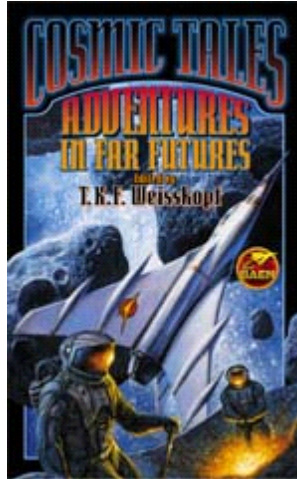


# **COSMIC TALES II ADVENTURES IN FAR FUTURES**

**Edited by  
T.K.F. Weisskopf**



This is a work of fiction. All the characters and events portrayed in this book are fictional, and any resemblance to real people or incidents is purely coincidental.

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**Dedication:**

**For the next generation,**

**Katie, Max, Peyton & Jackson**

**Hannah & Owen**

**And, of course, for that great explorer**

## **Grandma Vera**

**BAEN BOOKS edited by T.K.F. WEISSKOPF**

Tomorrow Sucks (with Greg Cox)  
Tomorrow Bites (with Greg Cox)

Cosmic Tales: Adventures in Sol System  
Cosmic Tales: Adventures in Far Futures

## **INTRODUCTION:**

# **Why do we need tales about "Strange adventures on other worlds, the universe of the future"?**

*T.K.F. Weisskopf*

\* \* \*

A voice, as bad as Conscience, rang interminable changes  
In one everlasting Whisper day and night repeated—so:  
"Something hidden. Go and find it.  
Go and look behind the Ranges—  
Something lost behind the Ranges.  
Lost and waiting for you. Go!"

—from "The Explorer" by Rudyard Kipling

\* \* \*

In the previous volume of *Cosmic Tales, Adventures in Sol System*, I tried to show why we need stories about the near future: to inspire us to get our butts off this planet. In this volume, I share with you stories about what happens when we escape the Sun's pull and explore the galaxy, fulfilling our destiny. These are stories of those possible futures where destiny becomes reality.

Humans need tales of adventure and exploration. We want to see what's beyond the next hill. We have an urge to "seek out new life and new civilizations," if I may borrow from the introduction to *Star Trek*. I think it's one of sf's jobs to encourage that urge, to expand our minds to include the possibilities of the strange and weird. Early in the history of the novel, all that was necessary to distance the reader and put him into a strange different culture was to set a novel in Spain, or Transylvania. Back when sf was getting its start in the early part of the twentieth century the world was already beginning to shrink. It was soon no longer possible to find strange new civilizations in darkest Africa or encounter hidden treasures and pagan princesses in the deepest jungles of South America, let alone the edges of Europe.

We'd been everywhere. And it's only gotten worse with the onset of global positioning systems, jet airliners, communications satellites, cell phones, and long-life batteries that can power a laptop anywhere. There is very little an adventurer can discover, though much that can be revealed to a dedicated tourist.

This book is for adventurers.

It's possible to find adventure in the past, but even the Dark Ages aren't so dark anymore now that legions of dedicated Ph.D. seekers have analyzed every remaining fragment of literature and every surviving civil and legal record. The past has been largely drained of its romance. Who is going to write another *Scaramouche*, now that it has been done? Life will always be a mystery, and there are many stories left to tell about Earth and its future. But for thrilling adventure stories, full of wonder and new experiences, we have to look further out. We have to explore and colonize new planets.

The expansion into near space will be work, hard work. But in the far future, we, and the authors of the tales included here, can have fun. We hope you will, too.

\* \* \*

If you'd like to see more *Cosmic Tales* or to comment on this volume or its predecessor, *Cosmic Tales: Adventures in Sol System*, write to me care of Baen Books, P.O. Box 1403, Riverdale, NY 10471. Or you can write directly to me at [toni@baen.com](mailto:toni@baen.com).

## THE TREE OF DREAMS

*If this is the Garden of Eden—where are the snakes? What happens when the business of planet-conquering just doesn't go according to the book. . . . James P. Hogan's most recent longer works include Mission to Minerva, a new novel in the "Giants" series coming out later in 2005, and Kicking the Sacred Cow, a nonfiction review of science's most treasured orthodoxies and the challenges to them, released July 2004.*

### **James P. Hogan**

The far-space exploration vessel *Hayward Kermes*, operated by the Kermes-Oates Restructuring consortium on license from the Sol Federation to promote cultural advancement among the outer regions, blipped back into 3-space two months ship's time after leaving the fitting-out station above Ganymede. It entered the Horus system, and four days later took up a parking orbit over the star's second planet, Lydia.

As stated in the preliminary report beamed back by the reconnaissance ship *Oryx* three years

previously, Lydia was a warm, Earthlike world with two moons, slightly smaller than Earth but with a surface closer to three-quarters water rather than five-sixths. It had five major continents, spread across greater extremes of tropical, desert, temperate, mountain, and polar climates. Pictures obtained from orbit and lower-altitude probes confirmed Lydian habitats ranging from village communities to moderate-sized towns that exhibited colorful and picturesque architecture rendered in wood, brick, adobe, or stone, according to the locality, with spectacular central buildings in some areas, suggestive of religious or imperialistic societies. Technology did not appear to have progressed beyond primitive or early agricultural in any area. Of the *Oryx* itself, there was no sign. Its preliminary assessment was the last to be heard from it.

\* \* \*

Lydian skies could be spectacular, mixing a palette that ventured from the palest of streaky greens unveiling the sun at daybreak, to full-bodied violets, lilacs, and lavenders that turned the western clouds into towering castles of light in the evening. One of the biologists with the *Kermes* had put forward a theory attributing the displays to photodissociation in the upper atmosphere of exotic molecules produced by the planet's lush and varied flora, which made even the tropics of Earth seem unassuming in comparison. The biologist had been challenged by the mission's head physicist and head climatologist, both of whom claimed the subject as belonging rightfully to their domain, and a motion was already being filed back on Earth for the issue to be brought before a scientific arbitration court.

Chelm was seldom drawn into such things. As an archeologist, his field was more self-contained and defined, and territorial disputes with other disciplines tended to be rare. Colleagues warned him that invisibility equated to obscurity, and having a low political profile was tantamount to committing career suicide. Wilbur Teel, his section head, would come poking around, looking for possible areas of overlap that could be used to pick a fight with the linguists or paleo-sociologists, maybe, and hinting that Chelm could help his future promotion prospects by taking a more aggressive stance himself. Chelm sometimes wondered if perhaps he *was* too accepting and passive. But the thought of a future supposedly broadened by getting involved in the perennial rivalries and infighting that went on among the upper administrative echelons back on Earth simply didn't excite him. He wasn't, he supposed, if he was honest with himself, really that competitively disposed by nature—not that he would have admitted it to the ship's psycho-counselor. The fact of the matter was that he *liked* his work and its challenges, especially when it took him out in the field and among the natives. Times like right now, for instance . . .

He sat on the end of one of the log pilings supporting the boat dock that formed the lower level of Ag-Vonsar's house, watching the old man scrape an upturned wherrylike craft that had been hauled up for cleaning and repair. The house was built on stilts like the rest of the settlement at the bottom end of the lake, with storage space immediately overhead, the general living area above, and sleeping rooms above that again. The houses were all interconnected by stairways and bridges to form what was essentially a village over the water. The workmanship was rich, ornate, and precise, bringing to mind a combination of ancient Mesoamerican pattern work and colorful Chinese intricacy. Besides making boats, Ag-Vonsar also constructed sluice gates for the system of water channels and locks that irrigated the surrounding area and allowed the level to be controlled during the season when the river feeding the lake was in flood. The dry dock and shop that he maintained for this heavier work were part of a boatyard built along the shore.

