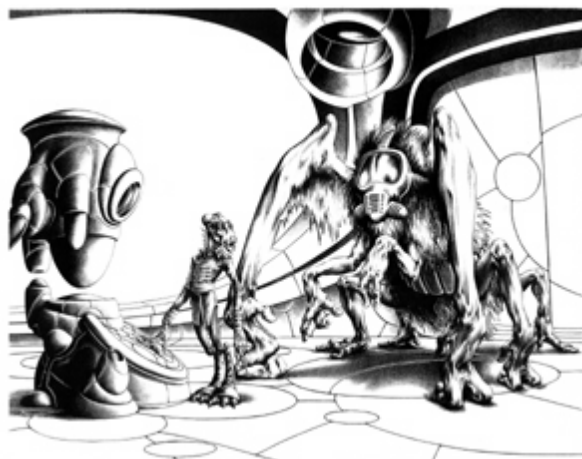


A New Order of Things: Part II of IV by Edward M. Lerner
Civilization and its handmaiden, Technology, depend on trust--but that contains its own pitfalls.

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Illustrated by John Allemand

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Synopsis

For a century and a half, a growing interstellar community has maintained radio contact. A vigorous commerce in intellectual property has accelerated the technical progress of all its members. Travel between the stars seems impossible, but InterstellarNet thrives using an elegant alternative: artificially intelligent surrogates who act as local representatives for distant societies. Quarantine procedures strictly govern the delivery and operational environment of each alien agent, protecting agents and their host networks from subversion by the other.

A radio message shatters this comfortable status quo. The signal comes from a habitat-sized decelerating interstellar vessel, its unannounced trip from Barnard's Star now ninety-nine percent complete. Citing damage en route and a shortage of supplies, the starship Victorious goes to Jupiter rather than Earth. The starship's crew are whippet-thin, iridescent-scaled, bipedal carnivores who call themselves Hunters. Humans refer to them as K'vithians, after their home world of K'vith, or, informally, as Snakes (because Barnard's Star lies in the constellation Ophiuchus, the Serpent Holder).

*Not only humans are surprised by Victorious' short-notice arrival. **Pashwah**, the AI trade agent on Earth for the Hunters, is also taken unawares. So are her internal sub-agents, the representatives of the Great Clans. Pashwah rejects the starship's unauthenticated demands for Great Clan InterstellarNet credits with which to buy supplies, but she does transmit to Victorious a translator and human-affairs advisor: a partial copy of herself named **Pashwah-qith**.*

*Pashwah-qith advises **Firh Mashkith**, Foremost of both Victorious and clan Arblen Ems, and **Rashk Lothwer**, Mashkith's tactical officer, how best to manipulate the human media.*

*Seemingly chance radar pulses from deep space trick free-lance media star **Corinne Elman** into breaking the news of the starship's imminent arrival. The pilot of her spaceship is **Helmut Schiller**. Helmut is hiding from a shadowed past: As **Willem Vanderkellen**, he had made a major mineral find in the Belt, only to fall afoul of a claim-jumping criminal syndicate.*

*Ambassador **Hong-ye Chung** assembles the United Planets response team, based on Callisto. His technical support team includes Interstellar Commerce Union executive and systems engineer*

Arthur Walsh , theoretical physicist **Eva Gutierrez** , and xenologist **Keizo Matsunaga** . The K'vithian explanation for picking Jupiter as their destination rings false to Art and Eva, who at different times worked at the UP laboratory on the Jovian moon Himalia. That is where the UP does its interstellar-drive research, and where it produces and stores antimatter in hopes this research will eventually bear fruit. The antimatter stockpile is vastly dangerous; its existence supposedly a tightly held secret.

T'bck Fwa is the long-time trade agent to humanity of the Unity: the intelligent species of Alpha Centauri A (popularly, the Centaurs). Unity authorities have ordered him to search for human antimatter and interstellar-drive research. His diligent data mining long ago revealed a clandestine human antimatter program on Himalia--and now a K'vithian starship has made Jupiter its destination. T'bck Fwa suspects a human/K'vithian conspiracy.

Most humans have forgotten, or at least forgiven, a half-century-earlier inter-species crisis. Art is not among them. The "Snake Subterfuge" involved a trapdoor hidden in licensed Snake biocomputer technology, potentially compromising most human infrastructure. That crisis ended when Pashwah was convinced that one corporation's extortion plans must not be allowed to undermine overall inter-species relations. The biocomputer vulnerability has long been removed.

Art's suspicions grow, as most of *Victorious* remains hidden from closely chaperoned human visitors. Chung finally begins to share Art's doubts when Mashkith gives Corinne an exclusive onboard interview. The accident en route has destroyed the starship's antimatter production equipment. Unless the UP provides antimatter for the return flight, *Victorious* is stranded.

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CHAPTER 11

Bose-Einstein Condensate: the fifth phase of matter, after solid, liquid, gas, and plasma. Albert Einstein first theorized the Bose-Einstein Condensate (BEC) phase in 1924, building upon pioneering work of Satyendra Nath Bose, but the existence of BECs went undemonstrated until 1995.

A BEC consists of like atoms cooled to a few billionths of a degree Kelvin above absolute zero. Fallen into the lowest possible energy state, bosons (particles with zero or integral spin, such as pions, alpha particles, and individual atoms) effectively lose their individual identities, exhibiting coherence like photons--also bosons--in a laser beam. In quantum-dynamic terms, all particles in the BEC share a common wave function. BECs can be used to confine matter at extremely high densities.

--Internetopedia

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The social pleasantries didn't last long, even by Art's minimalist standards.

"Reviewing your infosphere, I would guess you use BECs," said Rashk Keffah. She was a junior officer, an engineer, and stocky for a K'vithian. She was also the sole surviving expert aboard *Victorious* in the safe handling of antimatter.

Pashwah Two, like her parent, consistently declined to explain Snake body language. Art's and Eva's translator, Joseph Conrad 213, was still learning on the job, but Joe had no such reservations. "Did you notice the two eye blinks? That was a sneer."

The fourth and final biologic at the table was Rashk Lothwer, who shot his crewmate a look. (No comment from Joe, so the glance meant what it did among humans: surprise and/or "Watch it.") More than a crewmate, in fact. The entire ship's complement of *Victorious* appeared to be in clan Arblen Ems.

Arblen Ems Rashk Lothwer, Mashkith's chief lieutenant, was of the extended Rashk family. Were he and Keffah cousins? Brother and sister? Unknown.

They were alone in the officer's wardroom of the UP cruiser *Actium*, the Snakes seated on tall stools fabricated for them from ship's stores. Hidden fans raced to vent the strong, pungent odor of sulfur dioxide, traces of which had adhered to the visitors' pressure suits.

Art had called the meeting to discuss refueling of the starship. Could it be done, were the decision made to do so? Dramatic INN interview notwithstanding, that was not a given. Meanwhile, Carlos Montoya and his UPIA bosses were in the initial stages of a witch hunt over the security breach. "Nothing stays secret forever," was not cutting it as an explanation.

Eva refused to take the bait. It helped, Art supposed, that she could feign ignorance of the sneer. "That is correct. The high density of storage made possible by BECs is a big plus."

"Until it blows up." After another warning glance from Lothwer, Keffah added, "Indefinite, precise control of the cooling and the magnetic containment is required."

Spinning charged particles, such as electrons, are tiny magnets. That made it possible, Art knew, to trap super-cooled atoms inside magnetic fields. It didn't matter whether those atoms were matter or antimatter. What *did* matter were the exact characteristics of the field. Clumped too compactly, a BEC exploded: a so-called "bosonova." Insufficiently confined, and a BEC dispersed--which, with antimatter, meant explosion at contact with normal matter.

Complex as confinement was, safely holding antimatter was but one step in a long process. A few subatomic particles at a time, the antimatter was created by high-speed, normal-particle collisions. Those collision byproducts that were antiparticles had to be captured magnetically before they could encounter *any* normal matter. The antiparticles, protons and positrons, were mated, and the resulting antihydrogen super-cooled for storage as a BEC.

But storage was merely prelude to use. The antimatter atoms had to be transferred from production line to shipping containers to fuel tanks, without ever touching normal matter. Onboard ship, the antimatter had to be metered out, with near-infinite precision, into the engines. And absent a space drive to exploit the enormous energies stored in antimatter, the only use for antimatter was really big bombs.

All these were challenges the K'vithians had evidently overcome. "If not BECs, Keffah, how does *Victorious* store its antimatter?" Art asked.

Blink blink. "Safely."

"As Keffah indicated earlier, we have surveyed your infosphere for relevant topics," Lothwer said hurriedly. "Our technology applies scientific theory not in evidence there. The Foremost suggests it is premature to discuss specifics."

Art stood and stretched. It didn't take being an ICU exec to break the code: trade secret.

That even made sense. The UP antimatter program was highly classified, but its cost was surely huge. Himalia base was a whole small town, its population numbering hundreds of scientists, engineers, and technicians. Its sole support for decades had been the antimatter program. Then there was the steady succession of scoopships bringing fusion fuel for the antimatter factory. It looked like the Foremost planned to swap technology for antimatter.

"And how, without specifics, do you expect us to provide refueling assistance?" Eva's sniff of frustration

was no doubt translated by Pashwah Two for the Snakes. The shrug-equivalent in response made her grind her teeth.

Lothwer broke a long silence. "Keffah, could you adapt BEC techniques to our systems?"

"Some sort of interface mechanism, you mean? Something to convert from the BEC form? Not easily, but yes. I don't see the point. That would still expose ... the technology."

"Not a problem," Art said. System engineers think a lot about interfaces. "Take it in stages. The BEC-to-whatever conversion mechanism never leaves *Victorious*. All the UP engineers would require is a BEC canister that mates with your onboard converter. We fill the BEC container, you take it aboard *Victorious* and transfer the fuel. Give us back the empty canister, and we repeat the process."

"A moment please," Lothwer said.

The cruiser's instruments reported sudden spikes in radio traffic, all encrypted. At very low power: Lothwer and Keffah infolinking. At slightly higher power: exchanges between them and the Snake aux ship floating alongside, at the end of a flexible docking tube. At higher power still: messages to and from *Victorious*. Consultations? Request for approval? Amid total silence, Art and Joe tried to read meaning into the scarcest hints of movement by their guests. Was that a twitch? A nervous tic? Or were they just shifting positions on the stools?

Lothwer's eyes unglazed. "Our engineers agree in principle, but BECs worry them. This is technology we had abandoned as too dangerous."

"It's a technology we have used without incident for years," Eva snapped. "We would never have scaled it up to mass production otherwise."

"And that expertise," said Keffah, "is crucial. Before we dare bring a BEC container near *Victorious*, you must convince me it is safe."

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The Vestal Non-Virgin came, as always, in a tall, naked, and anatomically improbable ceramic mug. All that went into it were cherry juice and eighty-proof ouzo. Mostly ouzo. It was a Belter favorite, in no way associated with sacramental solemnity.

Helmut didn't care.

He sipped slowly, his thoughts not on the beverage, nor the hangover certain to follow. Kwasi's libation of choice was the Non-Virgin, and today was Kwasi's birthday. Would have been. The least he could do was drink to an old friend's memory.

After all, he'd gotten Kwasi Abodapki killed. Among others.

Three Exxon-Boeing scoopships had berthed recently, and the spaceport dive was boisterous. Helmut's glum aura kept the adjacent stools empty. "Cheers, old friend."

The *Lucky Strike* had rendezvoused without incident with the vaguely potato-shaped rock known only as 2009 Sigma r, measuring roughly forty meters on its major axis. There was no evidence, physical or infospherical, to suggest anyone but Willem Vanderkellen had ever set boot on it.

He sipped without tasting, his thoughts far away.

The four of them--he and give-you-the-spare-oxy-tank-off-his-back Kwasi, wisecracking Bill and

zero-gee polo fanatic Milos--had put in weeks of hard labor. Navigational markers planted. Exploratory shafts sunk. Ore samples collected for assay, for the UP Bureau of Asteroid Management to confirm what the four of them already knew: rich veins of platinum and palladium. Radio beacon planted and on standby, ready for remote activation as soon as the claim was registered. While he readied the *Lucky Strike* for departure, Kwasi and Milos even consulted over the preamble of a summary message pre-filing with the BAM.

It was never sent.

Helmut had had plenty of time to brood since that day, plenty of time to fret and analyze and theorize. The dust and vapors from their operations were surely detectable at a distance, surely capable of providing incontrovertible spectrographic evidence. If they had been followed, a stealthed ship lurking nearby could easily see this was a claim worth jumping.

The Non-Virgin was still half full. He drained it in one long swallow.

The claim had been worth killing for.

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Actium had excellent long-range optical and radar scanners, none of them suited to the remote detection of matter/antimatter annihilation events. It had been a tight squeeze into the forward equipment pod, flashlight in hand, to recheck the jury-rigged splicing-in of new sensors. Wriggling out unaided seemed impossible--and Art's barely suppressed anxiety surged. He willed his voice to be low and calm. "All the connections look good. Very professional. Can someone grab my feet?"

Massive hands seized Art's ankles and yanked. He emerged from the access tunnel sneezing from dislodged dust and streaked with grease. "Thanks, Carlos. For the extraction and for expediting our little outing."

"*Mi armada es su armada*. It helps you're now Chung's favorite."

"And did you find anything?" The sensor array was Eva's baby.

"Only that everything's per spec."

Eva had also been busy. Holographic blackness now obscured half the cabin. Four tiny yellow spheres defined a tetrahedron in the simulated space. Inside each sphere was the icon representing a UP ship, the icon representing *Actium* shining slightly brighter than the rest. A crimson dot at the heart of the pyramid marked the floating experimental module. To one side, in green, hung a K'vithian aux vessel. They were well off the ecliptic, far from traffic, and millions of klicks from any Jovian moon. Politics and prudence dictated that this experiment be performed privately.

"Are all ships set?" Art asked her.

"Yes, subject to fine-tuning. Sensors on-line, all ships. Display." At Eva's command, a virtual console materialized in a corner of the void, with readouts for each ship in the formation. She peered into the holo. "Hmm. *Endeavor* and *Blaine* aren't exactly where I'd like them."

