Control has been planning this for a long time; the previous crew raised two cats in space – the other one’s still in its cage – to accompany us during the mission. She believes they will help us to deal with the psychological impact of leaving Earth behind; contact with them has been shown to stimulate the release of serotonin, for example.”

Lin furrowed his eyebrows subtly, “Why didn’t I know about this?”

“The publicity organisers of the mission thought it would be fun if it was a surprise for us before departure; it must have been relatively easy to hide it from us whilst we were occupied by the late phase of training and the world tour. The others are talking about their responsibilities in the primary cockpit for the live broadcast and I’m meant to come in to surprise them.”

Lin’s lips tightened slightly. He didn’t like having the wool pulled over his eyes, especially for something as frivolous as some sort of performance, some sort of collective secret that the whole world held against him.

It concerned him that Space Fleet were able to keep this from the crew for so long; what other things could have been hidden from them? As INCO, he felt a responsibility to know every possible detail of the *Arion* and its mission, but he couldn't do that if the people who were meant to be supporting the crew kept things from him.

"Are you okay?" asked Kapoor for the second time.

He looked directly at her, "Of course. If there are any problems you need to know about I'll tell you." She looked away. Lin had always been a private man; she knew he had done work with the intelligence services in the past, but the details were hazy. After many years of them training together, she was, of course, entirely confident that she could put her life in his hands, as was all the other crew, but his propensity to hold things back worried her sometimes. She had always been good at noticing things about people that others didn't, and she got the feeling he was holding things back sometimes.

Satisfying herself that Space Fleet knew what it was doing during crew selection, she pushed the thought to the back of her mind and turned back to him, "I think it's time for me to introduce our feline stowaways to the rest of the crew."

And without another word from either of them, she pushed herself out of her seat and drifted out of the cockpit.

The primary cockpit was a mirror image of its secondary counterpart. Five seats – a row of three behind a row of two – in front of a multitude of robust-looking computer monitors, extended out on metal arms, all displaying data and notifications about different parts of the starship. Above them a pair of eyepieces hung down from the ceiling like a periscope, for direct observation of distant objects.

Yartsev was sat behind Ogunleye and Perez, who were presenting a questions-and-answers session to a camera perched on top of one of the monitors. Ogunleye appeared to be answering a question about the *Arion*'s course to another star,

“... after leaving Earth orbit *ISF Arion* will spend just over three months within the solar system before the real voyage begins. You see, we are currently orbiting Earth at an angle of about 7.65 degrees to the equator; it's no coincidence that the target star, 40 Eridani, is also 7.65 degrees to the equator...”

Perez interrupted, “Astronomers say it has a *declination* of minus 7.65 degrees.”

“That’s right.” Ogunleye continued, “When the *Arion* reaches escape velocity it will therefore enter an orbit around the Sun at the same angle. Then we wait three months until *Arion* is at its lowest below the plane of the solar system. At that point the main engine will be fired, sending us on an escape trajectory toward the 40 Eridani system...”

Kapoor pulled her way into the cockpit through the open hatch at the back and sat next to Yartsev, leaning over to speak to him discretely, “Do you have a moment? I need your help with something.” He nodded and disappeared out of the cockpit with her, “You’re scheduled to do your talk on the target planet in about ten minutes.”

“This should only take a few moments.”

In the store room behind the cockpit, she introduced him to the two cats. Yartsev was so shocked it took him a few seconds to right himself again in the weightless conditions. “Cats!?” His usual quiet demeanour seemed to have slipped away momentarily. “What are cats doing on the starship!? I hope this doesn’t mean one of the ice bags has broken down, because that will take a lot longer than ten minutes.”

She giggled; sometimes she wondered if some of Yartsev’s comments were serious or just an

impenetrable sarcasm, "Of course not. These will be our pets."

He observed them curiously; her feet hooked under one of the rungs running along the 'floor' of the room to keep her steady, she held a cat under each arm. A brown tabby cat pawed at the edges of her hijab playfully while a silver-white one stared back at him with striking blue eyes. Kapoor looked quite comical as she tried to handle them both in the weightless conditions "Here, let me help you – you look like some sort of cat hoarding hermit with those two!" Taking the silver cat, he held it against his chest and caressed it softly. Kapoor was taken aback; in all their years together she'd never seen him like that, "You like cats?" He nodded, "I like animals."