What had first attracted Chelm's interest to this place was a long, low, square-formed block protruding from a hillside and into the water to provide a breakwater and jetty bounding the upper end of the yard. He had assumed it was cut natural rock, until closer examination showed it to consist of an artificial material similar to concrete. Some Lydian structures, such as temples, aqueducts, and bridges in cities and other locations that Terran exploration teams had visited did, it was true, use forms of concrete. But the type was invariably reminiscent of the kind the Romans had developed: tough, virtually immune to demolition in some instances, deriving strength from the filiform binding of carefully blended minerals. The block at the upper end of the lakeside yard, however, was of coarser composition, reinforced internally

by metal ties in the style of Terran patterns that had come into use millennia later—as if the arrival of heavier industry had rendered the earlier reliance on finer-grain chemistry superfluous. Could it be that an advanced culture had existed at one time on Lydia, and then vanished practically without trace? If so, what kind of calamity could have overtaken it?

This was the kind of once-in-a-lifetime occurrence that sent an archaeologist's blood racing with excitement, and—unless Chelm was truly missing something—relegated such alternatives as chairing a peer review committee in some academy or university, or becoming a familiar face on the academic social and cocktail-party circuit, to the depths of irrelevancy and tedium.

And then had followed the seismic images showing broken outlines of even more massive and extended structures deeper down. The mission's steering group had higher priorities than archeological searches, however, and the possibility of even a pilot excavation was on hold indefinitely at that stage. Chelm had made overtures to see what the chances of recruiting native labor might be. The Lydians seemed amiable and willing enough in principle—but he had to be careful of the ship's sociologists and psychologists, who considered any activity of that nature to be part of their turf.

"They suggest structures like levees," Chelm said. "As if this might have been part of the river before the lake formed. They look like bits of levees."

"Levees?" Ag-Vonsar repeated, without looking up. The exchange took place via the transvox channel in Chelm's wristpad, but the process had become so familiar that he barely registered it. He was making an effort to learn the local Lydian tongue, but the number of languages identified already, each with endless dialects, made it a daunting business. The transvox was trained primarily in the speech of a region about the size of Europe's Iberian province, centered on a city called Issen, fifty miles or so from the lake settlement. Landers from the *Hayward Kermes* had established a Terran surface base just outside Issen.

"Artificial embankments built along the sides of rivers," Chelm said. "To stop them flooding over low-lying land."

Ag-Vonsar peered at the strip of the boat's underside that he had cleaned, running a finger along a seam that was showing signs of opening up. He had a surprisingly muscular and well-contoured body for what Chelm judged from his grizzled, crinkly hair, craggy features, and veined hands to be by Terran standards sixty or even seventy-plus years of age. As with most Lydians, his skin had the hue and tone of polished walnut. He wore a loose, red, knee-length tunic with a pouched leather tool belt, and laced boots of a soft material that looked like suede or felt. The doctrine that had once been taught of species developing uniquely, as never-to-be repeated accumulations of accidents, had long been discredited and forgotten. Genetic codes seemed to be universal—the reasons why were still not understood, and hotly debated—expressing themselves similarly in similar environments, and the missions probing ever farther from Earth were no longer astounded to find Earth-like life on Earth-like planets.

"Why would you stop the water that brings life to the crops?" Ag-Vonsar asked finally. "Tame the waters, yes—like the wild horse. But you would kill the horse. Then it can no longer work for you."

"The floods caused a lot of damage to the towns," Chelm pointed out.

"Then they built their towns in the wrong places. The floods deliver the silt that revives the fields. And the *darvy* fish that hatch in the early spring when the floods come eat the eggs of the shiver-fever fly. So it seems that your levees would bring sickness as well."

There really wasn't any arguing with that. Chelm smiled and looked away at the hills tumbling down to the upper reaches of the lake in forested folds and rocky outcrops decked with necklaces of waterfalls and streams. A group of *egani*—ponderous, buffalo-like creatures with shaggy hair the color of an Irish setter—had come down to drink on the far side. The Lydians seemed to have it all figured out. The water here seemed corrosive to metals, eating away the reinforcement bars in the concrete slab to leave little more than stains and residues in the surrounding matrix. Ag-Vonsar used no metal fastenings in his boats, Chelm had noticed, the parts being joined by precise-fitting wooden dowels and pins. The same seemed



to be true of the houses and other constructions forming the settlement. Ag-Vonsar said that the woods used for the houses were of a mix selected to repel the local varieties of bug pests.

The opening bars of *Eine Kleine Nachtmusik* sounded tinnily from the unit on Chelm's wrist. He turned it toward himself and pressed the Answer stud on the band. The inch-square screen showed the face of Praget, calling from the folda-cabin set up as the local field camp on a rise below the end of the lake, where the flyer was parked.

"We're about ready to head back," Praget said.

Chelm looked at the old man. "The flyer is leaving. I need to get back."

"Moishina will take you," Ag-Vonsar said, and then louder, directing his voice upward at the house, "Moishina. Our guest is leaving. Will you take him back to the shore?"

"Yes, of course."

"Okay, I'll be right over," Chelm said to the face on his wristpad. Moishina was Ag-Vonsar's granddaughter. Chelm had left her unpacking and sorting the items he had brought back from some digging farther up along the lake. The family let him use a bench in the lower part of the house. He preferred working there on his own, away from the stifling filtered and conditioned air of the cabin. It was supposed to be "safer" than prolonged exposure to the raw unknowns of the Lydian environment—but the ones who seemed to be sick all the time were those who stayed cooped up in the base. In any case, some kind of soil microorganism had developed a partiality for the plastic that the folda-cabin was made from and eaten through the floor, with the result that the place was overrun by insects.

"Do you know when you will be back?" Ag-Vonsar asked Chelm.

"Well, there are some routine chores I have to take care of back at the base. Not tomorrow, but probably the day after."

"I may not be here. I am due to journey into Issen on business shortly, but the day has not been fixed yet. If I have gone, your work space will still be available, naturally."

"You're sure it's not an imposition?"

"You are always welcome among our family, Stanislow Chelm from Earth."

Chelm thought for a moment. "You know, we could take you there right now if it would help. There's plenty of room in the flyer."

Ag-Vonsar smiled thinly. "I thank you, but I will not be alone. And we prefer our own ways of traveling."

"If you want to contact me while you're in Issen, just have someone enter my name into the Terran comnet. It will find me."

"What is this 'comnet'?"

"Just ask any Terran."

"I will remember. . . . *Moishina!* Are you taking a bath up there? Stanislow's people are waiting."

"Coming. I was just cutting some flowers for Quayzo." Moishina appeared at the top of the stairs as she spoke. Chelm guessed her to be in her twenties. She had the brown, sharply angular features that were typical of Lydians in these parts, and straight, black hair that fell halfway down to the waistband of the short saronglike garment that she was wearing. The stairs were steep and narrow but she descended them nimbly, facing toward them like a ladder, one hand sliding on the guide rail, the other holding a bunch of brightly colored blooms with the stems wrapped in leaves.

As she reached the bottom, the voice of Moishina's nephew Boro called from above, saying something that Chelm's transvox channel didn't catch. "Then tell him to hurry up!" Moishina called back. Boro called out again, shouting this time. A figure that had been approaching across the connecting bridge from one of the other houses—another boy, maybe about ten—broke into a run. A woman's voice came from somewhere, telling them in tones that would have been unmistakable anywhere, in any

language, on any planet, to be quiet. Boro came scampering down as Moishina moved toward a boat moored at some steps leading down from the dock. "A couple of extra passengers," she explained to Chelm, intoning it in a way that seemed to ask if that was okay with him.