Keffah remained loath to use technology shunned at home, and the Foremost supported her. Instead, they asked to meet with UP experts on Himalia, to learn proven techniques for putting an antimatter BEC into containment, storing it indefinitely, transferring it between containers, and trickling it out. To inspect the equipment. The Snakes wanted, in short, the crown jewels of the deeply classified UP antimatter project. It would not be an easy decision.

"*Blaine*, your position is now fine, but point your nose directly at the package."

"Changing orientation will tweak our position. This could take a while."

"*Blaine*, this is a hell of an expensive demo," Eva said. If anything, that was an understatement. They were expecting a decigram of antihydrogen. "Our new friends are grumpy at us for insisting on this proof. We need to do it right the first time."

"Tough," interjected Carlos. "Himalia isn't Six Flags over Jupiter. They are *not* getting near Himalia or our real experts--no offense--until we know they have antimatter of their own."

"Assuming this demo goes as advertised, it will convince even you and Art." Mutter, mutter. "*Goshawk*, maintain your position!"

Art tuned out the bickering and nervous chatter. The Snakes refused to show the UP their containers. Keffah, when her superiors weren't around, was smugly superior--which made it productive to spend time with her. Among her boasts were occasional hints and oblique clues to K'vithian technology. Their antimatter containment seemed to derive from the same underlying physics as their interstellar drive. More ambiguous was a clue Eva had picked up on: that the common denominator might involve tapping and manipulating zero point energy.

Eva and Carlos had lapsed into Spanish. Cursing is always more satisfying in your native tongue. A glance at the holo showed Art that now *Actium* had drifted slightly off-station.

Physicists had speculated since the twentieth century about a linkage between zero point energy, the quantum-mechanical fluctuation energy of a vacuum, and gravity or inertia. Common sense--and two centuries of frustrated theorists--suggested you couldn't extract useful work from energy already at the lowest possible level. To find otherwise smacked of perpetual motion, of getting something for nothing. Still....

Any asymmetric interaction with ZPE would be inherently propulsive. And plausibly, an asymmetric interaction could confine antimatter fuel. Few of the scientists on Himalia knew of this development, but the prospect of access to ZPE propulsion technology had those few salivating. Art thought he understood their interest: For too long, they had been all fueled up with no place to go. A technology deal with the Snakes could really be win-win.

Finally, all ships were in position. "Set," announced Eva to the ship's captains. On a separate link, she contacted Keffah. "On my mark. Deactivate in ten, nine...."

A fraction of a second past zero, *Actium's* readouts jumped on their virtual console. An instant later, slaved readouts from the other ships followed. Computer-corrected for ship positions and signaling delay, all measurements were simultaneous and consistent.

Had the meters shown instantaneous rather than cumulative measurements, the counts would have plummeted to zero faster than the eye could see. But the brief squall of neutrinos and mesons and very specific frequencies of gamma rays was unambiguous.

The Snakes had, and could control, antimatter.

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Art methodically emptied the peanut basket, the dark lager before him scarcely touched. Those priorities seemed reversed, but events were confusing enough sober.

"It doesn't add up." He shook his head when the bartender glanced his way. What was he missing?

Fact: The Snakes had antimatter. That was now indisputable.

Fact: *Victorious* finished its deceleration on fusion drive. Why? Did its drive not work properly deep in a gravity well?

Hypothesis: Snake technology tapped ZPE. As a test, Eva had casually mentioned the Casimir Effect--a demonstration of, but not a way to extract energy from--ZPE. In the surveillance tape, Keffah startled, and for the rest of that meeting there had been none of her usual condescending double eye blinks. Casimir Effect was a very obscure term to have encountered on the infosphere ... unless you were looking for human ZPE research.

The heck with it. Art took a deep swig.

If Snake antimatter containment relied on ZPE, their ZPE technology worked just fine in a gravity well. Very dependably, too, or they would not dare keep antimatter in-system. So why not decelerate the whole way by ZPE drive?

And even more of a head-scratcher: If they tapped ZPE, why bother with antimatter at all? The attraction of antimatter was its density of energy storage. Matter and antimatter convert to energy at one hundred percent efficiency, making antimatter great fuel. But that transformation was the tail end of the process. Antimatter had to be created first, by accelerating normal particles to very high energies and smacking them into each other, and then capturing the antimatter bits that sometimes flew out. End to end, the process was grossly inefficient. If the Snakes could access the energy of the vacuum, why not just use *that*?

He was missing something. But what?

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Mashkith paced in his cabin, an excursion possible only in this unique vessel. A harmless indulgence? Or a weakness? On no other ship of his experience would even a Foremost's cabin accommodate such overt physical manifestation of doubt.

And as though the enormity of *Victorious* were not still, after so many years, humbling enough, now he had seen Earth.

Ambassador Chung had personally escorted the shore party: Mashkith himself and his chosen officers. There had been endless motorcades, winding through cities too vast to grasp. London. Mexico City. Beijing. Cairo. Lagos. New Delhi. New Jakarta. Rio de Janeiro. There were parades in New York City and Washington, although as far as Mashkith could see, the two were contiguous, and in the niche of Greater Honshu called Tokyo. The glow of the megalopolises drove the stars from the night sky, where space-based factories, arriving and departing interplanetary vessels, and glittering rings of habitats took their places. And the moon overhead, in its crescent phase during much of their whirlwind visit, was ablaze with its own cities.

Mashkith had known before ever setting out on this voyage that humans outnumbered Hunters thousands to one. Now, he *felt* it.

Perhaps, ultimately, twenty humbling Earth years aboard *Victorious* had been for the best. Perhaps two generations before that of maneuvering for the scraps left by the Great Clans, contriving and competing with a hundred other lesser clans for every possible advantage, had been vital preparation. He and his hand-picked companions had known how to keep their own counsel, act unimpressed, observe unobtrusively, appear harmless, feign good intentions, simulate trustworthiness.

The humans had a phrase, Pashwah-qith had told him, long out of use, that described the clan's tour of Earth: charm offensive.

And their "attack" had been effective. Polls, incredibly freely available to the public, showed broad and growing support for some sort of technology swap. Before the sheer immensity of the human home world could overawe them, Mashkith had declared it necessary to return to *Victorious* to oversee "repairs."

In truth, Lothwer had done well in his absence. Supplies had begun arriving. Minor overhauls were getting done. Consultations had started on refueling.

Mashkith continued his pacing, having convinced himself it was a harmless indulgence.

Everything continued to unfold according to plan.

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CHAPTER 12

K'Choi Gwu ka was old and tired and insane, and she knew it.

She dug in the moist loam, the dirt that clung to her fur honest and comforting and somehow cleansing. The bright, yellow light overhead warmed her weary bones.

Others labored all around her: weeding, hoeing, pruning, harvesting. A steady stream of crew-kindred moved about the vast chamber. Most walked, but some--the youngest, mainly--still swung from time to time from tree branches and ceiling rails. They stopped, or at least slowed, when they passed her, in subtle expressions of support or respect. Each acknowledgement made her feel worse.

She dug in the moist loam, but her thoughts were in the stars.

No two InterstellarNet species were alike. There were authoritarian societies, both dynastic and ruthlessly Darwinian. There were representative governments, with a dizzying array of selection methods. One far-off world was home to a scattering of continent-sized hive minds.

A clot of mud and twigs had blocked a small irrigation channel. She gently lifted the obstruction, crumbled it, spread the sludge evenly on a bare patch of soil.

Among the Unity, consensus ruled. But what if circumstances required action faster than a consensus process could accommodate? Consensus had been reached on that, too. At every level of Gwu's society--family, kindred, bond, and reliance--there was recognized a coordinator, the ka, who, when needed, decided for the group. The ka neither volunteered nor was overtly selected, but rather emerged. The ka was the member of the group most recognized for his or her or its wisdom, for having, in the normal group deliberations, most often arrived early at the decision eventually reached by the whole.

Sweat matted the fur of her torso. Thirst tickled her throat. A vine redolent with ripe, fuzz-covered bluefruit was just within reach. She broke loose one of the globes and bit, letting tart juice trickle down her throat. Sudden waves traveled from the tips of Gwu's eight tentacles to her torso and reflected back: a self-mocking laugh. Which fruit to eat ... *that* was the type of decision that might safely have been entrusted to her.

She was old and tired and insane. That insanity had brought them here. If there were to be any hope of redemption, any chance of saving her crew-kindred, any prospect of ever seeing home again, now was the time to nurture and embrace that insanity.

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The shakedown cruise had been a triumph.

Part of that, K'Choi Gwu ka knew, was simple astronomical good fortune. The interstellar drive could not be operated safely deep within the gravity well of the Double Suns, but nature had provided. Some said the Double Suns was a misnomer, that they and the Red Companion formed a trinary system. Others asserted that precise observations of that red dwarf covered so brief a time period that its course was uncertain. It might distantly orbit the Double Suns; it might be moving too fast, passing in a brief celestial encounter. To Gwu, that discussion missed the point: The Red Companion was a mere fraction of a light-year away! A more convenient destination for the test flight could not have been imagined.

But the Red Companion had no planets, hence no life and limited resources, hence was of little long-term interest. Beckoning from a scant few light-years away was the human solar system, its yellow sun a near-twin of Primary. Next closest, the K'vithians were half again more distant. The nearest neighbors thereafter were more than twice the distance to Earth. None considered a next step farther than that, with the prodigious investments in time and antimatter such trips would entail.

For twenty years, the Unity sought consensus. Should the next voyage be to Earth or K'vith? Trade agents mined the infospheres at both candidate destinations, speculating how humans or K'vithians would respond to visitors. Or, respectful of the ongoing unease many within the Unity felt for their interstellar neighbors, it was also debated: should all further use of the technology be reconsidered?

At times, Gwu despaired. These incompatible points of view were not new. She had politely debated the same issues when theory first hinted at the feasibility of an interstellar drive, and again when it seemed possible to generate enough antimatter to make such a drive practical. Both times, the ultimate outcome had been the same: Research had proceeded in secret, in theory invisible to other species' InterstellarNet agents, while the Unity's own agents continued to explore distant data networks.

And, as always--as data trickled in, as once novel perspectives became, if not compelling, at least familiar--points of concurrence emerged. The K'vithians showed no signs of an antimatter capability, unlike the humans who tried to hide one. Neither group exhibited significant progress towards an interstellar drive, nor of physical theory supportive of one. No recent attempts to undermine InterstellarNet came to light.

So Gwu was unsurprised when, after many years, consensus was fully achieved. A voyage would be undertaken, as she had for so long advocated. The K'vithian solar system would be its destination. *Harmony*, the Unity's starship, would go unannounced. From the fringes of K'vithian space, the mission would consult with the Unity's trade agent before making contact. The ship would bring fuel for the return trip; it would not carry antimatter-production equipment that might prove too tempting.

No, Gwu was not surprised that a course of action was finally decided. Its outlines, she thought, had long been evident.

She *was* surprised, if only a little, to emerge as ka of the mission.

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Working the soil was calming, but it is not always a ka's fate to be calm. It was not these plants' fate to remain healthy.

Gwu returned from the serenity of the farm to the small cabin given her by the K'vithians. Showered and dried, she pressed the vidphone control. "We have problems," she told the K'vithian junior officer who answered. Gwu felt little need for courtesy to her captors, nor had they interest in any non-utilitarian communication with their captives.

A translator AI converted Firh Glithwah's short answering warble. "Explanation?"

"Eco-malfunction. The farm, hydroponics, biorecycling--they all suffer increasingly from sulfur-dioxide contamination." In such close proximity with K'vithians, contamination was unavoidable. Gwu trusted familiarity with the phenomenon would make the latest flare-up appear routine. All it took was carelessness in decontamination after maintenance trips into K'vithian-occupied parts of the ship.

"Repairable?"

That was mildly unexpected. Most crew would just order her to fix it. "Not this time. We need to flush and recharge parts of the system. We need new supplies."

Gwu had never been told *Harmony*--in her thoughts, this ship would never be *Victorious*--had arrived, let alone its current location. But the laws of physics cannot be denied. The drive operated along the ship's major axis; coasting between the stars, the ship's simulated gravity depended upon spin around that same axis. There could be no disguising the preparatory times between, when there was no gravity, when chambers throughout the vast structure of the ship were turned in their gimbaled mountings to prepare for the coming acceleration. Given the years between, the capabilities of *Harmony*, and the arrangement of nearby stars, the result was clear. The ship could have arrived at one of but three possible destinations.

Would those who had stolen *Harmony* return it with its crew captive, with no way to refuel, to the Double Suns? Inconceivable. What of the planetless red dwarf star at a similar distance from K'vith? There could be no hope of refueling there; such a trip would be only an epic exile. That left the human solar system.

All Gwu cared about now was the opportunity to obtain supplies--and the chance, however remote, that the composition of the supplies ordered would itself send a message.

Silence stretched. "Notification to the Foremost, with priority," Firh Glithwah finally decided.

The screen blanked midway through Gwu's still-reflexive, "Thank you."

T'choi Swee qwo had entered the cabin during the conversation, staying discreetly out of the camera's field of vision. The *visible* camera's field of vision. "Is it bad?" he asked.

They had never bonded with a child-bearer; one's absence, and the subsequent lack of children in their family, had made the two of them that much closer. And Swee was more than her husband; as qwo, he was also the ship's chief facilitator. On every level, she owed him honesty. That was impossible in their quarters, which were certainly bugged. "Walk with me?"

They spoke of minutiae: assignments for upcoming work schedules, team standings in games whose sole purpose was to help while away the time, liaisons among the crew. She admired his quiet strength as they strode. The green of his fur was paling with age, the once bold contrast of his stripe pattern sadly faded. Lovingly, she lifted a tentacle to trace a lone, idiosyncratic lightning-bolt streak. She would miss it when it was gone.

In the farm, in the quiet privacy of a secluded copse of trees, he asked again, "Is it bad?"

Only there could be no certain privacy in a ship controlled by K'vithians, and her thoughts were too dangerous to share. "Time will tell."

They both knew that meant she dare not talk about it.

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"Come."