"Oh yes, you worked with animals when you were a child, didn't you?" She remembered now; before he went to university Yartsev had worked with his mother, a national park ranger in Yakutia monitoring wildlife on the cold plateau of North Asia. It crossed her mind then that she had never seen him spending time with animals under normal circumstances, that is, other than outside sims of dealing with a cryogenic system failure.

Yartsev nodded, "That's right. Not up close; not up close very often, anyway. We did have a cat, though.

A Neva Masquerade, if I remember. Just like this one, actually, but more grey than silver.” His eyes dipped down toward the cat as he cast his mind back to a distant past.

Kapoor nodded; she would have talked more but she was mindful of time, “We’d better introduce the new members of the family.”

“Yes...” he stirred, “...yes, let’s, let’s...”

They clambered through the hatchway into the cockpit, each accompanied by a feline companion, and positioned themselves in two of the back seats. But as they entered, Perez glanced back and her face broke out in a gleaming smile, “Aww! They’ve got cats with them!” Ogunleye, who was in the middle of explaining the technicalities of using pulsars for deep space navigation, whipped his head around in response to the strange exclamation. Meanwhile, Perez had melted as she stroked the cats adoringly, any awareness that they were being filmed for broadcast across the world apparently forgotten, “They’re gorgeous! What are their names!?”

Kapoor smiled as she handed the cat over to her colleague, “This one is called Felicette and the other is called Sputnik, as decided by popular vote last month. Felicette was the name of the first cat in space whilst ‘sputnik’ is Russian for ‘fellow traveller’.”

Catching on, Ogunleye joined in, "I'm sure we have room for two more. But don't ask me if the air filters get blocked up with cat hairs," he said in jest.

"Don't worry," Kapoor assured, "they were genetically engineered specifically for living in space; they don't leave hairs everywhere and their muscles and bones experience deterioration at a much slower rate than would usually be expected in weightless conditions. They were launched up here as kittens and trained by the previous crew; they're quite confident moving around without gravity."

Perez butted in as she handed Felicette over to Ogunleye, "Sounds like they're better built for the mission than we are. Felicette could have your job in a few years, Commander!" The others laughed at that, though perhaps with a slight sense of unease. "Yes," he replied, examining the cat as he spoke, "I've heard of animals accompanying crew on missions in the past, especially the long-duration ones to the outer planets. They sent a lot of pets to Mars over the years, though you'll have to ask Lin about that."

Perez poised herself to get out of her seat, "Shall we ask him now?"

Ogunleye glanced at one of the screens, mindful of the continuing broadcast, then turned and handed Sputnik back to Yartsev, "I'm afraid not; it's time for our

Environmental Consumables Manager Ayisa Kapoor to tell us about the planet we'll be calling home a few decades from now. Kapoor, if you will..."

She came forward to sit next to Perez and begin her talk.

Afterwards, Kapoor was helping Yartsev check the cryonic modules in the payload section. The lightweight module they were in, built into the wider superstructure of the payload section, was the dimensions of a large shipping container, though most of the space was taken up by rows of rigid mesh shelves, leaving only a cramped corridor through the middle. The contents of the shelves was eerie. The shelves were tightly packed with rows of black cocoons, each less than two metres long but more than half a metre wide and each pinned down onto their respective shelf by taught silver blankets secured over their tops. Bundles of tubes of various sizes and colours protruded from the back of each cocoon and ran off along the backs of the shelves to unapparent destinations. A closer inspection of the profile of the cocoons would reveal a not-entirely-coincidental resemblance to a sarcophagus, though the inhabitants of these sarcophagi were not entirely deceased.

“Do you think it’s right?” said Yartsev. His solitary voice echoed in the narrow confines of the module.

“What?” she replied; her right hand occupied by a small tablet, she used her left hand to steady herself against the shelves as she followed him deeper into the dimly lit space.

“There are 216 people in here. Their hearts aren’t beating. Their brains show no activity. Their body temperatures are over a hundred degrees lower than that of a person who should die of hypothermia. By most accounts they have been dead for several weeks now.”

“But not quite.”

“Well, yes. They don’t rot. Their organs and the patterns in their brains are preserved, but there’s no brain activity. All of the electrical impulses that have been firing through their brains throughout their lives have ceased. So tell me...” reaching the far wall of the module, he turned to her, “...when those impulses start again, will they be the same people? Or will they just be copies, based on those brain patterns preserved over decades of time.” Though his voice was subdued, it sounded like he was challenging her, even accusing her of not taking stock of such moral considerations

before. But through his round glasses, his eyes betrayed a sense of deep internal reflection.