"Sure." Chelm shrugged. It was their boat, after all. He followed her, stepping down inside and sitting himself on the center cross-board facing aft. Moishina gave him the flowers to hold while she took up the oar and remained standing in the stern. Boro's friend arrived, climbing aboard behind Boro after expertly untying the mooring line behind him, and the two boys squeezed past Chelm to crouch in the bow. Ag-Vonsar raised a hand in farewell as Moishina pushed the boat away from the dock. She propelled the craft deftly with a rhythmic sculling motion, evoking lithe, supple movements of her body. Chelm had to make a conscious effort to stop himself staring. The boys chattered behind him, trailing their hands in the water. One of them almost caught a fish, and then lost it.

"Quyzo. Is that one of the spirits?" Chelm asked, as Moishina turned the prow shoreward. The Lydians had a spirit for just about everything. Mountain passes, waterfalls, dells in the forest, each one had a shrine to the dedicated being who safeguarded travelers entering its domain, dispensed good fortune or bad, or danced capriciously over the world in the form of the elements. Ag-Vonsar had told Chelm about the *Fessym*—mountain sprites who teased the land into crying tears of laughter, producing the springs that made the river that fed the lake. Chelm had asked him out of curiosity if he really believed magical spirits existed.

"It doesn't matter," Ag-Vonsar had replied. "People should live their lives as if they do, anyway."

"Quyzo lives in the lake," Moishina confirmed. "But he watches over the whole valley. So the village is his family."

"Is he a happy spirit, do you think?" Chelm asked.

"Oh yes, very much. He catches stars to make the water sing and sparkle. You can see them in the lake at night."

They tied up at a wooden jetty below the jumble of slipways and painted roofs that constituted the yard. Boro and his friend disappeared along the shore in the opposite direction; Moishina walked with Chelm up the rock steps that led toward the rise where the Terran field camp was situated. They came to Quyzo's shrine on the way. It did indeed convey the impression of him as a cheerful little fellow, perhaps somewhat inclined toward the mischievous: a finely worked, abstract sculpture of variously tinted stones, set in a rocky niche above a running pool and gazing out at its lake abode over a low stone parapet smothered in flowers. Lydian artists never tried to depict the actual likenesses of their spirits.

Some figures were sitting on the rocks beside the terrace in front of the shrine. It was only when Chelm and Moishina had approached to within a few yards that Chelm realized from the empty expressions on several of the faces, and the simple, guileless smiles on others, that the group was partly made up of *jujerees*, probably being taken on an outing. The nearest English translation was "child-people." They were harmless and incapable of malice, having reverted to a condition of infantile trust and dependency, greeting each new experience with the awe and delight of eyes beholding the world for the first time. The Lydians didn't seem to know what caused the affliction, but the *Kermes'* Principal Medical Officer guessed it to be a genetic condition. There were moments, such as when the petty jealousies and rivalries of life at the base got to him, or some particularly inane and exasperating edict came through from Earth, when Chelm came close to envying them.

Moishina unwrapped the flowers she had brought and placed them in one of the vases along the parapet, picking out the previous withered occupants and dropping them in a receptacle to one side, provided for the purpose. She fell silent for what Chelm assumed was a quick prayer or moment of reflection, and then turned toward one of the women minding the *jujerees*, who had come over. "Forgive me if I intrude," the woman said.

Moishina smiled. "Not at all."

"I just wanted to say welcome to the Terran. I have seen them at their work up above, but never

spoken with one."

"Stanislaw Chelm," Moishina said, extending a hand to introduce him.

"My name is Norelena. We have come from Veshtor, over the hills to the east, to bring our charges here to see the valley and the lake." Norelena's voice dropped to a more confidential note, as if confessing the true reason for wanting to talk with them. "And you *have* to take a break from them sometimes—otherwise I'm sure you'd end up the same way."

Moishina chuckled. "I can imagine it."

Chelm sensed a movement nearby him and turned. One of the *jujerees*, who had previously been gazing rapturously at the lake and the mountains, had stood up and moved over. He was lighter-skinned than most of the Lydians that Chelm had met, with rounder eyes and less angular features. On Earth, appropriately dressed, he wouldn't have looked out of place on a typical street. Chelm did his best to act naturally and mustered a grin. "Hi."

The child-person grinned back. His eyes were depthless as they looked into Chelm's, interrogating him as if he were a new sight to be analyzed and registered, but conveying no hint of any shared thought or percept that could enable communication. And yet, just for an instant, Chelm had the feeling of something searching, reaching out toward what some instinct said should be there, but not knowing how to recognize it if it were.

And then the *jujeree's* gaze fell to the Sol-Federation Exploration Division emblem on Chelm's lapel—a gold-on-blue spiral motif with flashes, representing the galactic structure and unleashed energy. His face widened into a smile. "You like the badge, eh?" Chelm said. The *jujeree* didn't speak, but reached out to touch the embossed metal surface. It seemed to fascinate him. "Here, you can have it." Chelm unpinned the badge and pressed it into the *jujeree's* hand. The eyes looked at it, then up at Chelm once again. Chelm nodded encouragingly.

"It's yours," Norelena told her charge. "You can keep it." She glanced at Chelm. "Thank you so much . . . Stanislaw Chelm. You have no idea what such things mean to them." Moishina was staring too, as if seeing him in a new light.

On the top of the rise higher up behind the shrine, Chelm could see the team standing around the flyer, obviously waiting for him. He picked out Praget, making impatient gestures and waving down toward the terrace. Praget's arm came up to let the other hand stab at his wristpad, and a moment later the call tune sounded from Chelm's unit. "Okay, okay, I'm coming up now," Chelm said before Praget could start.

"Well, hurry it up. What have you got going down there, a union meeting? The rest of us would kinda like to get back sometime between now and the next ice age."

"On my way," Chelm said again, and snapped the call off. He was about to bid his farewells, when he noticed the *jujeree* staring at the wristpad. Chelm shook his head. "Uh-uh. Sorry, but that's different. I can't let this go."

"Mozart," the *jujeree* said.

Chelm blinked in astonishment and looked from Moishina to Norelena. "Where in hell did he learn that?"

"What does it mean?" Moishina asked.

"That bit of music that it played. Mozart was the person who wrote it. But that was hundreds of years ago, back on Earth."

Moishina looked perplexed. "I don't know. . . ." She faltered. "There have been Terrans all over Lydia for a while now. I suppose it's amazing how such things can be picked up."

\* \* \*

Although the Lydians showed no hostility toward the Terran presence—indeed, they seemed to have little concept of such things—Issen Base, with its lander pads, situated five miles outside the city, had

been "secured" inside a double-layer chain-link fence protected by sensors, surveillance, and guards. Regulations and routine procedure required it. When the Principal Medical Officer, after conferring with the Scientific Advisory Committee, declared the base to be also microbially "safe," the facility began expanding and taking on additional comforts as more administrators and officers, along with their staffs, tired of more than two months of being in the ship, began moving down to the surface.

Chelm sat in front of Wilbur Teel's desk, staring out through the window of the cubicle appropriated by Teel as his office in the blandly rectilinear assemblage of prefabricated modules that officialdom in a dazzling flash of creativity had designated "Block 3." Teel was turned toward one of the screens, taking a distress call from Chuck Ranneson in the Cultural Exchange Center, set up in the city to give the Lydians a preview of the benefits they stood to enjoy from being subsumed into the Sol Federation economic system.

"What do you mean, not interested?" Teel challenged. "Are you telling me you can't even *give* the things away? You're supposed to be a sales negotiator. How do you think this is going to look on your review?" A routine ploy in the opening up of new worlds was to distribute portable screenpads to the natives with a chart of easy-to-use icons to whet their appetites. The assortment of included games and advertisements was designed for appeal to the younger set.