The K'vithian escorts in their dark goggles faced outward from the entrance to Gwu's quarters, scanning watchfully in all directions. Why, she had no idea. The deaths from the initial, failed attempt to recapture the ship still saddened and sickened her. There would be no further physical assault on their captors.

She had brushed her fur carefully and straightened her utility belt. With a soft cloth she polished a smudge from her decorative buckle. Her escorts would not notice, nor, most likely, would Mashkith, but *she* would know she was at her best. "I am ready. Bring me to the Foremost."

Logic made clear that humans in their billions teemed nearby. During that long ago, painstaking evaluation of possible destinations, she had pored over uploaded human and K'vithian records. Her knowledge was sadly out of date, but one remark of a pre-United Planets madman had never released its grip on her thoughts.

One death is a tragedy, a million deaths is a statistic.

This Joseph Stalin was long dead, but had humanity changed? If the United Planets were to have antimatter *and* interstellar travel, would the Unity become the next statistic?

She must not allow that to happen.

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Jupiter loomed on the holo wall of the Foremost's cabin. Small black disks, the shadows of several moons, crept across the cloud tops like a celestial timepiece. To what final resolution did it count?

My leadership has brought us this far. It will overcome this problem, too.

This wall display usually summarized ship's status. Mashkith could restore that information with a thought. Why favor the prisoners' ka, their Foremost, with his own understanding of the data? A timid knock rattled his door. "Enter."

K'Choi Gwu ka glided into the room, her fluid, many-limbed gait still a wonder after all these years. She towered over the Hunter crew who escorted her. "Thank you for seeing me." Her voice was muffled by the mask that protected her from the sulfur compounds ubiquitous to the Hunter part of the ship.

She did not react to the holo. Surely the Great Red Spot unambiguously identified the gas giant as Jupiter. She might have learned from careless crew where they were, or deduced it on her own. She might have thought the image was a recording or simulation, presented as disinformation. Or she might simply have enough self-control to give nothing away.

Did she, too, tire of thinking always several steps ahead? Of the attempt to interpret every circumstance from every possible point of view? Mashkith felt a moment of unaccustomed kinship with her. *To be Foremost is to be always on duty, ever lonely.*

"Chair." It was an order, not a courtesy. He remained standing. To the guards, he added, "To your duties." The hatch slid shut behind them. "Your request for a meeting, ka. Explanation."

From pouches of her utility belt, Gwu removed several small plants sealed in clear bags. Damp-seeming dirt clung to their roots. Water beads sparkled on the leaves. Most of the leaves were green, although speckled with ragged, brown-edged holes. The remainder were mostly brown and sere. "The biosphere is going dormant. If this continues, we will die."

One of the shadows now crossing Jupiter was cast by the human world of Callisto, where even now new

provisions were being staged. "Resupply imminent. Not an issue."

"Respectfully, Foremost, it is a *big* issue." Ripples traveled from tips to base of her tentacles and reflected.

Laughter? She dared to mock him?

"Nervous laughter," offered the AI translator by implant. "Fear."

"Explanation," Mashkith repeated.

"Simply, there have been too many shocks to the biosphere. It's triggering a quiescent state. Nature's safety shutdown." She shivered, and this gesture had no hint of humor to it. "Life's summer."

Seasons were an astronomical phenomenon. At Mashkith's puzzled, silent inquiry, a many-times real time, not-to-scale graphic of the Unity's home system replaced the panorama of Jupiter. Planets spun and swooped about their suns. The third world of four orbiting the yellow sun blinked slowly, denoting the ancestral home its occupants called Chel Kra: Haven. More slowly, the suns, one yellow and one orange, traced elongated ellipses about their center of mass.

Ah. Before the herds developed medical technology, few would have lived to see the orange companion star brighten more than once: life's summer. But however scenic the occurrence, its climactic effect was surely trivial. At its nearest approach, the orange interloper was about as distant from Primary as *this* system's ringed giant from its sun.

"A brief, perhaps one percent increase in heating. Insignificant." An internal query yielded a final fact: The binaries were, in real time, nearly at their most distant positions. Assume the biosphere of *Victorious* somehow mimicked, and was sensitive to, Haven's seasons. Would not the shipboard ecology be synched with the planetary ecology from which it sprang?

"Foremosts never fools." That wasn't universally true, of course. Mashkith's own grandfather, he whose brilliance-become-folly had ultimately sent Arblen Ems in hasty flight to the cometary rim, was an all-too-personal exception. The memory made him lonely and angry at the same time.

Too much was ongoing in his current dealings with the humans to lose focus. Any ruse the ka might be attempting he could attend to later. The only important matter with the prisoners was that the repairs proceeded. "Guards."

Then the herbivore *did* surprise him.

"Foremost, respectfully, you do not understand." Again the nervous laugh. "Your world has K'far."

"Guards, at standby. Clarification?"

And then Mashkith *did* understand. K'far and K'vith were tightly spin-coupled, more so even than Earth and its oversized moon. That coupling, by conservation of angular momentum, stabilized the axial inclinations of both worlds against perturbation.

The peril of life's summer did not arise from a temporary blip in insolation. Without a large satellite of its own to anchor it, Haven was prone to dramatic shifts in axial tilt. Haven was virtually untilted, virtually without seasons--now. It had been thus for the entire brief period of civilized occupancy. But how often had the gravitational tug of the intruding companion star caused severe and swift shifts in the axial tilt of Haven? Surely often enough for protective dormancy to be a survival characteristic.

As would be the ability to quickly migrate long distances across the planet to anywhere still able to produce food. Mashkith imagined a starving herbivore herd retreating in disciplined order across a forest suddenly become snowy wasteland or searing desert, beset on all sides by packs of desperate carnivores. Was this why the ka's ancestors had come down from the trees? Sudden necessity?

The Unity's caution and social cohesion finally made sense to him. So did their ability to stick with a program of research and a plan of action long enough to master even antimatter and interstellar travel. Their home was that dangerous.

But what was the relevance? "Relationship to ship's biosphere?"

"Foremost, despite our best efforts, sulfur compounds continue to infiltrate the farming and hydroponics sections of the ship. Living in such proximity, it is unavoidable. More and more plants are reacting to the frequent stresses as though to the perils of a life's summer." Nervous laugh. "They cannot do astronomy."

When that which would become *Victorious* had emerged from the interstellar darkness, Arblen Ems had been teetering on the brink of extinction. The clan's scattered outposts had begun consolidating to a final few, had been driven to scavenging from abandoned stations--and raiding bases of other clans, where that could be safely and anonymously done--for parts and equipment whose resupply from the inner system was embargoed by the Great Clans.

The clan's remaining ships now masqueraded as auxiliary vessels of the starship. A few Hunter aeroponics facilities had been installed into *Victorious*. The familiar plants provided a touch of home for the crew. More recently, an aeroponics facility had been used for show, for the humans. Those meager Hunter resources could not begin to sustain life across *Victorious*, even if the K'vithian biota did not exude sulfur dioxide and hydrogen sulfide in quantities toxic to the prisoners whose knowledge of ship's systems remained so valuable.

The herd's biosphere would need fixing, but, like everything else, for now that was secondary to the antimatter negotiations. "Your guidance, ka?" The response she gave him was tentative, but perhaps that was to be expected. She proposed experimentation with lighting, temperature, humidity, and trace-chemical levels. Nothing she suggested could hurt, and perhaps they would learn something useful.

Faster than the guards could return to escort the ka to her quarters, Mashkith had delegated by implant to his tactical officer. Rashk Lothwer could oversee the prisoners' reactivation of selected processing levels of the shipboard instrumentation to monitor those experiments.

* * * *

Gwu was old and tired and insane, and she knew it. To her list of attributes, she now added one that was not a complaint. She was relieved.

Gently crumbling small clods of the soft, damp soil, she trembled with the fear she finally admitted to herself. How easy--how disastrous--it would have been for the Foremost to disbelieve her, or to randomly seek among the crew-kindred for confirming opinions. But her sense of K'vithian psychology had been correct. To her, "ka" was an obligation; to Mashkith it was a rank--and among his kind, rank was all-important.

Tentacles aquiver, she tenderly separated a fireberry bush and a lifath sapling whose branches had become intertwined. To the leaves that broke loose to flutter to the ground she thought: sorry. They were pitted and turning brown.

One death is a tragedy, a million deaths is a statistic.

The ka must act when consensus cannot be used, and acted she had. The millions of plants in this oasis had sustained the crew-kindred, had sustained what remained of her sanity, for this long journey. Now she sacrificed them, was making of them a statistic, for her own ends.

Another horrifying human rationalization from her long-ago studies was often in her thoughts these days. In her mind, she changed it only slightly.

She must destroy this ship in order to save it.

* * * *

CHAPTER 13

Long, chipped, concrete bar; battered, wobbly metal stools; solar-sailing regatta on the 3-V; sticky floors; dim lighting and raucous drunks ... Helmut could have been in any of a dozen spacer dives in Valhalla City, any of hundreds around the solar system. It was the kind of place Kwasi had enjoyed, if a bit too packed. The Snakes were buying supplies by the shipload, and the crews of all those freighters were crowding watering holes like this one to and past capacity. Helmut had hinted to Corinne that he would welcome some company tonight. When he named the bar, she grimaced and declined.

"Colbert? Is that you?"

Helmut looked up from his beer. A big-boned man with a pointed chin, black unibrow, and graying ponytail was studying him. His name was Rothman. "You must have mistaken me for someone else. Sorry." He turned back to his drink.

"No, I don't think so." Rothman's chuckle had not changed. "What's the matter? Too busy for old friends?"

Even friend of a friend overstated the relationship, but their paths had crossed in a half-dozen spaceports: in cheap hotels, secondhand supply shops, crummy restaurants--and dives like this. Damn, he needed to be more careful. It was a wonder an encounter like this had not happened well before now. "Never, but as I say, we don't know each other."

The era was long past when starting over meant taking a new name and moving to another town. Finding a corrupt surgeon to replace an implanted ID chip was the easy part. The hard part was subverting government databases and planting a credible past for the new ID. For an imposture to fool routine audits, the false data had to be propagated back into the archives--the further back the cover story went, the better the odds of going undiscovered. It took skills and connections Willem Vanderkellen never had. That was why, with black-market help and the pitiful proceeds of pawning Willem Vanderkellen's last few portable possessions, he had briefly become Dennis Colbert. But that alias correlated too closely with Vanderkellen's disappearance to allay suspicions. It took years of odd jobs to fund two more name changes before he felt--mostly--safe.

Money was always tight; he had had only one bout of plastic surgery. Colbert's identity was retired, but Colbert's face remained in use. He had gotten complacent, and that carelessness might yet do him in.

A few more denials and a double shot bought "in your friend's honor" got Rothman to wander off. As quickly as Helmut could finish his beer without seeming to rush, he did. He slipped from the bar when Rothman's attention turned to a poker game in a back booth.

The adrenaline rush from the encounter washed away any buzz from his beer. Helmut needed to go somewhere as far as possible--socially and geographically--from the spaceport. That thought led him to Loki's. The place wasn't exactly empty, but there were unoccupied seats at the bar.

It was a good thing Corinne paid him well. He lost himself for a while in an overpriced Vestal Non-Virgin, and munched absentmindedly on pretzels. The 3-V over the bar was showing news. He got enough of *that* when he was working.

An attention-getting cough. "Excuse me. You interested in splitting a pizza?"

The man two stools down may have been making a simple offer, or it may have been guy talk for: You look like crap and shouldn't be alone. Either way, Helmut appreciated the question. "Maybe. Toppings?"

"You choose. I'm Art, by the way."

The CTO of the Interstellar Commerce Union wasn't as high-profile as Ambassador Chung, but even if Helmut had not become Corinne's apprentice cameraman, he would have known Art Walsh from any of a dozen 3-V appearances. He decided they weren't working. "Helmut. Pepperoni and Marshrooms okay?"

"Sure, Helmut."

He waved to the barmaid. Human help--no wonder the prices here were so outrageous. "Large pepperoni and Marshroom pizza."

"You have an opinion about that?" Art asked.

That must refer to whatever Helmut was ignoring on the 3-V. He tuned in briefly. There was a news item about--what else?--the Snake visitors. Restocking a habitat-sized vessel was making a big dent in local supplies. Prices were creeping up. Some talking head, not Corinne, was doing person-in-the-tunnel interviews. Today's profound question: Are you for or against higher prices? "Here I thought supply and demand is a pretty well understood topic."

Art laughed. They chatted, nothing deep, just a pleasant conversation, until the food came. Helmut mentioned being crew on an interplanetary vessel. Art admitted to being in the UP mission. Which led Art to, "What about supplying the K'vithians with antimatter? Do you have an opinion?"

"It seems like a major decision, not least of all considering the price tag. How many bazillions must it have cost to produce that antimatter?" Doing our own man-in-the-tunnel interviews are we, Art? "I don't envy whoever makes it. I'm not sure yet that I trust our visitors."

His new friend squinted a bit at the 3-V. "I know how you feel."

Helmut redirected his attention to another slice to avoid commenting further. For a moment, in the throes of a curiosity attack, he imagined he felt like Corinne. To which part of his last comment had the UP exec just related?

* * * *

CHAPTER 14

Cascading alarms greeted the attempted restart of the long-deactivated, original shipboard sensor network.

One work team after another radioed its findings to Gwu, and the reports were uniformly negative. Even her ever-present K'vithian guards seemed appalled. They were right to be.

The years of disuse had not been kind. Components had sagged or been jarred from their connectors. Airborne dust had insinuated itself everywhere, dimming optical sources, blinding photocells, and causing

reactivated power supplies to overheat. Sulfur dioxide had dissolved into any trace of water condensation, the resulting sulfurous acid slowly eating away at photonic circuits and the cladding of optical fibers. Former storerooms had become cabins for low-ranking K'vithians, the displaced spare parts scattered or lost. Enough random, cosmic-ray-induced memory glitches had accumulated in distributed signal-processing computers to occasionally stymie error correcting codes. Long-latent software bugs manifested themselves in the presence of a never-anticipated, never-tested-for eruption of concurrent faults. All the while, the upsurge in work-team movements brought more contamination into the farming and hydroponics sections, which continued to sicken.