Kapoor rubbed her arms. It felt very cold in here, even with their well-insulated overalls. She had no answer to his musings; she could only add an observation of her own, “We all change so much through our lives already. I think I know who I am. And I expect to when I reach the end of my journey.”

Without making reply, Yartsev nodded and turned back to the wall. He produced a small meter from his pocket and held it up to a large vent. Kapoor made to speak, “I didn’t...”

“What pressure does life support indicate for vent P3M?”

She glanced down at the tablet, “99.3 KPA”

“Good. Temperature?”

“Minus 9.2 degrees.”

“Also good. On to cryonic module 4.”

They both turned to leave, “Were you going to say something? I think I interrupted.”

“Oh? No, it’s nothing.”

“Please. Tell me.”

They left the cryonic module, Yartsev closing a hatch behind them, and pulled themselves through a short connecting tube into the central spine of the *Arion*; a long tunnel, just narrow enough for a person to touch

either side with their hands, which ran the full length of the habitable section of the starship. Various tubes and pipes ran the length of the tunnel, snaking in and out of junction boxes along the way.

“I was just about to say I didn’t know you liked animals so much. I’m surprised it hasn’t come up before.”

“Really? I’m sure I told you about my time in the park before.”

She nodded, “I knew you worked with animals, I just didn’t know you liked them so much. At least, that’s the impression I got.”

He shrugged, “We had a cat called Catherine. I forgot about that; you bringing in Sputnik and Felicette just made me remember. That’s all.”

She raised her eyebrows and tilted her head to look at him, “Were they nice memories?”

He smiled, “It was very peaceful out there; there was nobody else for kilometres. It could be lonely sometimes, but I think it left an important impression on me...”

CHAPTER 5

ZIMOV RESERVE, YAKUTIA, EARTH

4 MAY 2267

Snow blew across the ground in a light breeze. The Siberian landscape was dotted with rocks and shrubs which punctuated the surface of the white blanket which had been thrown over the land. The rugged brown slopes of snow-capped mountains dragged across the horizon behind the bristles of a snow-dusted forest in the distance.

It was bitterly cold, even the slightest breeze nipped the extremities with a numbing bite. Nevertheless, the trickle of water from a dip in the snow signalled a wide stony stream bordered by thin shelves of ice. A few miles downstream, some deer appeared to be drinking from the water, before their heads shot up at some disturbance and they bounded out of sight.

Six studded tires rushed across the stream, squirting slush in their wake. Powerful suspension connected them to a ceramic frame enclosing a couple of passengers, wrapped tightly in thick thermal clothing.

Pavel pulled his hood over his head and shivered as a gust nipped his ears. His mother looked

over to him, "We're nearly there, Pavel. Then we can turn on the fire and the cabin will be nice and warm in no time!" She pushed the control lever forward and the whine of the engines dropped to a rough hum as the buggy scaled a snowy incline up to the prefabricated cabin at the crest of the hill. Virgin snow crunched as the vehicle turned to a halt. Pavel ran eagerly for the door as his mother unloaded supplies from the back of the buggy.

"Hello Catherine!" his excited voice drifted from within the cabin. His mother followed into the small interior, "Okay, you know the drill. Make sure either the outer door or the inner door is closed at all times. It's cold out there."

Pavel ran out of the bedroom clutching a grey cat in his arms, "I know!" She put the box she was holding down on the floor, pulled his hood off and kissed him on the forehead, "Of course you do."

Before long the cupboards were packed with all the food, toiletries and detergent they would need for the weeks ahead. Pavel made the beds whilst his mother checked the pressure on the methane tank and fired up the heater. Then she came in and inspected the beds, "Very neat, Pavel. The cabin shouldn't take long to warm up; should we check on the animals?"

He bounced into the air, "Yes!"

"Then if you're good, we can have hot chocolate when we get back..."

As they travelled in the buggy, she tested him, "Can you name the different animals we have on the reserve?" He utched up in his seat, "Yes! There are reindeer, moose, muskoxen, yaks, wisnets, tigers..."

"What type of tigers?"

"Siberian tigers!"

"That's right. But there's something very special I want to show you today..."

He utched up in his seat again, this time as if a bolt of lightning had been fired up his spine, "What!?"

She grinned and glanced at a gadget mounted in front of the driver's deat, "You'll find out soon enough..."