"They're not interested in talking to people on the other side of the planet, or watching things happen on Earth or anyplace else," Ranneson answered. "They don't see the point of it. They say their . . . I'm not sure what you'd call it; the best the transvox could come up with was 'awareness circle' . . . isn't shaped by what happens on the other side of the planet."

"There have to be kids there. Have you shown them the games and the movies?"

"They laugh at them. A bunch that I talked to couldn't see why people would want picture-lives when they can live real ones. But they thought things like that might be something to amuse . . . what do you call those smiley-face retards? *Jujerees*."

"What about the merchandising catalog? Look at what we're offering: fingertip-control environments and appliances; modern transportation systems; planned health care and psychiatry; entertainment in the home. . . . I thought you knew how to *sell* things, Ranneson. Maybe we should think about relocating you to a clerking slot up in the ship. . . ."

Outside, just inside the gate, a work crew was setting up an isolation-and-decontamination tent that the ship's legal counselor had insisted on, even though the doctors deemed it unnecessary. Although he thought the chances would be slim, Chelm had put in for approval to move his quarters out of the base. He had mentioned the thought to Ag-Vonsar, who had arrived in Issen on his planned visit, and Ag-Vonsar had said he would introduce Chelm to a friend who could arrange accommodation. Out of curiosity, Chelm had arranged to go into Issen and meet them anyway later that day. Even if nothing came of it, it would be an excuse for spending an afternoon away from the base.

"Okay, where were we?" Teel had finished his conversation with Ranneson and was ready to continue. Chelm switched his attention back from the window. Teel had a long, pallid face made up of furrows that arched from the forehead to hang vertically at the jowls, putting Chelm in mind of the lines of a Gothic cathedral. He seemed born to endure all the woes and afflictions that could beset a man, venting the resulting biliousness on his subordinates with a relish that, in unguarded moments, came close to revealing a capacity for enjoying at least that aspect of life.

"Scraping the barrel of the budget," Chelm answered.

"Right. . . . Look, you know as well as I do that archeology isn't exactly what you'd call high on our list of priorities. A mission like this only has so much in the way of resources. The things that advance our primary objectives get first bite: economic reform; geology and resource prospecting; introduction of an energy and transportation infrastructure, political restructuring. . . ."

"But there's symmetry down there. It's clearly geometric. Those patterns didn't form by themselves through any accident." Chelm was referring to the latest series of ground-penetration radar scans taken

from orbit, which had revealed what could have been the remains of vast structures or engineering works extending sometimes for miles beneath tracts of what were now jungles and deserts.

Teel shook his head. "You still don't grasp it, do you, Chelm? We're in the business of creating new worlds, not digging up old ones. The potential returns are huge for opening up a backward place like this. Twenty years from now it will be as profitable and progressive as the Los Angeles-San Diego Strip. And they have no concept of effective political organization here. No military. When we've appointed regional governors and set up local systems of provincial administration and control, the markets for defense and security alone will be worth tens of billions. Investors are already lining up back on Earth to get in on a share of Lydia."

Chelm hadn't seen anything on Lydia—apart from the armed Terran guards watching the perimeter fence—that anyone might need to be defended against. Before he could put the thought into words, however, Teel rose from his chair and came around the desk to stand looking out of the window, as if in his mind he could already see a complex of office towers, malls, and freeway bridges replacing the arches, alleys, temples, and domes of Issen's center, and the hills behind cleared and cut into leveled industrial terraces. He went on, "Now, *those* are the people who have to come first: the ones in charge of the enterprises that the consortium is interested in. And we have to back them, because the consortium generates not only our direct funding but also our political support. Now, if you were to help us keep them sweet, then who knows? Anything might happen. Maybe, even, brighter prospects for archeological research. But you have to learn to play the game."

"I'm not sure I know what you mean," Chelm said, although he did, perfectly well.

Teel sighed and turned from the window. "We've been through this over and over. I'm talking about your general attitude and refusal to fit in with the system. If you want to run your own life and professional career into a dead end, it's your business, and frankly I don't care. But when it affects the performance of *my* section, that's something else."

"But you've just told me that nobody's interested in what I do," Chelm protested. "What else is it you want?"

"That's for you to figure out."

Chelm turned up his palms helplessly. He had never been able to play these kinds of games. "You're losing me. I put in the requisitions for what I need. They were thrown out. You obviously endorse that decision. What more am I supposed to do?"

"What you're supposed to do is understand the politics of scratching other backs if you want them to scratch yours. Nobody's going to be interested in supporting your agenda unless it helps advance theirs too. Is that simple enough? What you have to do is get more involved in what's going on around here and develop a nose for *opportunity*." Teel stamped across to the desk and picked up a piece of paper that had been lying in the center. It was Chelm's application to be billeted in the city. He wheeled about, brandishing it aggressively. "But what do we get? Instead, you want to run away and hide from what's going on. Do you really think that's the way to build the right kind of relationships with the people here who can get you what you want?" He tore the offending document in two, then again, and dropped the pieces into the disposal unit. "No way, Chelm. You need to learn how to become a functioning member of the team here first, before you even think about something like this. Request categorically denied."

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Chelm had booked a ride into Issen with a utility shuttle bus running personnel and sample wares to the Cultural Exchange Center. But he always found confrontations like this one with Teel unnerving. On leaving Teel's office, he popped a tranquilizer from his medical pouch and went over to the rest lounge in the Lab Block to calm down. Thankfully, it was empty. While he sat savoring the moment of solitude and feeling the pill kick in, he checked his mail via his wristpad. Among the items listed, he saw that a communication had come in from Ursula, his fiancée for more than three years now, back on Earth. He selected it and tapped in the code to download from the ship.

Ursula was tense and edgy as always, like an overwound spring about to fly off its mounting. Chelm put it down to interactions between the medications she took for executive stress syndrome, high blood pressure, neuronal hypersensitivity complex, and emotional oscillatory metabolic reaction, but Ursula insisted that it simply reflected the heightened activity that came with the lifestyle of a high-achieving professional. The latest scandal back home was that the drug mandated for trans-System travelers following the cosmic radiation sickness panic had been shown to be worthless despite the miraculous success rates claimed for it, and the whole episode was unraveling as a gigantic fraud. The legal and medical associations and involved government departments were all claiming innocence and blaming each other, while the Sol Fed health secretary, having promised full investigation and exposure of the culprits, had resigned following revelations of massive family stockholdings in the prime corporation raking in the take. A Titan Liberation Alliance nuke was believed to have taken out the Federal Security Agency's orbiting bombardment station there, and construction contractors on Mars had put a moratorium on further work and were organizing protest boycotts of supply ships in response to a forty percent hike in insurance rates.

Closer to home, Ursula's rival for a big promotion opportunity was out of the running, having suffered a breakdown following the failure of a hostile takeover bid that he had masterminded—which was good news; Ursula needed the extra money that the position would bring to cover the deferred loan she had taken to pay off the called-in option on the Sirius-B transmutator scheme that hadn't worked out. Two militant atheist sects were waging legal battles and disrupting each other's meetings in a dispute over whose were the *correct* reasons for not believing in a God. California was going ahead with banning home cooking on the grounds that nutrition needed to be regulated and should be dispensed by licensed professionals. Chelm's nephew Toby had gotten his medical certificate and permit to ride a pedal cycle. Sister Celia had suffered traumatic shock after falling off a barstool from disorientation caused by the lighting, but she was expected to recover. Oh, and yes, did he have any idea yet when he would be coming home? She had found a bigger house with *gorgeous* landscaping, domestic robotics throughout, Olympic-equipped exercise room, and a full VR simulation deck, but the loan would be more than she wanted to take on by herself—especially with this Sirius-B business. . . .