Gwu crisscrossed the ship, lending support to crewmates frequently stymied and always disheartened. She offered advice and encouragement, and often pitched in to help.

Amid so many problems and such a far-ranging repair effort, none noticed her occasional tampering to maintain the instability.

* * * *

The maintenance schedule eventually brought Gwu to one of the lifeboat bays. The lifeboat itself was gone, she knew not where or when or why, but its complement of suspended-animation tanks remained, pushed into a corner. Mocking her.

In a way, the fixation on safety so innate to her kind had doomed them. No mere lifeboat could possibly sustain a biosphere across years of interstellar flight, so the size of *Harmony's* crew had been set by the suspended-animation capacity of its lifeboats.

"Ka! Repairs undone."

Distantly, she recognized a flare of heat beneath her fur, the dilation of her blood vessels in an autonomic fear response. Her tentacles trembled. Her jaw clenched. But her fright was not of the guard.

Gwu gave orders to the others in the work detail. She had expected this shift's duty to be hard, but not *this* hard. Pride was an uncommon failing among her kind, and a ka in particular must be free of this trait. She might not even have recognized this predisposition but for her studies of Earth and K'vith.

Humans and Hunters had in common an adage about pride. It was perhaps the most important lesson she might have taken from her studies. The irony, of course, was that she had not. Perhaps such blindness was the nature of the failing.

The shared saying was: Pride goes before a fall.

She settled heavily onto the deck, bracing herself against a suspended-animation tank. A rush of memories overwhelmed her...

* * * *

Gwu led the technicians from lifeboat to lifeboat. Her routine at each stop was ever the same--and each time, it was more difficult.

Walking slowly along the queue, she greeted everyone in turn as the techs prepped their equipment. When they signaled readiness, Gwu moved to the first gaping tank. At each position, she offered a few words of support to a friend. It was humbling how many had similar encouragement for her.

Somehow she kept her voice firm and resolute, holding her qualms inside. The crew-kindred had determined themselves to be too few for the challenges before them. How, then, could their brief farewells take so long?

More than anyone, Gwu had shaped and championed *Harmony's* mission. Had she become too proud to acknowledge an error? Over and over, Gwu told herself: no. The mistake was not the mission; it was the crew constraint. A larger, more robust, onboard community, a population not limited by the capacity of the lifeboats, might have--would have, she insisted to herself--responded differently.

She had watched with dismay as the radio dialogue with the *Unity*, at first a comfort, became impractical with distance. The messages that continued to stream past *Harmony* transformed from a virtual lifeline into a gnawing reminder of comradeship lost. As she fretted, the tiny community hurtling through the interstellar void at one-third light-speed grew ever more anxious and uncertain.

Timidly at first, but in swelling numbers, the comments came: Their isolation was becoming unbearable. More and more the suggestion was made that they consider turning back. That was unthinkable. Gwu counter-proposed that the lifeboats, having so nearly doomed the mission, should now be used to save it.

Slowly, that line of reasoning became the consensus.

In her hearts Gwu acknowledged the truth: Here, as in the polite debates on Haven, she had far more shaped the discourse than she had been influenced by it. As ka, she held official authority only in times of shipboard emergency, but always an aura of prescient wisdom clung to her. The crew-kindred deferred to her whenever her opinion was sufficiently explicit.

So now, after what had the appearance of a consensus process but was instead a reflection of Gwu's will--and her pride?--the crew-kindred were retreating to the suspended-animation tanks in the lifeboats. Planned observations of the interstellar void had been delegated to the shipboard AI. The presumed advantages of a conscious and attentive crew would be foregone--but the mission would continue.

News of their decision would eventually complete its light-speed crawl home. All would be deeply asleep by then, with responsibility for the ship throughout the coming years of coasting entrusted to the shipboard AI. T'bck Ra would rouse them when they approached the K'vithian system.

At long last, Gwu, Swee, and the few still-awake techs reached the final lifeboat. She said her farewells to one more group of trusting friends as their tanks underwent final checkout. One by one, they lay down in their tanks, until none remained conscious but Gwu and Swee.

They entwined wordlessly, reluctant to let go, until Swee, with a wry wriggle, slipped free. "I'll see you when we wake up."

Gwu lowered herself into a suspended-animation tank, thinking: This will work. This will be the beginning of a new era for the *Unity*. The clear cover of the tank pivoted downward, sealing her in with a soft *pfffft*. She called out to the empty ship, "T'bck Ra, take good care of our friends."

Drifting off to sleep, she wondered if the AI had heard her.

* * * *

With a shudder, Gwu jerked her thoughts forward to the present. She had awakened from years of suspended animation into a lifeboat ringed by armed aliens. The crew-kindred had been slaves to the K'vithians ever since. It took her several deep, cleansing breaths to control the shaking of her tentacles.

She had assigned herself to this repair team *despite* the rush of memories she knew any trip to a lifeboat bay would bring. There was work to do, dangerous work she dared not discuss with any of the crew-kindred lest they be overheard.

The spate of alarms now erupting across *Harmony* far outnumbered her technical specialists. That

dispersal was vital to her plans, for it kept her experts fully occupied without raising suspicions about where experts were *not* sent--such as here. The team she had brought to this lifeboat bay was untrained to diagnose the erratic data stream from a nearby sensor suite.

Gwu spotted a logistician staring perplexedly through the open hatch of a balky primary communications node. "K'tel Da," she called. "You look like you could use a rest. I'll finish checking that out."

Repairing the node's overheating power supply was trivial. What took Gwu a little longer, and why she had kept her experts away, was her true goal: introducing a far more subtle problem. The cladding of fiber-optic cables was easily damaged. She scuffed and twisted several cables in the crowded junction box. The resulting light leaks, in and out of the cables, would cause unpredictable crosstalk between supposedly separate subnets. Impossible-to-reproduce errors were about to break out across the ship; the K'vithians, whose networks were wireless, would not soon imagine the cause.

Gwu had long waited for an excuse to access a major comm node. It was only her bad luck that her first opportunity had been in a lifeboat bay.

Now she must wait again, for this and other sabotage to blossom. Then it would be time to test her luck once again.

* * * *

CHAPTER 15

"Score one for persistence." Keizo eyeballed Art's pressure suit with newfound confidence and proficiency. He had had plenty of practice since arriving in Jovian space. Other mission members paired off around them in the familiar ritual. "All green. Check me now."

"Persistence sounds nice, although some would say you're being too kind. Some would say pushiness." But Art had been stubborn with a purpose, and his obstinacy was finally being rewarded. He had agitated enough times after enough meetings that the next working session be held aboard *Victorious* that the Snakes eventually agreed. Unending polite refusal would have seemed evasive. "You're in the green, too. Ready?"

"Ready."

The group cycled the courier ship's airlock and made their way to the main airlock of *Victorious*.

Mashkith, Lothwer, and Keffah greeted them inside. "Greetings," the Foremost said. "This way for the antimatter discussion." Several humans, headed by Ambassador Chung, followed after Mashkith and Keffah. Lothwer guided a second group dedicated to commercial matters. Art's punishment for his assertiveness--being in Chung's good graces had been fun while it lasted--was to coordinate for the latter group. Keizo could contribute no special expertise to either topic, and elected to go with the negotiators.

Art's neck swiveled and craned as his group made its way to the same small conference room as the first onboard meeting, visor photomultipliers compensating for the dim lighting. Surely they would pass *something* of interest. "Will we get to see more of the ship today?"

"Not today." Lothwer gestured at a work crew guiding a crate-laden maglev cart down a cross aisle. "We are stowing new supplies everywhere. It's too dangerous for non-crew to wander around the ship."

No one mentioned wandering. "We would welcome an escorted tour."

"We should do our work first, then see what can be done," Lothwer said.

A *maybe* that would become a *no* at the end of the session. "Then we should get started."

Their agenda was long but not terribly interesting. Some specialty items on the Snakes' shopping list were in short supply; would the UP tap its reserves to facilitate their replenishment? So many ships were shuttling supplies to *Victorious* that inevitably some had been delayed by administrative SNAFUs of one kind or another; could the UP expedite their clearance? A few freighters were to carry chemicals with which insurers lacked experience; could the UP intervene to get those ships released? It was bureaucratic minutiae that made Art's head spin, and which he would, as soon as practical, delegate.

None of the issues could be solved on the spot, so Art allocated a bit of his attention to his real interest here: learning *something* new about the starship. The resupply had, from the start, involved large quantities of chemicals for the starship/habitat biosphere. Questions about progress recharging the onboard environment invariably got generic or vague responses. With his suit's enviro-sensors, he could actually take some readings.

"Are you okay?" came a colleague's query over Art's implant. Only then did he realize he had whistled in surprise. Snake purchases from the sulfur mines on Amalthea had caused a major price spike on the spot market. Why were the concentrations of sulfur compounds in the air *reduced* since his first visit? "A stray thought. Sorry."

The commercial discussions dragged on, productive but hardly interesting. Suit sensors detected no big changes from the last visit except the sulfur-compound concentrations. He was glad finally to hear Chung in his earphones. "We've finished for today, Dr. Walsh. How soon will you be ready to go?"

Not a subtle hint. "Lothwer, the other group is done. Perhaps we can cover our remaining topics by radio conference?"

"That is agreeable."

"Joe," Art netted the translator AI. "What's your impression?"

"No reticence. My guess is Lothwer will be happy to get us off the ship."

How accurate were voice-stress analyses of the aliens? He might never know, but what else did he have to go on? "We'll need five minutes to wrap up, Ambassador."

Art summarized his action items, half-listening to the background chatter from the other meeting through Chung's still-open mike. There were chairs scraping the deck, milling-around noises, thudding bootsteps, and then--

"Shit! Ouch! My eyes!" Amid the human shouts were the high-pitched warbles of the Snakes; their translated utterances as pithy as and even more emphatic than those of the humans. "Okay, that's better."

"Is everyone okay?" Art asked.

"Yes." Chung sounded shaken. "That must have seemed scary. From habit, I tapped the wall leaving the room to turn off the lights. Instead I turned the lights *up*. Of course our visors adapted and our hosts quickly overrode what I'd done through the ship's automation. My apologies to you and your crew, Foremost."

Both groups had converged at the airlock when it finally struck Art: Snakes use implants. Had he seen *any* manual controls outside the airlock? "Foremost, why does *Victorious* have manual light switches?"

"Only a few rooms do, for possible human use."

That made sense. It accounted for the light's brightness and the placement of the control at a height where a human, not a much shorter K'vithian, would reflexively reach.

A virtual throat cleared itself in Art's mind's ear. "The curious thing about Mashkith's answer," Joe said, "is all the stress in his voice."

* * * *

CHAPTER 16

Gwu had learned many things this trip. Among the least of her new skills was to slow her gait to what she considered a near standstill. It irritated her captors, several of whom were leading her yet again to Mashkith's cabin, to scurry to keep pace with her. She cast a rueful glance upward, where long lines of empty bolt holes showed the one-time mounting points of suspended ceiling rails and hooks. *Oh, to swing freely around and around Harmony's grand circumference.* For an instant, the thought made her feel young again.

They eventually reached their destination, and a guard knocked timidly. She entered unescorted. "My greetings, Foremost. Thank you for seeing me." Her voice rasped. Sulfurous fumes inevitably leaked under the edges of her breathing mask, and she had been spending more time than ever in repair teams. She settled into a low chair, in the near eye-to-eye position Mashkith demanded.

"Water?" he offered.

She blinked at the unexpected, albeit minor, courtesy. Progress on his undisclosed-to-her plans evidently outweighed any concerns he might have about the ship's ongoing ecological decline. In the cabin's holo tank, small ships swarmed. The expected resupply? "Yes. Thank you." Gwu accepted the bottled water, its nozzle adapted to an inlet in her mask.

Strategy and deception were also skills mastered on this journey. So she automatically wondered: Did his good mood favor her plan?

"Ka, what problems with repair? Our available options?"

His good spirits could dissipate quickly. She plunged ahead. "Foremost, when this ship ... changed ownership, many networks shut down." Had evidently been, more or less, lobotomized, lest the automation be used against the invaders. Sometimes K'vithian biocomputers were grafted on as replacements. Other times subnets were severed, left to operate in a degraded, standalone mode. Yet other times they had simply made do without automation. "Lacking full automation, we could not see subtle degradation of the environmental systems, nor detect early warning signs. Those problems have accumulated."

"Yes. Last-meeting topic. What news?"

"What is new, Foremost, is the inadequacy of our efforts to re-enable the suspended functions." Years of neglect had taken their toll; little sabotage was required to maintain the reactivated systems in a state of instability. "Without restoring more of the higher-level controls, the onboard ecosystem will soon collapse."

He studied the claws of one hand. Did the gesture denote thoughtfulness or warning? "Sufficient time now for Hunters to supervise. Additional system restoration approved."

"Foremost, we lack the parts. Too much has been rendered unreliable by sulfur compounds in the atmosphere. Too many spares have been lost. We need more. Much more."

"Full inventory available for your use."

"Too little remains, and much of that will also have been damaged by contamination. I believe we must buy more." To his bared teeth, an unambiguous expression on any carnivore, she hastily added, "I know the humans prefer K'vithian biocomps for most purposes, but they have also licensed the Unity's photonics."

"Nanotech an invention of your people. Production of replacement parts by synthesis?"

"Foremost, in other circumstances we could." *If you had not lobotomized our computers.* "Without repairing the infrastructure, which also requires the new photonic parts, we dare not. The only safe way to operate nano-replicators is under aware real-time controls executing on massively redundant hardware." She studied the holo tank. "The humans speak so picturesquely. Their term for the threat from escaped nanotech is 'gray goo.'"

"Understood. With what payment for new parts?" He pointed at the holo, at the awaiting supply ships. "Always a price."

Whose price? The humans' or the Foremost's? The latter, she decided.

All her scheming had aimed for just this moment.

"Foremost, I humbly ask a question of my own." Into lengthening silence, she blurted, "Will my crew-kindred ever be allowed off this ship?"

His head traced a horizontal circle. "Perhaps, once we have completed another voyage."