As the buggy crested the top of a small ridge, a great white plain was revealed to them, stretching off to the horizon. Defrosting thermokarst lakes were spread across the landscape, stretching from a treeline to their left like splatters of blue-grey paint.

"Deer!"

She brought a pair of binoculars up to her eyes; to their right, in the far distance, she made out a pair of figures by a stream. "Hey, good spotting... roe deer, I think. Well done!" She handed the binoculars to Pavel

and pointed in the opposite direction, toward the treeline, “But over there I think you’ll see something much more exciting!”

He clasped the binoculars to his eyes. After a few seconds of searching, he gasped. He knew what they were instantly, he’d seen them countless times before, but to see them in real life was something else.

“Amazing, aren’t they?”

Pavel could hardly speak, “Th... they’re mammoths. They’re actual woolly mammoths!” Jamming the binoculars back in front of his eyes, he watched them excitedly, bouncing up and down in his seat. About a kilometre away, a small herd of immense creatures lumbered through the snow parallel to the treeline, heading toward the ridge. They were like elephants with shaggy brown fur and enormous, curving tusks: the classic woolly mammoth.

“Should we get closer?”

Without need for further instruction, he jumped out of the buggy and ran around to his mother’s side as she climbed out herself. Pavel grabbed hold of her arm and hurried her on as she took a bag and a rifle from the back of the vehicle, then crouched down so she was at eye level with him, “Now you must be very careful, Pavel. Stay close. They’re big animals.” He

noded vigorously and they set off across the ridge, always watching the mammoths.

The depth of the snow was irregular. In some places it forced them to raise their knees high up with every step to avoid the resistance of the white powder, then they would unexpectedly stomp over a shallow, icy area. Despite his prior elation, Pavel was soon tired out and almost slipped a few times. She held his hand after that, “Be careful, Pavel! It’s steep.” Under usual circumstances she would have skied this route, but it would be far too difficult for her son; she’d only started taking him to the reserve with her a year ago, when he was thirteen.

Eventually they stopped and Pavel sat down on the ground, panting, exhausted, “Why didn’t we drive closer?”

“The buggy might spook them. I don’t want to take any chances,” she replied. Pavel thought this was a fair point; he’d rather trek a kilometre or so through deep snow than risk creatures as big as these stampeding.

They paused for a moment, catching their breath as the herd lumbered past them along the bottom of the slope. It was like a scene from the Pleistocene era; nine of them – six adults and three juveniles – marching through the tundra, reaffirming

their empire over the steppes. They took no notice of the two humans watching them, as if their mere presence was incidental, unworthy of recognition.

“Why aren’t they slowing down for the baby ones?”

“That’s what they do in mammoth herds. The adults have long, slow strides and the young ones of have run to keep up.”

Pavel scrunched up his nose, “Don’t they get tired?”

She shook her head, “They’re much lighter than the big ones, so they have a lot less weight to carry around.”

Next, he pointed to the mammoth in front, “Is he the leader?”

She turned her gaze to him, but he didn’t notice; he was engrossed in the spectacle before him. So many questions, so curious. It made her proud. “*She’s* the leader, yes. Mammoths are matriarchical, which means girls are in charge of family groups.”

He scrunched his nose up again, “That isn’t fair.”

She laughed, “Seems fair to me.”

“Only because you’re a girl!” He pushed her in the arm and she nudged him back playfully, then he folded his arms and stuck out his bottom lip.

“Oh, Pavel, come here!” She said with a mix of exasperation and empathy. His mother pulled him close again, so his head rested under her shoulder, “I was only giving you a nudge.”

The herd was moving away ahead of them now, tusks and tails swaying back and forth. She pointed to a mammoth near the back, lagging behind, “I think that one’s a boy. The one with the end of its tusk broken off.”

“Why is its tusk broken?”

“Males often fight with their tusks, ramming them together. The tusks can get broken sometimes.” She changed her position on the ground, looking down with her chin resting on her knuckle, “Actually, it’s very unusual to find males in family groups like this. They’re usually independent; only females and adolescents stay together.”

“Maybe... maybe he’s looking for someone... like you and dad?”

She shrugged uncertainly, “Hmm... it’s much more common to see males and females together in big herds from time to time, not in family groups like this.”

Pavel sat up, “You mean there are bigger herds!?”

His mother nodded, "Oh, yes. We've seen congregations of hundreds of mammoths at a time up here; we..."

"Do you think I'll see one!?" He interrupted. She laughed kindly, "Even I haven't seen a big herd; they're quite rare