At that moment, the door slid open and Jen from the exopsychology section came in. "Hi, Stan," she greeted, going across to the autochef to punch in the code for a straight black coffee, and reconfirming it without waiting for the health warning to appear in the window. Since just about everything came with health warnings; their effective information content was close to zero.

Jen was one of the few people that Chelm felt at ease with. She was open and honest by nature, good at what she did because she liked it, and uninterested in cultivating faked imagery and "style," all of which added up to a fair guarantee that she would never rise far on the generally accepted scale of recognition and success. But the most delightful thing was that she cared about as little as Chelm did—if that were possible; and she harbored fewer inhibitions about saying so.

"Oh-oh." She took in Chelm's strained look and dropped the everything-going-well-with-the-world smile that she had been wearing. She had wavy red hair cut short, and a freckly, snub-nosed face to which smiles came easily. Her ancestry, she had told Chelm once, was from a Celtic people who had inhabited central Turkey in Roman times. "You look like your face was hung on you to dry. Dare I ask? Would the problem be something that begins with tee and ends with el?"

"You're uncanny. How do you do it?"

"Oh, it's a gift that I have. They didn't put me in the shrink shop for nothing. So . . . what's he done now?"

"Given me all the reasons why I can't have what I need to do my job; then more or less told me it's my fault for not knowing how to get them. What's so infuriating is that I'm sure I'm onto something big, and he knows it. He's reveling in the power trip."

Jen nodded knowingly. "It's the same old story. He wants you to fight for it."

"If that was my way of doing things, I'd have joined the security forces. Tell me, Jen, is there really no

other way of relating to other human beings other than antagonism and confrontation? Everyone trying to screw everyone else first all the time. No trust, no integrity. Or is there simply something wrong with me? I'd really like to know."

Jen took a moment to sip her coffee before answering. "There are other ways. At least, there used to be, so I believe. But we seem to have created a culture that excludes them."

"Not everyone feels that way—you and I don't, for instance," Chelm pointed out.

"Yeah, right. And how much of the world takes any notice of what people like us think? Let's be honest, Stan. We're the sheep, and the wolves have taken over. Maybe it's some kind of inevitable, natural law, like the one about bad money and apples."

"God, I wish I could say you were wrong. But . . ." Chelm shook his head. "At least it doesn't seem to have affected the Lydians yet."

Jen made a face. "Don't speak too soon. I heard this morning that if Yassik doesn't come around and start playing ball soon, some of the Directorate are pushing for just going in and imposing a hard-line, military style. Investors are getting impatient. The argument is that there's nothing to stop us, so why mess around? Lydia doesn't have a single militarized state, let alone any capability to defend the planet.

Yassik was the ruler of the surrounding area, which he governed from Issen city.

The usual pattern in Terran programs of planetary "cultural advancement" was to recruit native rulers who could be relied on to manage the local populations in ways that kept order and served Terran interests. In return for cooperation, the Terrans guaranteed wealth and prestige, military assistance in the elimination of foreign rivals, and help with security and civil control at home. Not a bad deal for the typical shakily ensconced nabob or ambitious upstart. The problem with Yassik was that he seemed anything but insecure or ambitious, and had been unresponsive to attempted bribes, flattery, grandiose promises, and the other routine approaches.

It took Chelm a few seconds to absorb the ghastliness of what Jen was saying. Was it really about to come down to this: unprovoked aggression and military occupation to exploit an inoffensive and defenseless planet? Jen had said on a previous occasion that greed and power-lust could become addictions, stimulating the same neural chemistry as hard psychotropic drugs. "We don't have that kind of firepower, surely," he said, more to convince himself. "Just this mission. . . . A whole planet? Even if it's wide open."

Jen shrugged. "So call in backup from Earth. They could be here in under three months. You know as well as I do how easily a pretext can be concocted for the folks back home."

Chelm looked at her glumly. "Well, thanks for really making my day complete, Jen. As if it wasn't bad enough already with—" A peal of squeaky Mozart from his wristpad interrupted. "Excuse me." He took the call.

"Dr. Chelm. Shuttle bus driver here. We need you out here, sir. Departing in ten minutes."

"I'm on my way." Chelm clicked the call off. "I have to go. I'm taking a break this afternoon. Going into town. Strictly unofficial."

"Playing hooky, eh?"

"I think I need it." Chelm winked. "Promise you won't tell teach?"

"How could I? I never heard a thing."

\* \* \*

The road into Issen followed the bank of a river with steep, rocky banks, winding its way between hills planted in rows of small trees reminiscent of Mediterranean olive fields and vineyards, with open pastureland above. Houses huddled along the valley bottom among orchards and gardens watered by systems of interconnected ponds that reminded Chelm of the irrigation scheme he'd seen around the lake settlement. As at the lake, the designs were intricate and lavish with ornamentation, and yet carefully balanced—as if pleasing the eye and harmony with the surroundings were as important as function,

warranting every bit as much thought and effort. For Chelm, this was a revolutionary concept. It flew in the face of all the accepted principles of cost-effectiveness. And yet, thinking about it, he was unable to come up with a good reason why the practices he was familiar with should be considered a better way of utilizing the vastly superior wealth that he was assured his own culture possessed, if the result was the stark, styleless, but eminently practical configuration of blockhouses that made up the base he had just left.

The contrast became even more marked at the outskirts of the city itself, where the bus left the river at a lock gate that also served as a swing bridge. The buildings clustered closer and higher, eventually linking together across the streets in a bewilderment of connections and bridges, among which narrow alleys and stairways twisted their way out of sight on mysterious errands to hidden reaches of the city. Although alive with the bustle of shops, stalls, and crowds going about their daily business, the surroundings were well kept and clean. This was even more so in the central precinct, where the architecture took on more grand and imposing proportions, boasting minarets and columned frontages facing terraced plazas, and animal traffic was excluded. It could have been pieces of ancient Athens, Rome, and the Arabian Nights all blended together incongruously. To one side, across a square bounded by a canal and walled gardens, a new construction of high arches and onion-shaped domes was nearing completion amid a labyrinth of ramps, scaffolding, and ladders. Rendered in orange and green, it in some ways suggested the former Taj Mahal—before its destruction in a federal air strike during the Indian and South Asian Uprising against the Terran central authority. The stepped bridge connecting the square to the far side of the canal, where several tiers of buildings rose below a line of figures cut into a cliff face, added a dash of Venice to the mix.

The bus halted by several other vehicles that were parked outside of the building that one of Yassik's ministers had made available for the Terrans to use as their Cultural Exchange Center—a three-story affair of protrusions, gables, and balconies, rising to a riot of blue-tiled roofs and turrets. The Terrans had draped the outside with plastic sheeting to confine the air from the conditioning and filtering plant that they had installed, and hooked up a mobile fission generator for power. Chuck Ranneson was on the steps in front with one of his assistants, plugging to passersby through a megaphone, while a screen set up behind him showed a commercial clip for an Australian amusement park, but the only attention being paid was from a small audience of curious young children. Chelm avoided them and crossed over the street to where he had already spotted Ag-Vonsar waiting as promised. With him was a man with a short, tousled beard, clad in a gray, knee-length tunic and a dark brown cloak with the hood thrown back. Ag-Vonsar introduced him as Osti, who had space available that Chelm might find suitable. They crossed the river in the center of the city, which seemed to be devoted to public and administrative buildings, and from there came back into the peripheral area.