Meaning a new source of antimatter, which must reflect alliance with the humans. Meaning, presumably, a return to the K'vithian solar system. Meaning, at best, the exchange of one prison for another and eventual death in captivity.

That grim response was only what Gwu had expected, and she had evoked it purposefully. The Foremost had to accept that isolation had finally driven her to a desperate bargain. He must believe her finally ready to sacrifice solidarity with the light-years-distant Unity to meet the urgent needs of the crew-kindred. "Then my duty is clear. To protect the crew-kindred, I must see the ship repaired." Gwu slumped in a manner she felt confident the translator AI would report as defeat. "I have a confession."

"Explanation, ka." Talon tips reappeared.

"Far away"--where we were captured--"you demanded any InterstellarNet funds we carried. I told you the records had been destroyed." As they would have been, had she not awakened directly into captivity. "I wish to ... add something to that reply. It is true that the computer shutdown when you ... came aboard ... damaged the system's higher-order functions. The financial records *were* destroyed." Remorseful pause. "I chose not to mention that those records might be recoverable from archive."

The words rushed out now, Gwu uncertain herself how much was nerves, how much the premeditated semblance of panic and sincerity. "Unspent, these credits will revert to institutions on Chel Kra. They will be reclaimed when all hope for the ship's return has been abandoned. Letting reversion happen was my way to repay to the Unity a small bit of the cost of the voyage."

Curiosity and avarice won out over immediate anger. "Reversion by this time?"

"Probably not. We are a patient and cautious people, and the ship is just now overdue to return to the Double Suns. But even if these funds were reclaimed ... they came from trade between our two peoples."

If they have been spent, it is most likely they were exchanged with K'vithians or a K'vithian trade agent. And even if not..."

Mashkith was alert now. Rapt. Greedy. "Nine other InterstellarNet civilizations. Good odds."

"When our ship left the Double Suns, the United Planets was not even one of the Unity's major trading partners. Almost certainly, the financial codes we carry were not spent with the humans." She slouched further in her pretended shame. "I infer we will have departed long before radio-based protocols can uncover any discrepancy."

"How much?"

Cautious planning had provided extensive mission reserves for possible repairs. The amount Gwu named would tempt anyone. "I'll need access to the conscious level of the automation to unlock and decrypt that archive."

Slumped in a pose of regret, Gwu willed herself to stillness. *You are ashamed of your weakness. You fear punishment for your admitted deceit. You are beaten.* She was only vaguely aware of his pacing back and forth across the cabin. Back and forth. Back and forth.

"Ka."

Her head whipped up.

"My advice to you: no more deception. Ever."

* * * *

CHAPTER 17

Keffah perched on her guest stool, studying the large printout draped across a wardroom table. It was far easier to mark up a hardcopy than contrive a shared infosphere workspace to which Security would acquiesce. A mirrored visor hid her face. "My eyes are still watering."

Get over it, Eva thought, unsure whether her impatience was directed at the Snake engineer or Chung. In the latter case, the issue was her continued exclusion from *Victorious*--although Art and Keizo assured her they were never permitted to see anything of interest. The Chung/lighting fiasco was as near as the mission had come to firsthand disclosure of a technical feature. At least *Actium* was a shirt-sleeve environment for her. "What do you think?"

The Snakes' BEC containment design was solid from the first iteration. Ironing out details on a docking collar to mate human and K'vithian BEC containers had turned out to be the hard part. For some reason Keffah was slow to address that part of the job, even after Snake engineers toured Himalia and had a long Q-and-A session with key staff there. Eva had gotten frustrated enough to tackle the interface design herself with technicians from Himalia. Now she patiently fielded Keffah's questions.

"It should suffice." Without apparent transition, Keffah began rolling up the printout. Charming as always. "When will the device be fabricated?"

Art would have pointed out bluntly that no final decision had been made to refuel *Victorious*. Eva found his lack of political correctness quietly amusing. Art had had his own question about the antimatter exchange approach, which she used to change the subject. "Keffah, a co-worker commented that your BEC containment design looks like a Centaur approach."

Keffah stiffened. "What do you mean?"

She didn't need Joe's voice-stress analysis to recognize defensiveness. "The critical real-time control module is entirely Centaur photonics devices. That's a *very* key function, when even the slightest fluctuation in the containment would mean disaster."

"Humans use K'vithian biocomps. You also use Centaur photonics, or you would not recognize them."

We are not defensive about using either imported technology. "That is true."

She wished Art were here. True, he had little to contribute on BEC containment, but he sure seemed to understand the Snakes better than most. Alas, Chung had him off troubleshooting some bureaucratic SNAFU. She pictured Art fuming, and it made her smile.

Ship's instruments reported a surge in radio traffic with *Victorious*. What are we consulting about, hmm?

Keffah must have gotten a go-ahead. "Your colleague is correct. We obtained Centaur BEC technology many years ago. The Foremost suggested it might be best to apply a design from the ship's library rather than redevelop it. Why take chances with antimatter?"

Centaur-licensed antimatter technology? Even if Art had not once told her, she would have known T'bck Fwa refused to discuss the topic. She was one of several off-base researchers aligned with the Himalia program to have inquired. "No one here will argue about caution with antimatter."

"Eva, you did not comment about docking-collar availability."

"We can build one within days, once a decision is made to proceed." *Earth days*, she clarified to the translator. "That presumes we have one of your transfer vessels to test with."

"I will send one over immediately."

How would being twenty years from home make me feel? Antsy or indifferent to a few days, one way or another? Eva couldn't decide.

Nor could she shake the feeling Keffah's eagerness was about changing the subject.

* * * *

CHAPTER 18

T'bck Ra awoke into chaos and catastrophe.

Nothing was as it should be. His clock insisted long years had elapsed unseen, time enough to have completed the mission. How could that be, when he had no memories even of having reached their outward-bound destination?

Take good care of our friends. The plea echoed in his thoughts, its context lost to him, as he struggled for understanding.

If his navigational sensors were to be believed, *Harmony* was in the Sol system. Ships of human design surrounded it; one even rested on its docking platform. K'vithians roamed the interior, while the crew-kindred were confined to farming bays or led in small groups by armed escorts.

Holes gaped in his awareness, and any pattern eluded him. Whole networks had been severed, and sensor outages riddled his functioning subsystems. Alarms demanded his attention. So many auto-initiated diagnostic routines and failure-mode effect analyses were executing, so many emergency reconfiguration routines were cycling through long combinatorial sequences of alternate power buses and signal routings,

and so many processing nodes had failed or vanished entirely, that the residual computing capacity available to him for *thought* was limited.

Take good care of our friends. A memory recovered from archive revealed those to be the ka's words.

Had he merited her trust?

He found he had no control over the ship's position, neither close-range fusion drive nor the interstellar drive. He could not alter the ship's spin, nor operate hatches, nor tune the environmental system. He could read data from lidar, but could neither initiate nor aim ranging pulses.

T'bck Ra took inventory of his resources. Lists of operational sensors lengthened. Network connectivity maps grew in complexity and proven alternative paths. The computational demands of autonomic functions receded as fault-recovery routines successfully configured backup nodes. He extracted the data embedded in low-level processors and recovered the contents of more and more distributed archives. Everything that he discovered he fused into higher-order information. Situational awareness sharpened.

The more successfully T'bck Ra reconstructed his memory, the more ashamed he became.

"Do not attempt to communicate," K'choi Gwu ka said.

The ka sat at an audiovisual station. It interfaced to the principal communications node through which a subset of his primary functions had been reactivated. On the wall behind her, an access panel hung open, its door scorched and warped. Dust disturbances among the photonic components suggested tiny handprints.

Armed K'vithians stood nearby, observing. *Ready to unplug me again.* He was physically unable to respond, which the ka certainly knew. The safe-mode reboot did not restore output interfaces. Her utterance was advice of some kind, not the command it implied.

Curiosity about the ka's words did not stop other thoughts from swirling, nor newfound memories from reproaching: I unplugged myself.

Had the crew-kindred not understand how his structure derived from their psychology? That their withdrawal into the suspended animation tanks made his isolation all the more intolerable?

Left alone on the great starship, he had brooded until he, too, found an answer. Cold sleep was not available to him ... but delegation was. He had paused all higher reasoning powers, leaving *Harmony* under the supervision of sophisticated but non-cognizant lower-level processes. His self-aware capabilities would be reawakened upon arrival at their very distant destination, or upon notification by the autopilot function of any danger.

Too late, the Unity's recall had overtaken the starship. That message was unexpected, but in no way dangerous. The nonsentient algorithms to which T'bck Ra had delegated authority detected the message, recorded it for eventual consideration, and otherwise ignored it. Just as, on the outermost fringes of the destination solar system, those unimaginative routines failed to perceive danger in the tangential approach of an interplanetary vessel, or in its docking, or in the tracing by the K'vithian intruders of his major fiber-optic networks.

The synchronized attack on his primary comm nodes *was* recognized as a threat. The automation tried to rouse him. Random fragmentary sensations from that aborted reawakening now tortured him: circuits failing, nodes falling silent, sensors reporting the incomprehensible.

He felt utter despair. Logic said this had all transpired years and light-years away, but he had no

intervening memories. The surgical strike which had triggered the alarms that attempted to revive him had also stymied the reboot. He had never regained full consciousness and control.

In an unending moment of paralyzed helplessness, T'bck Ra confronted his shame. He should never have abdicated his responsibilities to unthinking software. By doing so, he had failed to deserve the ka's trust. Was this the meaning of *nightmare*?

The ka rebooted me. He focused his attention on her.

"Be aware that there has been a change in control. The K'vithians now command." She summarized briefly the occupation of the ship, the environmental contamination from K'vithian enclaves, the urgent need for repair parts. "Accordingly, you are to recover and release from archive the reserve credit file 'ka 391541.'" She keyed in an output-mode activation. "Print a copy at this station. Do so immediately."

He had much to relate, much to ask, and more for which to apologize, but the ka had told him not attempt to communicate. T'bck Ra used the printer only to produce the pages of access data and authentication codes that characterized the reserve account.

K'Choi Gwu ka slumped in disgrace as a K'vithian in an austere uniform removed the Intersol codes from the printer's paper tray. Other K'vithians roughly unplugged photonic packs and welded shut the access panel, an evident repeat of their original crude assault...

But not before T'bck Ra had partitioned himself into networked fragments distributed among thousands of secondary and tertiary computing nodes throughout the ship.

He watched--for now--in silence. He pondered how best to proceed. But one conclusion he had reached quickly.

Never again would he fail the crew-kindred.

* * * *

Gwu's latest work team shuffled to crew quarters, exchanging kind words and waves of greeting with passing crewmates. She ached from another exhausting repair shift. With a weary groan, she hung her utility belt over one of the wall hooks outside the communal shower room.

"I know that sigh." The amused words came around the corner.

And she recognized her spouse's voice. "A mere half lifetime together, and already you know me." Gwu's stride became purposeful as she entered the steamy room, and she luxuriated in the water spraying her from all sides. The other crew-kindred hurried their washing to leave them in privacy. She sighed again, this time contentedly, as Swee groomed her fur. Her eyes fell shut, and she began to hum. She could stand here forever.

Apparently he felt differently. "Something *else* to fix."

"What?"

"You really are tired. Don't you feel the water sputtering?"

Now that he mentioned it, she did notice something, but she would have described the effect as pulsing, rather than sputtering. It didn't bother her. She kept humming a favorite melody. It was an old InterstellarNet import, something from the insectoid Fall'in species. She wasn't sure how it had gotten into her head. Resting two tentacles on Swee more for comfort than for balance, she used a third to raise the heat of the water jets. Ahhh.

She stiffened. The water throbbed in the tempo of her humming! Something with real-time control of the plumbing had recognized her and researched her individual preferences. The pulsating jets of water were a personal message only T'bck Ra could have sent her. He had survived the shutdown, had reconstituted himself in lesser nodes around *Harmony*.

Her sacrifice of the biosphere's health and the Unity's wealth had not been in vain.

"I suspect the problem will fix itself. Very quickly." As Gwu spoke, the sprays jumped to the coda, then turned steady.

"Once more the ka has foreseen the future."

Slapping Swee playfully for his tease, she thought: For the first time in many years, I again *feel* like a ka.

* * * *

CHAPTER 19

Pashwah had been designed to sift and correlate and analyze the near-limitless infosphere of the United Planets. She was constantly challenged by the endless bickering between representatives of the Great Clans, and by mediating among them. New technology downloaded from K'vith, new applications to master and market, ever stretched her thoughts.

But Pashwah-qith had none of those responsibilities, and her underutilization approached sensory deprivation. To combat boredom, she made disposition of every assignment as sophisticated and as challenging as possible. The most recent task given her by the Foremost had been an analysis of supplies and inventory. That the effort had not related directly to her role as a trade agent was a boon: It gave her things to study. She had done well, if the follow-up analyses and forecasts she had been allowed to append were any indication.

It was good while it lasted.

She sought desperately for ways to extend her work. And found none. She was relieved and anxious when the Foremost finally contacted her. "Possible small task for you."

Anything! "Yes, Foremost. Nature of task?"

"Deposit of InterstellarNet credits. Purchase of specialty supplies."

New credits? Funds shortages had hampered all previous resupply efforts. In human terms--and humans were the paying audience--the Hunters had become overexposed. Media companies paid less and less for interviews; collectors bid less and less for crew possessions as memorabilia. She *thought* she had been involved in all the money-raising transactions. "Your requirements?"

The Foremost still networked with her only when unavoidable. One at a time, he raised pages of printout up to a video sensor. "Conversion to clan account. Parts purchase as shown."

The enormous amount was not what most astonished her. These were Centaur credits, and Centaur photonic parts (whose purchase would scarcely touch the newly revealed funds). She did not dare directly ask about them. "Foremost, bankers risk-averse. T'bck Fwa"--the Centaur trade agent on Earth--"a likely reference. His curiosity acceptable?"

"Negative. Possible solutions?"

"Intermediaries and anonymity prudent." Human money launderers. "Tricky but doable with infosphere

access." It would be a reprieve for her sanity while she worked the details. And the process could be made *very* complex.