Chelm was impressed by the brisk, powerful pace that Ag Vonsar was able to maintain—without benefit of aging retardants, energy boosters, or exercise machines. Or perhaps he had not yet learned to judge a Lydian's years. Very soon, he had lost all sense of direction in the maze of alleys, squares, bazaars, and arcades. He felt himself becoming strangely euphoric. The scents of the blooms in vendors' displays and window planters along the streets blended with the odors of fruits and strange foods being cooked on curbside stalls and in open shops to produce a constantly changing background of exotic aromas that made him heady. His two companions kept up a commentary on curiosities and points of interest that they passed, but Chelm was too absorbed by the hubbub of voices and sounds punctuated by peculiar music, the patterns and the colors, the unintelligible signs and banners, and the curious faces turning to watch him wherever they went, to more than half listen. It was as if the vibrancy and vigor around him on every side had energized a part of his being that had been dormant throughout what, up until now, he had called life.

Osti was a potter, and the place they eventually brought Chelm to consisted of two rooms above his workshop, approached from the rear via stairs from an alley descending erratically through a tangle of interconnected architecture. Two sons had lived there previously, but the older one had moved out to start a family of his own, whereupon the other had left for the coast to seek adventure at sea. The interior



was open and airy, with windows at the front and a small balcony overlooking a cobbled court that led down to a quay by the river. All the essential furnishings were there—even a countertop built along one of the walls, which would make a good desk and worktable. It was ideal. Chelm found himself wishing that he hadn't let his curiosity bring him here. The thought of having to go back to the base was almost painful.

The rooms had been recently cleaned, and there was a scent in the air from a vase of flowers beaming color in one of several niches built into the walls. Somehow, Chelm couldn't see this as the work of Osti or Ag-Vonsar. But the question was answered almost immediately, when Ag-Vonsar's granddaughter Moishina came in carrying a flask in a wicker container, and a dish of hot, spicy-smelling food that she had brought from somewhere. "Our lives come together again—yours from Earth, mine in Lydia," she said, in one of the peculiar Lydian forms of greeting. "The cupboard was left empty, so I went to get something. This is called *kinzil*. And some wine."

"You needn't have . . . but it's appreciated," Chelm said.

"But it would be unforgivable to invite someone under one's roof without offering food." Moishina sounded surprised, as if stating something that was well-known.

"And the flowers? Are they for another spirit too?"

"No, for you. To brighten your new home. Companions for you, you see."

"It's not my home yet," Chelm cautioned. "And might not be at all. There could be a problem getting approval at the base." He couldn't bring himself to say that it had already been refused outright. There might still be an angle.

"You have to have permission for where you live?"

"The place needed opening up and airing anyway," Osti said. "We are grateful to you, Moishina." He looked at Chelm. "How long will it take before you know? . . . Not that there's any hurry."

"A couple of days, maybe." Chelm gazed around again, for a moment savoring the feeling of acting like a serious buyer. Then he looked back at where Osti and Ag-Vonsar were standing. "Out of interest, if I did get clearance, how much would we be talking about?"

Ag-Vonsar made a brushing-away motion in the air. "Ah, don't worry, Stanislaw Chelm. We can talk about that at the appropriate time."

"Really. I'm curious."

Osti looked a little awkward and pursed his mouth. "Oh, I had been thinking of around, say, ninety zel for a week. Or we could make it by the greater-moon month."

Chelm was thrown off-balance. He had done some checking around, and from what he could make out, the figure was substantially below the going rate. His first impulse was to actually offer more, to bring it up to what seemed fair. . . . But then, on the other hand, he couldn't be sure that all his impressions were accurate. And in any case, he didn't want to come across as a pushover—especially since he was still feeling sore after his run-in with Teel. So in the end, he merely nodded vaguely.

"You are too generous," Osti said.

The meal was like a pita bread with a filling of meat and vegetables; the wine somewhat on the dry and tangy side, but Chelm decided he could get used to it. They talked about Osti's sons and some of the antics they had gotten up to here, the news from Ag-Vonsar's part of the world, and things for Chelm to do and see if he did end up moving into Issen. Ag-Vonsar and Osti were curious about Chelm's interest in the past history of their planet's cultures. Chelm got the impression that such a concept was new to them. A civilization in its early stages wouldn't have developed much concern about unearthing the past, he supposed—which was galling, since precisely for the reason that it was young, it would be in a position to preserve priceless information about its roots that could only be recovered with so much effort later—and incompletely at that.

"You should talk with some of the *nejivan*," Ag-Vonsar said. "They preserve knowledge of the ways

of past ages. They would be able to help you. I will inquire for you." The *nejivan* were a caste of priest-judges, as far as Chelm had been able to make out, who served in the temples and courts, officiated at such ceremonies as marriages and funerals, and provided the society's foundation of law and teaching generally. They probably wouldn't have much that bore directly on Chelm's area of interest, but Ag-Vonsar had made the offer in good faith. Chelm accepted it, and thanked him.

Then Chelm checked with the Cultural Center for the schedule of transportation back to the base, and declared reluctantly that he would have to be leaving. Ag-Vonsar and Osti had business to attend to elsewhere. Moishina said she would take Chelm back across the city to the Center.

\* \* \*

They took a different route this time, through a garden of pools and cataracts, where the rocks had been exquisitely carved into animal forms, then along the river past docks and wharves surrounded by boats. People who wanted to be invisible could lose themselves permanently in a place like this, Chelm thought to himself. No scans, ID profiles, or registration with any authorities required; Lydian doctors were surprisingly skillful, and would easily be able to remove the implanted microchips that most Terrans possessed—in some cases mandated—that could be tracked to within a few feet by satellites. Which brought to mind the still-unsolved mystery of the vanished *Oryx*.

"Tell me," he said to Moishina, "do you know of other Terrans ever having been here? Another ship like ours, that came . . . it would have been around five of your years ago?"

"I have heard of such questions being asked. But no. I'm afraid I have no answers that I can give you."

But the ship *had* been in orbit over Lydia. That didn't prove it had sent down landers, of course. But having come this far, what reason could there be for it not to have done so? Then again, there was nothing that said they had to have chosen the same area to land in. All the same, from what Chelm had seen of the way things worked here, it would be strange if any news hadn't reached Issen during all that time.

They came to an open market exhibiting wares of every description, with musicians and street entertainers playing to small crowds among the stalls. Seeing the vendors and buyers haggling reminded Chelm of the uncertainty he had felt about dealing with Osti. "I wondered if I was being too easy," he said to Moishina. They had stopped for a moment to look at a stall hung with pictures and tapestries.

"You were gracious to agree," she replied. "We were impressed."

Chelm felt relieved. "I thought the expected thing might be to offer him less. But the figure seemed low anyway. And in any case, somehow it wouldn't have felt right . . . as a guest, not knowing this world well yet."

Moishina frowned, evidently puzzling over what he had said. "Why would you want to offer him less?" she asked.

"Force of habit, I guess," Chelm replied, with a shrug. "Business is business. I know it was a good rate to begin with, but . . ." He let the rest hang, seeing that she wasn't following. "Well, isn't that what you do here?"

She shook her head. "No. . . . You always give a little more, ask a little less. That is the way we are taught. You must return more to the world than you take. Otherwise, how could it feed us all?"

It was then that Chelm registered the exchange that was going on between the stallholder and a prospective customer who had taken a liking to a carved wooden relief showing boats passing under a bridge.

"I'll tell you what. I'll give you eight zel," the buyer said.

"Do I look as if I'm hungry or incapable of managing my affairs? Five would be quite sufficient. . . . Very well, make it five and a half."

"And do I look so tattered and ragged that I need to rob a trader who brings us such fine works? It

is surely worth seven. Any less, and you can keep it."

The buyer was insisting on the higher price, and the seller was trying to bid it down. Chelm looked at Moishina perplexedly. "I don't understand. They're both trying to give money away."

"Yes," she agreed. And then, as if to explain, "As much as they can afford to, at least."

Which didn't explain anything. "You mean people don't try to get more of it?" Chelm asked, becoming increasingly bewildered.