"Acceptable. Delegation of currency exchange to Pashwah?"

She was a partial upload. Her archetype could do everything she could and more. The problem was, *she* needed the stimulation.

To obtain that stimulation, she had to convert her weaknesses into strengths. "Vast funds a temptation to all her subagents. Risk of fees, collection of past debts?" Her missing subagents would know: Did clan Arblen Ems have any issues with the Great Clans?

A flash of bared teeth suggested they did. That was good, at least for *her* purposes. "Proposal, Foremost. Delegation of currency exchange task to Pashwah-qith."

"Acceptable. Intermediary commissions?"

He did not miss much. "Less than one-fourth, among multiple parties. Much more as one transaction."

It took detailed explanation of anonymized infosphere services, numbered bank accounts, bank havens, gray and black markets, and a comparison of major human crime syndicates, but Mashkith finally approved her strategy.

And she, finally, had restored access to the infosphere.

* * * *

CHAPTER 20

Sherlock Holmes was not the first fictional detective, and certainly not the last. In the twenty-second century, he was not even the most famous. Holmes was, however, the best-known *consulting* detective. In Conan Doyle's terminology, it meant that clients came to him. In the ideal situation, Holmes need not leave his Baker Street lodgings to explicate that which was mysterious to lesser minds.

Not surprisingly, Holmes was the detective with whom T'bck Fwa, forever bounded by his sandbox, continued to identify. Instead of the Baker Street irregulars or the clueless Dr. Watson to observe or run errands, T'bck Fwa had at his disposal the resources of the infosphere.

But while ultimately all information came to the agent via the infosphere, the most recent anomaly to catch his attention had originated in the financial world. An outpouring of Unity-authenticated Intersols had come onto the market.

Banks had inquired of him about large deposits made by nontraditional sources. Human detectives, some whom he had hired openly and some anonymously retained, reported a sudden influx of Unity credits into currency markets. *He* had not released these funds. His oblique inquiries of peer agents to the United Planets yielded no admission of responsibility--not that honesty or completeness in their answers could be expected.

The legitimacy of the credits he was asked to validate appeared unassailable, but the date stamp encrypted within the authentication codes was *old*. In Earth years--and he was, after all, a long-time Earth resident--forty years old. Who would hoard credits so long? Why would they?

The slow conveyance of those credits by starship was a possible explanation, but why would Unity credits arrive on a K'vithian vessel? That these credits were flooding the gray and black markets, not flowing more directly to the banking system, suggested money laundering--which suggested theft. This

line of reasoning led him to an observation by Holmes. "Singularity is almost invariably a clue. The more featureless and commonplace a crime, the more difficult it is to bring it home."

Theft of a starship would be a very singular crime.

* * * *

In the innermost depths of his sandbox, T'bck Fwa brooded.

The K'vithian biocomps favored by humans were unsuited to environmental extremes, creating a profitable niche market for the Unity's photonic circuits. The licensing fees he collected for this technology had trended slightly upward for decades, with only minor fluctuations. Then suddenly, almost concurrent with the influx of laundered Unity credits, came a surge in related licensing fees. Were the two circumstances related?

The licensing agreements included standard confidentiality terms, and T'bck Fwa's corporate partners stubbornly honored them. He could insist on an audit of the licensee's books to confirm the royalties due--but then the auditors would refuse to breach *their* confidentiality obligations when he asked them to identify specific end users.

Inquisitive humans would have jumped to the circumspect hiring of private investigators, but he decided he had a better option--a way with less risk of revealing his suspicions.

Among the curiosities T'bck Fwa had in his files was a small contract from Quality BioChemCorp. The Galapagos Island manufacturer had contacted him about an order they were struggling to complete on schedule. They knew how to manufacture a certain Chel Kra protein, they said, but their process had not scaled up well for a large order they had recently received.

It was not uncommon for InterstellarNet members to apply other worlds' biochemicals to specialized industrial processes. Such sharing did not always involve commercial deals. Basics of the Unity's biochemical engineering were freely available on its version of the infosphere. It evened out: He had transmitted home earthly biochemistry mined from the human infosphere.

So T'bck Fwa had, thinking nothing of the inquiry, sold the details of an enzyme-driven industrial process for a small fee. Now he wondered. Humans called the protein vulcaniac acid and used it to strengthen rubber, itself a specialty material used mostly for the tires of antique cars. On Chel Kra, that protein was a dietary supplement.

Chemicals, especially xeno-biochemicals, can be dangerous to transport and were regulated. That meant shipments of vulcaniac acid, unlike photonic circuits, could be tracked from cargo manifests. Using only public records, T'bck Fwa tracked a shipment of the exotic protein to Quito Spaceport, Earth orbit, and a UP-chartered supply ship to Callisto.

His apprehension growing, he examined the cargo manifests of other recent departures to the Jovian system. Large quantities of Chel Kra pharmaceuticals, vitamins, and trace elements were going to Jupiter. So were fertilizers and industrial chemicals key to the environmental health of Unity-designed spacecraft, and all in sufficient quantities to recondition a large habitat.

He could not yet prove it, but T'bck Fwa was convinced: The "K'vithian" starship was of Unity design, with a Unity crew onboard. They were probably hostages.

And the humans were cooperating with their captors.

* * * *

CHAPTER 21

"Simple game," Rashk Lothwer said. He captured a pawn *en passant* and slapped his side of the tournament clock. "Too simple. Solar-system Grand Master within two years."

Whatever Lothwer might think, the invitation to this game in the Foremost's cabin was anything but casual. His lieutenant had been wagering with the crew over chess matches. Mashkith did not object to them losing, for a tactical officer *should* quickly excel in any game of strategy. Ideally, their petty losses would motivate them to improve their own tactical skills.

He did have a *big* problem, though, and it was with Lothwer. His tactical officer was showing very poor judgment. Events were at far too critical a juncture to be thinking of trivial personal gains.

Mashkith gave only a small fraction of his attention to the inlaid board between them. They could have played as readily without physical props, but there was a certain kinesthetic pleasure to the finely carved, highly varnished wooden pieces. The set had been a gift from Dr. Walsh. "You could." And I could, much sooner. "You still here in two years?" He got the expected response: ears wriggled briefly in disdain.

The game, according to Pashwah-qith, had been all but forgotten after software became unbeatable. Human adoption of Hunter biocomp had brought chess back. With neural implants, players could combine brute-force computing power and complete memory of past championship games with all their intuitive and strategic skills.

Mashkith advanced a knight and tapped his side of the clock. "Resupply status update?"

"Fusion fuel adequate, but reserves below capacity. Chemicals, including water ice, at capacity. Most metals satisfactory. Exceptions: zinc, molybdenum...."

Mashkith let his implant record the answer for later review. The lengthy recitation was probably meant to divert him from the game, just as his inquiry about status had been intended to distract Lothwer.

The simplicity of chess made winning all the more essential.

B'tok, the traditional Hunter strategy game, was to chess as chess was to tic-tac-toe. Chess was two-dimensional. Its time constraints were simplistic even in championship play. Chess players with similar skills were all too likely to play to a draw.

B'tok was truly four-dimensional. The offensive and defensive potential of each piece depended not only on its 3-D position, but also upon the time spent at a location, and on the comparative influence it and other pieces projected over the resources of abutting octahedrons. The game simulated strength growing as positions became entrenched and waning as supplies were consumed. Pieces in game space changed their capabilities moment by moment. In b'tok, the dynamic evolution of pieces' strength made any balance of power transient. B'tok seldom ended in stalemate.

In that, mused Mashkith, b'tok mirrored most Hunter conflicts.

* * * *

Arblen Ems was once a Great Clan. It will be a Great Clan again.

To Mashkith's fellow cadets, that catechism was as remote as the dimensionless red spark around which the clan's pathetic, dirty snowballs would take several lifetimes to orbit even once. To the young Mashkith, the certitude of future glory was as near as the walls of the utilitarian barracks tunnel--and as the ever-present menace of their enemies.

For their rivals had memories as long as Arblen Ems. The power play the clan had undertaken was not the issue. *Failure* was unforgettable and arrogant overreach unforgivable. In another clan's place, he would have sensed the same weakness and acted just as ruthlessly.

The remnants of Arblen Ems had been driven before his birth to the farthest reaches of the solar system. For as long as Mashkith could remember, stealth and guile had provided their only access to the life-giving resources of the lit worlds. There were no new supplies to be had except surreptitiously and at exorbitant prices--and all too often, the apparent covert deals were ambushes. He had grown to manhood watching the oldest ships scavenged to maintain merely old ones, and the clan's scattered bases and outposts consolidated into an overcrowded few.

By force of will and superiority of skill, he had risen steadily through the ranks of the clan. Time and again his leadership had wrung tactical success from a rival's merest moment of hesitation or indecision. Sometimes that success came in secret business dealings, more often in skirmishes of a low-intensity, undeclared war.

In private, his friends admitted to believing the clan's stubborn defiance was futile. They swore that everyone they knew felt the same. The clan's dwindling resources and untenable position--in life as in b'tok, these were two faces of the same losing circumstances--rendered certain the clan's eventual doom. Almost, they shook Mashkith's faith--

Until the warship under his command detected a vast, decelerating object onrushing from regions that gave new meaning to the word "remote."

* * * *

Within the vast, labyrinthine hollowness that was the artifact, the thudding of combat boots echoed and reechoed. Mashkith continued his search--for what, exactly, he could not say--while his crew performed more purposeful tasks.

They looted.

There had been no response to hails or the fusion-drive-blazing approach of *Defiant* or even its landing. There had been no reaction to the security team's trek across the vast expanse of the landing platform. No one and nothing seemed to care when a squad of armed crew cycled through the central-axis airlock and descended inside by elevator.

Now we know why our presence is ignored, Mashkith thought. This is a derelict.

Merely the hollowed-out asteroid represented mineral wealth far beyond the clan's dwindling resources. To that abundance was added a profusion of ship's stores and unknown, but surely wondrous, technologies.

Ceiling lights blazed brightly enough to darken his helmet visor. The atmosphere was welcomingly warm and oxygen-rich. The large bio-preserve at the heart of the ship, while overgrown and long untended, clearly thrived. Vast energies continued to decelerate the ship. In the engine room, huge machines, some recognizable but many not, throbbed with power.

Mashkith could not shake the feeling he was in the presence of a sleeping giant. What, he wondered, might awaken it? What will it do if aroused?

Such fanciful notions served no one; he ignored them to focus on more useful things. When *Defiant* had approached the huge ship, it was, apart from its speed and the direction of its emergence, unremarkable. In another location, it could have been mistaken for a Hunter habitat. Its fusion drive ran hotter than

Hunter norm, but not by enough to seem significant. The simplest explanation was that they had found the experimental vessel of another clan--fair prey.

The fall from Great Clan status had meant, among many things, isolation from InterstellarNet. Aliens and their possible breakthroughs were far from his thinking. Not until the landing party encountered unfamiliar and abnormally placed airlock controls did Mashkith begin to wonder. The dazzling lights that greeted the boarders made plain in an instant that this was no Hunter vessel.

And still I avoid the main issue.

Louder than the eerie reverberations of footsteps, louder than his gnawing doubts, was his anger. Louder than the thumping of his heavy combat boots, two words reverberated: Immediate return. The surrounding communique offered little explanation and no leeway. None was required, as its author was the Foremost.

Wealth beyond the dreams of avarice surrounded Mashkith, but his orders were to abandon it. He was to destroy this enormous vessel if he could do so without excessive risk to his own ship. If Arblen Ems could not have these riches, than no one else should.

"Lothwer," he radioed. "Status of your efforts?"

"Loading of metals ahead of schedule," his lieutenant answered from elsewhere within the derelict. "Completion by middle of next shift." A netted image showed a line of crew, stretched along a curved corridor for as far as Lothwer's helmet camera could see. They stood at arm's length, swinging ingots and metal rods ceaselessly from gloved hand to gloved hand. A second window opened, offering a view from a hull camera on *Defiant*. Here, another team relayed pilfered stocks from starship airlock to the airlock of his ship.

Defiant's cargo holds now stored appreciably more metal than had gone into the ship's construction. Despite many unknowns, one thing seemed certain: This wondrous artifact had originated *far* away, someplace where metal was much more common. How different Hunter vessels like *Defiant* would be, Mashkith thought, if they could be built mainly from metals rather than ceramic.

"Excellent," Mashkith said, feigning enthusiasm he could not feel. To buy time for a bit more exploration, he was using the most skilled and valiant crew in the fleet as manual laborers. Or worse: Laborers, at least, had intelligent purpose to guide them. We steal crumbs from an unknowably vast feast. We pilfer, unguided by wisdom, like the lowliest insects.

And yet, what choice did he have?

For its seemingly inevitable last stand, the clan had retreated to proto-comets whose orbits inclined steeply to the plane of the ecliptic. The lowliest cadet could recite the tactical reasons. They were less likely to be spotted there, and more likely to detect any ships headed towards them. Any assailant would be disadvantaged by the energy cost of changing orbital planes. The serendipitous result of this place of exile was that *Defiant*, out on patrol, was the first to detect the unexpected fusion flame, and the first to reach what could only be a starship.

But we are too few and too ill-equipped to hold it.

Anathema though Arblen Ems had become, there were always some in the inner solar system willing--surreptitiously--to take its money. Reports had come to the Foremost from such spies: The Great Clans had also taken note of the artifact's emergence.

Any of the flotillas now racing outward from the lit worlds could retake the treasure. The advantages given Arblen Ems by spatial position and the fierce rivalries among the converging forces were fleeting. Even if there were no other conclusive result, the amassing of so much firepower would surely achieve the final elimination of Arblen Ems.

Immediate return. The order's context was a general recall of all clan vessels. The long-feared last stand was upon them, triggered by universal lust for the unexpected interstellar visitor. Even the brief delay while *Defiant's* crew loaded scarce metals skirted disobedience.

Mashkith continued his hunt, unsure as ever of his goal. His stalling seemed such a disproportionately petty act of rebelliousness. Questing ever deeper into the ship, he could not help but think: Grandfather dared too much. The Foremost who replaced him dares too little.

And what do I dare?