"Why would they want more than provides for their needs?" Moishina replied. "Getting it would just take time out of their lives, which they would rather spend doing the things they want."

"But wouldn't more money mean they could buy more of what they want?"

Moishina shook her head. She seemed to be having as much trouble understanding Chelm. "Money is necessary for fulfilling obligations that you would prefer not to have. Needing more means being less free." She thought about it some more, as if trying to make sense of how it could be any other way. "On Earth it is not the same?"

"Not at all. It would be considered inefficient. Impossibly inefficient."

"So, what is efficient?"

"Being profitable. Making as much from a deal as you can."

"As much what?"

"Money." Chelm waited, saw that he still hadn't gotten through, and elaborated. "Buy low and sell high. It's really very simple. The bigger the difference, the more you get to keep. So everyone makes a living."

Moishina rubbed her brow with a knuckle. She was obviously having a hard time with this. "So that is the way you are taught? On your world, everyone takes as much as they can, and gives as little in return as they can get away with? But if everyone is trying to take from you, you would have to protect yourself. Is that why the Terrans have built the fence around their base?" Chelm recalled that he had seen nothing resembling a lock or bar on the door into the rooms that Osti had shown him. All of a sudden, a lot of things that he had always taken as self-evident didn't seem so obvious anymore.

"It's the way to create wealth for investing in better things," was the best answer he could come up with.

Moishina seemed to take a long time thinking through what that meant, and then shook her head again. "I don't think that Quayzo would be very happy in that world at all," she replied.

\* \* \*

It was two days later when Chelm received a summons to Teel's office. He arrived to find that Carl Liggerman, the mission's Chief Security Officer, was there too. Liggerman was a heavy, thickset man, with close-cropped black hair, a permanently blue chin, and pugnacious, beetle-browed features. He suspected everyone and everything, was devoid of humor, and Chelm had always found him intimidating to the point of devastating. Chelm had no idea what transgression might have prompted a confrontation with the two of them in concert. Surely it couldn't be his unauthorized jaunt into Issen, which would have warranted a rebuke from the section head at most. He steeled himself for the worst. Their manner, however, came close to being conciliatory.

Teel began. "When we talked before, I said that by showing more awareness of the mission's priorities, you might do yourself a favor when it comes to getting support for your own objectives. Specifically, it's possible that the questions you've been raising with regard to archeological research could be reviewed in a more favorable light."

"Oh?" Chelm was immediately suspicious and responded neutrally.

Liggerman leaned forward to take it, as if Teel were mincing around the subject. "The big problem we've got out there right now is that Yassik doesn't understand progress and can't recognize an

opportunity when it's being waved under his nose."

"Utterly uncooperative," Teel said.

Liggerman continued, "When we've run into this kind of situation before, there have always been rivals or disaffecteds of some kind that we could install, from at home or abroad, who would see things more realistically." He made a resigned gesture in the general direction of the city. "But in Lydia, we haven't been able to identify anyone who would fit that role. The ones we've approached either act like they don't understand, or they pretend they're not interested. What it has to mean is that they're holding off until they get a better handle on why we're here and what's in it for them—and that's not altogether a dumb move. But we've got a ball to get rolling. We don't have time to sit around admiring the scenery until they decide to show their hands."

Chelm nodded that he understood, at the same time asking with his expression what any of this had to do with him. Teel chimed back in. "You seem to have developed a closer rapport with some of the Lydians than most of us, Chelm. Even—and I don't mind saying it—the professional ethnic psychologists. That could make you the ideal person to sound the Lydian situation out for us." He paused for a moment to let Chelm digest that. "You see my point? Maybe *you* could get them to open up and be more forthcoming; find out who and where the potential movers are. Then it's just a case of dealing with the more ambitious ones and seeing what motivates them. Everyone wants something. There's always an angle, eh?"

Chelm could see the picture now. The mission's program was stalled because the people who were supposed to do the political groundwork had failed to recruit the native leadership and were getting nowhere trying to find a more "responsive" element that could be used to foment trouble as a pretext for Terran intervention. Teel had seen a possible opportunity for his department to reap big credits with the ship's Directorate, which in due course would be communicated to Kermes-Oates Restructuring and the authorities back home. The deal for Chelm, as Teel had said, would be a more receptive attitude toward his work. There was more too, he realized as he leaned back to consider the proposition. Liggerman voiced it.

"Naturally, this would make a big difference to the application you filed to move into the city. With your leads and contacts, it would be the perfect place to be based for collecting the kind of information we want. So there it is. How long do you need?"

There really wasn't anything to think about. In his mind, Chelm was picturing the two rooms above the pottery workshop already. In any case, what did the alternative have to offer? "I can give you an answer right now," he replied. "Okay, I'll take it."

\* \* \*

Chelm's clearance came through later that same day. Within hours he was packed and ready to go. His quarters in the base had already been claimed by a Kermes-Oates development planner from the ship, who cited her work as requiring her to be in proximity to the city. She was drafting an outline proposal for the first phase of restructuring and listing the sites to be scheduled for demolition. But it was equally an instance of anyone who had the right authority or pull getting themselves a posting down on the ground. For those who didn't, it worked the other way. Chuck Ranneson, as Teel had threatened, was consigned back up to a ship-bound job to make room for one of Liggerman's aides to move down.

Chelm moved out to his new abode the first thing next morning. He was even able to arrange for his pay to be issued in Lydian zel. The Lydians had supplied a list of Terran products and equipment that they required, presumably out of curiosity or for evaluation, and which they insisted on paying for. Hence, the Terran administrators found themselves flush with Lydian currency that they were happy to dispose of. Presumably some system of regularized currency exchange would follow. Chelm wasn't really an expert on such things, but in the meantime it meant that he had the wherewithal to do some shopping.

Jen was at the Cultural Center in Issen that morning and took a couple of hours off to come and see Chelm's new abode, immediately falling in love with it. They went out together for some household items

and comforts to make the rooms homey, in the process making some headway in getting to know the neighborhood better. Chelm explained to Jen about the custom of always trying to give a little more and take a little less, which she laughed at delightedly and thought was wonderful. Nevertheless, they emerged as patsies when it came to Lydian bargaining, somehow ending up with a lamp, some towels, and a serving dish that they had allowed to be foisted on them for nothing as "welcoming gifts" to the alien.

"How did you get approval to move out?" Jen asked when they got back, obviously taken by the thought of trying something similar. "Do you think it might work for me too if I applied?"

"It couldn't hurt to try, I guess," Chelm told her. He tried not to sound too hopeful. Going into the deal he had struck with Teel and Liggerman would have spoiled the day. "Maybe I just got lucky."

\* \* \*

The next day, Chelm was visited by a young man in a yellow robe and hooded green cloak who introduced himself as Troim, an acolyte of a high *nejivan* called Xerosh. Xerosh had heard word of Chelm's interest in Lydia's past ages—presumably from Ag-Vonsar—and humbly offered to share what knowledge he possessed. And in any case, he wished the honor of meeting the traveler from afar who had come to live in their city.

Troim took Chelm into the center of Issen, arriving at a large building of stone with inlays of what looked like polished marble, set atop steps that converged toward high doors framed by a triangular architrave bearing reliefs of human forms and supported by pillars. The building was a peculiar mixture of designs, with lower walls sloping back like the base of a pyramid, a stepped, ziggurat-style center portion, and the top part culminating in a large, silvery dome. Inside, they passed through a succession of arched and columned halls, carrying a continuous flow of people coming and going, that seemed to combine the functions of temple, public forums, and city offices. A broad central stairway took them up to an overlooking gallery behind balustrades, from which corridors diverged in several directions. They found Xerosh in a chamber along one of these, poring over charts laid out on a table set among shelves crammed with manuscripts and bound volumes.