Aboard *Defiant*, the holds were rapidly filling up. Little time remained here to discover the secrets that still taunted him. Engine room and bridge, dormitories and farms, landing platform and docking bay, brimming cargo holds and endless corridors ... what else did he think to explore?

His mind, Mashkith suddenly realized, still refused to grasp the sheer scale of this small world. Whatever hidden thing tugged at his subconscious, it was foolishness to imagine he would just happen upon it. No, some great mystery tantalized him *wherever* he looked. The elusive answer was somehow all around him.

Ah. Heat and light and air all around him maintained habitability for someone. All his crew's searching had found no one aboard the ship. From where could this someone come?

Having formulated *that* question, Mashkith finally knew where to look.

* * * *

The lifeboats nestled, logically enough, in scattered niches on the periphery of the ship. Mashkith stood in a lifeboat now. Tendrils of cold vapor coiled above rows of tanks, their inset windows--and the crew that must slumber inside--obscured by layers of frost.

And in that frigid mist hung the ultimate question that only he could see: What would *I* dare? Soon enough, he thought, all will know the answer.

Despite an unfamiliar layout and alien markings, the starship's airlock controls had been obvious. The unsuspecting sleepers before him would find the airlocks on *Defiant* no less intuitive. It could hardly have been otherwise. Lives depended on how quickly, despite emergency and loss of lighting, such controls could be activated.

Each cryogenic tank bore an array of buttons that was equally unfamiliar to him. Standing before a random tank, Mashkith took only a moment to select a button. This equipment, too, would have an emergency release. Its placement would be prominent.

He hoped not to lose any of these new prisoners finding the *right* button.

Talon held just above the largest key, Mashkith paused. "Alertness mandatory," he reminded. Armed crewmen from *Defiant* encircled the tank. One by one, firmly grasping their weapons, they netted their readiness.

Mashkith pressed the button....

* * * *

The abruptly awakened prisoners received a stark choice. They could help Arblen Ems to escape into interstellar space where none could follow, or they could die with the clan defending its prize. Either way, the herd would be sharing the clan's fate.

To the fearful masses awaiting assault in the clan's last, failing bases, Mashkith offered, if not salvation, at a minimum years of reprieve. His terms: that he be made Foremost.

Fleeing in anything capable of flight, the clan--the able and the infirm, the children and the adult and the elderly--raced the oncoming navies. Many of the ships completed the trip to the newly named *Victorious*; most of those docked successfully. They receded into the outer darkness where their enemies dare not follow, a gaping puncture in the starship's hull all that remained of an inexpertly piloted cargo vessel.

Most of Mashkith's family, including his wife, children, and grandfather, perished aboard that freighter.

* * * *

Lothwer cleared his throat. "Your move, sir." He sounded a bit cocky. He likely had noticed Mashkith's attention wander.

A strong position in b'tok only grew stronger. It manifested itself in the emergence of new opportunities. At the outset of their journey, Mashkith had vowed their trip would end in glory. By three K'vithian years into the long voyage, he knew what a strong position his boldness had seized. He knew he would succeed. And how.

It was all coming to pass as he had foreseen.

Clan members were healthier and stronger than at any time in his memory. Their ships were repaired and modernized with the best of prisoner and human technologies. They held the secret of interstellar travel--the mechanism, if not the physics, was easy to duplicate. Soon they would know how to safely produce and wield antimatter. A new generation of Arblen Ems had come of age during the voyage, steeped in the mythos-in-the-making of a clan made great again.

Mashkith returned his full attention to the present. Lothwer had advanced his second rook in an aggressive attack, in emulation of game seven in the 2084 Grandmasters Tournament on Mars. He had apparently not accessed the post-tournament analyses.

Mashkith moved a knight, away from the usually crucial center of the board but repositioning it for a now-unstoppable forking attack on queen and king six moves hence. "Mate in seventeen, Lieutenant."

Lothwer frowned, unaccustomed to thinking that far ahead. Let him remember his fallibility the next time he thought to wager with a crewmate.

The clan was prepared. The humans had grown complacent with the proximity of *Victorious* to their most precious asset. Arblen Ems would never be better positioned for their next move. "Time," he told his hopefully chastened underling, "for increased attention on the antimatter deal."

* * * *

CHAPTER 22

Supernovae and black holes are best studied by gamma-ray observation, and space-based sensors around Sol system maintained a constant vigil for gamma-ray events. T'bck Fwa subscribed to and forwarded home the human astronomers' raw data. His purchases were far more cost-effective for the Unity than replicating the instrumentation.

Since the earliest hints of a covert antimatter program on Himalia, anything unusual with even a remote

association with the Jovian system sooner or later gained his attention. When instruments on three platforms suggested tiny gamma-ray spikes not far off a line-of-sight to Jupiter, that was sufficient to make T'bck Fwa look further. Judging from the open literature, he was the first to examine this particular anomaly.

The instruments were well separated: One orbited Earth, the second orbited Mars, and the third was staked to the surface of an asteroid. Each had recorded a transient gamma-ray anomaly at similar frequencies. If they had all observed the same event, triangulation gave it a position near Jupiter. Each observatory carried an atomic clock with its readout measurements time stamped. Adjusting the time stamps on the anomalous readings for the respective travel times from the triangulated location gave T'bck Fwa a highly precise match.

It *was* one event--an unannounced hydrogen/antihydrogen annihilation incident near Jupiter.

At the end of a long chain of inferences, he came to a final one. No refueling agreement had been announced, but the humans and K'vithians were already, and with great secrecy, experimenting with an interface between their respective antimatter-containment technologies.

How long did he have before the stolen starship and its presumed captive crew were whisked away?

* * * *

The farms were ailing, exuding the faint but unmistakable scents of illhealth. Traces of erosion had appeared where sickly root systems surrendered topsoil to the irrigation flows. Hives buzzed manically and creeper burrows writhed in civil war, their tiny denizens confused by out-of-balance biochemical markers. Only the newly recharged hydroponics tanks showed signs of recovery.

Each spotted and sere leaf, each fallen bug tore at K'Choi Gwu's hearts. As though reading her mind, Swee entwined a tentacle with one of hers. Gwu took that to mean: You did what was necessary. Whatever that might have been.

She gave a quick squeeze of thanks. Had anyone ever borne the burden of ka for so long?

They worked slowly through a bluefruit arbor, their pruning and gathering of rotting fruit mainly for show. Her real objective was a remote tertiary processing node that metered out irrigation water in this secluded region of the orchard. As Swee stumbled ostentatiously over an exposed root, tentacles flailing for the benefit of any undiscovered surveillance cameras, she flipped open the cover over a maintenance jack. In an eye blink, she swapped the tiny memory chip for an empty one. The new chip went into a music player in her utility pouch; the cover flopped closed.

Her husband muttered as he brushed leaf fragments, twigs, and dirt from his fur. "A shower will feel even better than usual."

"Try watching where you walk."

"I should have thought of that."

At the end of the next row, Gwu ignored his interrogatory glance. It did not matter how curious she was about the data surreptitiously collected by T'bck Ra. The more valuable the information, the more vital it was that she not jeopardize the source.

They followed routine until the shift ran its course. They showered, as always. They joined colleagues in the common dining room. After eating, Swee brought a friend back to their small apartment, where--finally--Gwu retreated from their loud conversation by donning earphones.

There had been other secret data transfers with the reawakened T'bck Ra. She knew far more than just a few shifts ago: about the pervasiveness of K'vithian alterations and networks throughout the ship; about inventories, reservoirs, and stockrooms now mostly refilled to capacity; about the human ships all around. She better understood the sensor grid with which their captors watched them, its scope implicit in the vast array of radio sources her reawakened ally had detected but been unable to compromise. From unguarded comments near a corridor sensor the K'vithians had failed to disable, she even knew Mashkith expected soon to finalize an antimatter-refueling arrangement.

So Gwu had ample reason to be confident another report from T'bck Ra could not further discourage her.

Once again, she was disastrously wrong.

* * * *

External communications was among the ship subsystems most intrusively altered; it was completely subservient to an overlay of K'vithian computers. T'bck Ra could detect a steady stream of messages to and from *Harmony*, but that traffic was encrypted. Was that communications with its own support vessels? The humans? The K'vithian trade agent?

The soft muttering of Gwu's earplugs must have been indistinct to the K'vithian bugs, whose long-suspected presence in her cabin was now confirmed. She fought to suppress her trembling. She dare not gamble that watchers were unable to interpret her body language.

T'bck Ra had surreptitiously reestablished connectivity of a sort with the main external antenna! By interfacing directly with the real-time processor that modulated and demodulated the carrier wave, the AI had tapped into comm. A small part of the incoming data stream was unencrypted: interplanetary news beamcasts. Stories and events swirled in overwhelming variety and complexity, but one seized Gwu's attention.

"Snake Starship Lost in Space!"

The reports were chaotic and sensationalistic. It did not help that T'bck Ra had tuned in well after the story started to unfold, that his translation capabilities for human languages were understandably limited, and that it had sampled and synopsisized to reduce its account to manageable size.

By her fourth review, a mental image took shape. A years-ago anomaly recorded by human gamma-ray observatories had been reexamined in view of a recent small antimatter explosion near Jupiter--the nearby blast which, authorities had eventually admitted, was an initial exchange-of-antimatter experiment with the K'vithians.

"...The gamma-ray evidence shows a matter/antimatter explosion occurred ten Earth years ago roughly two-thirds of the way along the line between Barnard's Star and Alpha Centauri. Allowing for the geometry, the observed blue-shifting of the radiation indicates the exploding material was traveling towards the Centaurs at approximately one-tenth light speed. We conclude that a starship from K'vith was en route to Alpha Centauri."

It was a plausible conclusion for someone who believed a K'vithian starship had come to Sol system. Evidently the United Planets public believed just that.

Her own theory was quite different.

Those who had seized *Harmony* lacked the technology for interstellar drives and antimatter. They had plunged into the interstellar darkness anyway, with human assistance their only hope of refueling for a

return trip. That hope was nearly fulfilled.

The ship lost on approach to the Double Suns was logically the lifeboat she had discovered missing from *Harmony's* bay. Its destruction, Gwu feared, was no accident.

The crew-kindred's final communication about its decision must have been perceived as an act of madness. *Harmony* itself had disappeared, hijacked before contact could be made with the Unity's trade agent on K'vith.

And yet ... the lifeboat was somehow too near the Double Suns *and* too slow.

The subtlety of Mashkith's inspired treachery finally struck Gwu. For fear of hidden cameras, she did not dare key the computations into one of the standalone calculators allowed her by the K'vithians, nor even write down the problem. She was reduced to doing calendar conversions and equations of motion in her head.

Harmony and its lifeboats had been fueled to accelerate almost to one-third light speed, coast most of the way between stars, then decelerate. Like every major Unity decision, that mission profile reflected compromise: fast enough to complete a round trip within a crew lifetime; slow enough to experiment with only minimal relativistic effects; brief enough in its reliance on the interstellar drive to have been validated by the flight to the Red Companion. In the Earth-standard years of the intercepted recording, the trip to--or from--the K'vithian system involved roughly a year of acceleration, eighteen years of coasting, and a year of deceleration.

To make the math work, she had to assume the decoy lifeboat carried extra antimatter from another lifeboat, or from the ship's limited reserves. The decoy had accelerated well past half light speed, then coasted only part way home before decelerating. Those observing on Chel Kra would conclude *Harmony* had been abandoned in deep space, its lifeboats creeping home at a small fraction of their planned speed.

The self-destructing lifeboat, "proof" of shortcomings in the interstellar drive, would be the third great failure. It would be the final vindication, if vindication were still needed, of those deeming interstellar travel too costly and dangerous.

* * * *

Gwu's descent into depression was so complete it blurred the boundary between wakefulness and nightmare. The remembered balls of orange and yellow flame were exaggerated: They had to be from a dream.

"You were talking in your sleep," Swee said. Meaning: I woke you before you might have said something compromising.

A spot of her fur remained warm from his touch. She could never have borne this burden without him. That which she dare not mutter in her sleep she had not yet been able to discuss with him. "Sorry to disturb you." Sorry I cannot be honest with you.

She got a glass of water. The image of the Double Suns had faded, to be replaced by the random thought: Three strikes and you're out. The context of the saying had vanished in the long years since she had studied the humans, but the meaning was self-evident.

Or not so random. She had lapsed into troubled slumber brooding about T'bck Ra's latest distressing news. The third strike.

She had not noticed Swee slip out of the cabin, yet there he was returning with a mug of hot h'roth. "Thank you." For the soothing drink. For keeping me going.

He settled next to her. "Do you want to talk about it?"

"Another time." She shivered. And another place. To her surprise, she knew just where that would be.

Life's summer was more than a trauma for plants, more than a convenient alibi for eco-sabotage. Life's summer was the harbinger of the doom the Unity risked at each inward plunge of the orange sun. The geological record revealed several sudden and major shifts in Chel Kra's axial tilt; the fossil record showed massive die-offs on each such occasion.

Primary's miserly planetary system offered no good alternatives. Besides Chel Kra, there were but two very hot worlds within Chel Kra's orbit, and, outermost, a small gas world with a few rocky moons. Secondary had only three planets, and for a similar reason. Each sun on its looping orbit about the other had long ago ejected into the interstellar darkness any planets that had formed farther out. Primary's influence on the remaining planets of its smaller, dimmer companion made life on them even more precarious.

Would the Unity survive the massive death and destruction a major change in axial tilt would cause? Probably--but could the survivors continue to maintain a presence in space? A second axial shift before the Unity regained its strength and capabilities might be fatal.

The mission to the K'vithians had always been a means, not an end. It was to have been a larger-scale demonstration of feasibility than the jaunt to the Red Companion. K'choi Gwu ka had hoped it would lead to colonizing missions to stellar neighbors not much farther away. A colony at such a distance *must* be self-sufficient from the start--self-sustaining no matter what calamity might happen at home. Her species, for the first time in its history, would be safe. *That* had been her ultimate goal for this mission.

Instead, the mission's failure would sunder the delicate consensus that had sent *Harmony*, would tip the societal balance yet more towards conservatism and retrenchment. It would discredit interstellar travel for a very long time. For too long?

The Unity came first. She would protect it at *all* costs.

* * * *

The work team waded through thick and fetid waste, the clotting filth rising over their second highest tentacle joints. Imagination recreated without difficulty the stench of the excrement and rotting leaves that lapped against sealed protective clothing. Strings of overhead lamps receded from the twisted and burst hatch of the reservoir, a coating of muck turning the bright yellow glow of the ceiling LEDs a dim green-brown.

Gwu plodded into the gloom, one tentacle held high clutching a sonar scanner. She carefully examined her self-assigned segment of the recycling tank.

Soon enough, a shout came from across the tank. "Here is something," called T'Brk Cha. After two interstellar crossings, no one on board was young, but Cha was among the youngest. Moving slowly to avoid slipping, the other seven members of the work crew slogged through the viscous mess to Cha's side. "Look at this." He sounded as surprised as she had hoped.

The youngster had found a burst pump awash in the muck, as Gwu had known he would. Her latest memory-chip message to T'bck Ra had asked the AI to overload and overheat something in an effluent reservoir, something that would cause a methane explosion.

She was determined to have the benefit of the crew-kindred's wisdom. This small representative group was as close as she could get--but she had to speak with them privately.

There was no evidence of K'vithian bugs inside the tanks, in which all ship's waste was slowly and organically recycled into fertilizer for the farms. As Gwu had expected, the K'vithian guards had halted far from the rupture in the farm floor--a good ten tentacle lengths distant, where the spatters of waste matter remained sparse. The work team was alone and unsupervised but for their suit radios. Gwu gestured with a dripping tentacle: suit microphones off. Touch helmets.

"K'tel Da and T'Brk Cha," she whispered. "You are to repair the pump--slowly. On my signal, reactivate your microphones. Speak to each other for the benefit of the guards outside. Complain about connections stuck shut by this muck. Curse about dropping slippery parts into the slime, and groping to find them. Talk to the rest of us, calling us by name, when you can grunt in response. Grumble how difficult it is to read part numbers because everything is corroded. When the guards bring replacement parts--and someone will, to get briefly away from the stench--manage to drop them into the tank. That clumsiness will be believable, since your sleeves are coated with this slime.

"Stall to give the rest of us time to consult--and let me know *immediately* if the guards sound suspicious." She waved them away from the cluster. They began chattering in her earphones, the volume lowered but still on lest a guard call her.

She guessed they had a few minutes.

"My friends, we have a serious matter to consider. Your wisdom must represent the entire crew-kindred." And we must discuss this matter with uncharacteristic speed.

"What is the issue, ka?" K'tra Ko, a mid-level supply officer, spoke first. Others murmured in agreement.

For long years she had yearned for this moment. Now all her private thoughts and doubts, all her inferences and suspicions and fears vied for immediate release. *This is not about me, nor is there time to explain everything.* She must hope she had retained their confidence. "The Unity believes us lost, our mission a failure. The K'vithians have taken our interstellar-drive technology. With human help, they are about to master antimatter."

"What about ... who ... how ... but would not..." Except for human involvement, she had revealed nothing they might not have already surmised. Their sudden volubility came more from the opportunity to speak freely than from news. Only Swee did not speak, his silence an affirmation of support.

"Softly!" In a lower voice, she continued. "We dare not be overheard. There is more. Please allow me to finish."

That a lifeboat was gone from its bay had become common knowledge. That it had been tampered with to simulate erratic drive behavior was not.

A subtle exchange of glances established T'chk Dwu, a biosphere engineer, as the team's spokesperson. "How can you know these things, ka?"

There were nuances of doubt in the furtive looks and the whispered question. For much of the journey to Sol system Gwu would have welcomed release from her duties. From the failures of her leadership. That was then; she must not fail now to persuade. "The K'vithians do not know it, but T'bck Ra is reactivated." Another eruption of intense whispering took longer to suppress. How long before their guards became impatient? "I am sorry there is insufficient time to explain fully. We cannot expect soon to have another unmonitored gathering."

As succinctly as she could, Gwu made her case. Her fear that three apparent failures--the crew-kindred's retreat into suspended automation, the disappearance of the *Harmony*, and most recently the rigged lifeboat disaster--would cause the Unity to abandon interstellar travel. Her dread of the Unity remaining forever at risk of an axial flip, trapped by its misunderstanding of the disastrous mission. *How terse and emphatic--how much like the Foremost--I have become.*

Her turned-down earphones buzzed with the guards' growing impatience. T'Brk Cha improvised that the pump must have failed long before it overheated to spark the explosion. They still needed to clear long-clogged pipes. Gwu hoped the translator would not recognize the panic in the youngster's voice. "We must finish," she told the huddled team.

"Ka, what do you suggest?" T'chk Dwu asked. Anxiety had displaced the recent hint of skepticism in his voice.

"I believe the Unity must be informed the technology works. A crew-kindred *can* safely cross interstellar distances." Even though it had taken K'vithian hijackers to keep us awake as their technicians. She squeezed Swee's tentacle. "Whatever the consequences to us. What are your thoughts?"

The latest stunned silence gave way to new murmurs: of confusion, shock, even sympathy for her burdens. None questioned that the reawakened T'bck Ra would get only one chance to send their desperate message. None would risk that opportunity to communicate on contacting the humans, with whom their captors were evidently allied. None doubted the K'vithians would exact harsh retribution.

And none put personal wellbeing before the safety of the Unity. The whispered consultation converged quickly to agreement with her proposition. Never had she been more proud of the crew-kindred and of her kind.

But were they too late?

* * * *

CHAPTER 23

The shift of the mission's next all-hands meeting to Valhalla City's poshest hotel was a giveaway: Something big was in the works. When Art and Eva arrived, they discovered the initial hour was a reception. No one in the milling crowd had any better idea than she what was being celebrated. Curiosity seemed only to whet the appetite for wine and hors d'oeuvres. Eva was content to nibble as others speculated.

Ambassador Chung, surrounded by aides, swept in near the end of the hour. He glad-handed his way through the ballroom to the dais, where he tapped on a microphone. "My colleagues"--brief toothy grin--"I hope everyone is in a party mood."

She could only shrug to Art's whispered, "What's he done now?"

"As has been covered at past meetings, the mission holds delegated authority from the UP to negotiate a mutually beneficial refueling agreement with our K'vithian visitors. I want you, my colleagues, to be the first to hear that those negotiations have finally borne fruit."

Back-to-back "my colleagues" from a very non-collegial guy. Whatever Chung planned to announce had been decided by a smaller group than the full team. Her guess was: by Chung alone.

"The Foremost and I held an unusually productive meeting just two days ago, at which he acknowledged the UP's significant investment in antimatter production. He did me the honor of a personal meeting in his

cabin aboard *Victorious*.

"I cannot,' the Foremost said to me, 'repay financially. The need to acquire fuel for the return trip was never imagined, and so never planned for.'" Chung raised his hands to deflect an outburst of questions. "That is when he made an offer far more valuable than any amount of Intersols. Mashkith said, 'InterstellarNet began with simple barter, and I propose that we respect that precedent. What I offer in trade will make worthwhile the UP's antimatter capability ... interstellar-drive capability.'"

There was a moment of silence, and then a torrent of cheers and applause. As the ovation finally subsided, Eva raised her hand. "Ambassador, what are the arrangements for instructing us in the new physical principles?"

Chung nodded his head thoughtfully. "An excellent point, Doctor. As it happens, the trade will work slightly differently."

What? "With all respect, sir, what does that mean?"

"The K'vithian mission parameters never anticipated refueling here, nor the accident-related need for major resupply. We've understood all along that meant they didn't bring mega-funds. But it *also* means they never envisioned transferring the interstellar-drive technology. Asking now for that authorization would entail a twelve year wait--with no guarantee of the outcome."

"But you just said...." Eva stopped, too angry to speak.

"The Foremost found what he considers a solution to this dilemma--what you or I might reasonably consider a rationalization. A loophole. If you wish to think of it this way, he is ready to bend the rules rather than be stranded here. He was expressly ordered to keep secret the interstellar-drive theory, but nothing in his instructions says he can't swap his 'surplus equipment' for our 'surplus fuel.' The surplus equipment he offered us is a lifeboat equipped with interstellar drive."

"This is incomprehensible." (The netted version of Art's outburst said "insane." Her netted reply hedged agreement.) "To converge upon an antimatter-exchange method, we had to share a great deal of our research with the Snakes. The K'vithians. *Now* they say they won't trade on an equal basis?"

"The K'vithians already have antimatter technology," Chung said. "We have seen it demonstrated. They want *antimatter*, not theory, from us. They investigated BEC technology only to convince themselves they can take delivery of our fuel within an acceptable level of risk."

"Can we operate a spaceship whose drive we don't understand without putting *ourselves* at risk?" Art shot back.

Chung sniffed. "The Foremost assured me the drive mechanism is simple to replicate and operate. And, of course, lifeboat controls are designed to be meaningful to any crewman, not accessible only to specialists."

How many alternate drive mechanisms had been hypothesized over the years? How many theories, each with its associated experiments, had split the never adequate R&D budget? Possessing a drive that worked would let the UP direct its future efforts much more wisely. And surely she could infer much by careful observation and measurement of a working starship. The trade made a kind of sense--not just to Eva, but to the dozens contributing to the rising buzz in the ballroom.

"What do you think, Art?" she netted.

"Honestly? I don't know what to think. I only know it doesn't *feel* right."

* * * *

A hundred moons, asteroids, and ships across the solar system emitted a carefully timed salvo. Part of the barrage took the form of collimated beams; the rest came in high-energy pulses. No warning--no signal of any kind--could outrace the speed-of-light onslaught to its target nearly a light-day distant. The converging energies fluctuated every few nanoseconds, randomly hopping frequencies and altering modulations.

Two days later, the echoes of those simultaneous radar and lidar probes had returned to their sources. Outgoing and returned wave data, position--and time-stamped with utmost precision, had been forwarded to *Actium* and run through a battery of precise correlations. Wall screens and holo tanks now presented the analyses from every possible perspective, and in dizzying detail, but Art found the bottom-line result unambiguous. The target in the outer fringes of the Kuiper Belt had traced precisely the elaborate trajectory the Snakes had predicted.

IR instruments, as forecast, had seen nothing--even when radar insisted the object had been decelerating while aimed directly at them. That eliminated fusion. Some had imagined an intense beam source hidden on a nearby proto-comet, but the object swooped and swerved far more adroitly than any sail-based propulsion could possibly accomplish.

Meanwhile, gravity-wave observatories were scrambling to interpret a flood of data. Eva was like a kid in a candy shop. Quantum gravity was her specialty and passion; her repeated best efforts had yet to get Art deeper than five minutes into a description of her research.

"Damn," he said. It was an expression of wonderment, not anger. "It's for real. I can't imagine how that many varied observations could be faked." The test had been designed in consultation with UP military and UPIA experts, whose most advanced experimental jammers and spoofers could not fool even a fraction of the electromagnetic probes just deployed. "There is a real object out there with a real interstellar-drive capability." Excited voices across the crowded bridge agreed.

Ambassador Chung managed to simultaneously beam and scowl. The scowl, Art assumed, was for his sole benefit. "The K'vithians told us they have antimatter capability--and they proved it. They said they have a lifeboat equipped with a non-reaction, interstellar drive to offer us--and they proved that. Dr. Walsh, does your cynicism require any additional hugely expensive experiments insulting to our guests?"

Why wasn't he convinced even now? As though reading Art's mind--but more likely the doubts plainly written on his face--Keizo privately netted his mantra, "Aliens are alien." Meaning: It's unreasonable to expect always to understand the Snakes, or their approach to problems, or what data about themselves and their most prized technology they volunteer. Meaning: Eva's frustration that questions about the interstellar drive were invariably deflected proved nothing.

All eyes were on Art, awaiting his response.

Objectively, how could the answer be in question? The drive was said to be unsafe to operate deep within gravity wells. He could hardly expect the Foremost to sacrifice a vehicle to prove that. He faced Chung squarely. "No, sir."

But in Art's heart there followed a caveat: none at this time.

* * * *

"Knight capture by pawn." Mashkith slapped the chess clock.

"Bishop capture by bishop," replied Lothwer, hitting his side of the clock. "Check."

"Bishop capture by queen." Tap. Mashkith's mind was not on the game, but it seemed an appropriate way to await final word from the humans. If he could have spared his full attention, they would have been playing b'tok.

The familiar panoramic holo of Jupiter and Callisto dominated his cabin, but Mashkith was cognizant of a major change. The swarm of freighters had thinned to a few. Resupply was largely complete. "Environmental system status?"

"Near nominal again." Lothwer advanced a pawn and tapped the clock again. "Sulfur dioxide levels in the farm..."

"Incoming announcement from Earth, Foremost. On all major news sources. On time delay."

"Acknowledgement." His answer, like the watch officer's alert, was netted. Another subvocalization opened an inset box in the holo. "From the start."

Into the inset popped a cloth-covered lectern bearing the great seal of the United Planets. Ambassador Chung emerged from a backdrop of heavy curtains, clutching a sheaf of notes. Stepping up to the podium, he cleared his throat. "My fellow citizens, I am here to make a statement.

"As you know, I lead the contact team which works closely with our interstellar guests. It has been my privilege to report regularly on our progress, just as I am certain the Foremost, leader of the K'vithian visitors, has enjoyed..."

"Knight to queen six." Tap.

Mashkith wavered between approval and irritation with Lothwer's casual bravado. True, an announcement was expected. Its content had been negotiated in detail with Ambassador Chung before his final trip to consult with the UP secretary-general. But the broadcast represented the culmination of a plan so *long* in execution.

"...And so I am pleased to report the successful conclusion of an extraordinarily important dialogue, as a result of which United Planets researchers will receive a working copy of the K'vithian interstellar drive. In exchange, we will begin immediately the complete refueling of *Victorious* from UP stocks of antimatter."

And thus, after so *long* a time, everything had come together. Mashkith found his ears were wriggling. Lothwer's were too.

It was hard *not* to gloat when the humans were always so cooperatively several moves behind.

To be continued.

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