Chelm had pictured a patriarchal, Moses-like figure, with flowing white hair and a beard. Xerosh was wearing a robed tunic similar to Troim's, with a dark red cloak and the addition of a thick, braided belt and a silver medallion hanging from a cord about his neck. Otherwise, he was fiftyish, maybe, clean-shaven with dark, cropped hair, and square and stocky in build. He had smooth, rounded features that carried fewer lines than his years should have produced, and large, deeply intense, dark brown eyes.

"Xerosh, *Kal-nejivan* of Issen," Troim said, addressing him. "Stanislaw Chelm, archeologist-scientist from Earth."

Xerosh extended his hands. "Our world is yours. May life return to you what you give to life. Welcome to Issen."

"You are too generous." Chelm gave the standard Lydian response.

"Thank you, Troim. You may leave us," Xerosh said. The acolyte bowed his head toward Xerosh and Chem in turn, and departed. The two men exchanged formalities and politenesses for a while, Xerosh asking Chelm about the differences between Lydia and Earth, and the impressions he had formed since arriving. Finally, he came to the subject of Lydia's past, and how could he be of assistance?

Chelm tried to convey the idea of archeology and its purpose. Was there anything along the lines of a museum in Issen, which might start him in the right direction? His transvox channel had trouble finding a Lydian equivalent to the word. "A place where things are preserved that have survived from long ago," Chelm said. "So the story of the people who lived then can be reconstructed."

"Ah, yes. We have stories of long ago," Xerosh replied.

He conducted Chelm back to the gallery with the balustrade, and from there to a rear stairway leading down—smaller than the one Chelm had ascended with Troim. A passage brought them to a space that seemed to form a rear vestibule into the building. The way from the interior—through which

they had just emerged—was flanked on either side by massive square pillars, tapering upward, carved with intricately interwoven linear designs. Xerosh turned and motioned for Chelm to look up at the tablet set into the wall across the space above, between the pillars. It must have been fifteen to twenty feet long, of a smooth, dark rock, almost black, and was inscribed all over with depictions of stylized human forms involved in undecipherable events; animals, artefacts, and enclosed spaces with apertures, that could have been fixed constructions or vehicles; and patterns of signs and symbols written in rows above and beneath, and interwoven among the scenes to divide them into what looked like a narrative series.

"This tells the story from the earliest times, when the world and the sky were born from the thoughts of the spirits, and only the animals walked the land," Xerosh said. Staring up at the tablet as if reading, he recited, "And then there came giants, who rode upon stars and possessed powers beyond those known to men. They could turn night into day. They commanded fire from rocks, that shaped matter into whatsoever form they desired. They imprinted their will into the very designs that cause living things to grow. Neither distance nor time, nor vastness nor minuteness, nor limits of memory or thought, were impediments to their knowledge. Yet their hearts burned with covetousness and rage, and they fought ferocious battles that laid waste the earth to possess that which cannot be possessed, and as the Dark Gods they perished. And the spirits created mankind to spread and multiply, to restore and heal and tend the world; and so have we been entrusted."

Chelm waited a moment and then nodded solemnly. It sounded like the typical creation myth of a primitive culture—interesting for the cultural anthropologists, maybe, but not exactly his line. Of course, he wouldn't have been ill-mannered enough to say so, and thought up a few questions to ask for form's sake. This only seemed to encourage Xerosh, however, who answered them, and then confided, "There's more."

Chelm followed him out through the rear portico and along a tree-lined terrace to more stairs, which descended to a side entrance to another building. The surroundings here were plainer and less spacious than the imposing public halls and galleries of the building they had just left, suggesting more of a workaday environment. They passed through a library; a room like a large office, where somewhere between a half dozen and a dozen people were writing and copying, and two operating what looked like a hand-driven rotary press—a surprise to Chelm; and then two rooms each containing a central worktable, side benches bearing charcoal burners and retorts, and lined with shelves of bottles and glassware, that could have been some kind of laboratory, a pharmacy, or an alchemy shop. Beyond this, they emerged into a cloister bordering a garden enclosed by high walls and filled with rows of closely spaced shrubs and small trees, herbs, flowers, and plants of every kind. The emphasis seemed to be on variety, with just a few specimens of each kind. A local stream had been captured to create a pond in the center, and from the twittering and movement, it appeared that the place was popular with the city's community of birds. Several figures were at work here and there, tending, watering, and weeding.

"This is just a small establishment that we keep in the city to try new ideas and consolidate our repository of learning, you understand," Xerosh said. "The original knowledge comes from the experience and wisdom of people everywhere, passed down over time." Chelm didn't really follow, and looked back questioningly.

Xerosh explained, "Another story that goes back to the ancient times of our race is of how the magic that exists within plants was studied and put to use. In the beginning, they provided just simple foods. As knowledge was gained over the ages, they came to be recognized as gifts from the spirits, which would ease cares and pain, bring sleep and new life to souls weary from toil, heal the sicknesses of body and of mind, and open the inner eyes of the soul to the purpose of life. The Dark Gods, too, sought these things, but they looked for them in the forces that are outside, not the soul that dwells inside, and the fruits of the seeds they sowed were violence and fear, the lust to compel others and possess all. They believed they would be as the spirits that had created the world. But the spirits let them destroy themselves, and the world was begun once more."

They were now walking along a path between some beds containing seedlings. Chelm couldn't but

think how strange it was that a world as far-flung as this should have evolved its own version of the Fall legend, practically universal among the cultures of Earth. But what Xerosh was saying about the ways of life since was too idyllic. From what Chelm knew of human nature—and the natures of all the humanlike species that Terran expansion had encountered—the impulse toward power and personal aggrandizement, and readiness to resort to force in order to achieve them, were too powerful not to have asserted themselves.

"But the people of Issen and the lands around obey the laws of Yassik," he pointed out. "How does Yassik come to exercise that authority? Wasn't the office that he holds as ruler established by predecessors who fought and disputed at some time? It had to be, surely."

Xerosh didn't quite seem to understand. "The people obey Yassik because he accepts the burden of taking responsibility." He went on to describe a system whereby the villages and other communities sent representatives to an assembly that met every two years to proclaim the ruler. The ruler then offered ministries and other official positions to selected individuals to form the governing body. It sounded like a rudimentary form of a republic—but a surprisingly enlightened one, nevertheless, for the planet's level of technical development.

"What about his rivals for the position, or others who might want to impose a different system?" Chelm persisted. "How would they achieve their objectives? Isn't some kind of confrontation inevitable? When all else fails, that leads to conflict. Then only superior strength will prevail."

Xerosh frowned while he turned this over in his mind. "You make it sound as if others would *want* his position," he observed finally.

"Well, yes, after all, isn't that the universal . . ." Chelm stopped as he saw that Xerosh wasn't following at all. "Are you telling me they wouldn't?"

"No. Not if given the choice . . ." Xerosh eyed Chelm uncertainly, as if hesitating to state the obvious. "Ruling the land is a wearying and unnerving task, filled with responsibility and worries. It takes great fortitude, character, and dedication to serve the people. Not all of those asked are willing to accept."

Chelm felt his whole foundation of reality shift again. It was like the time in the marketplace, with Moishina. "You mean it isn't something that's forced on the people?" he said.

Xerosh shook his head, evidently mystified. "The people are grateful. They know that for two years Yassik will have to pass judgments, make decisions, and that he will give of his best. And so they are sympathetic and supportive, and they do what they can to make his term easier. Abuse of a public office would be the worst of crimes . . . Why do you look at me so strangely, Stanislaw Chelm? Are our ways somehow in error, do you think?"

Just at that moment, Chelm could only shake his head mutely. In error? Just the converse! In one simple statement, Xerosh had undermined the rationale that had been taken as the axiomatic, unavoidable root of just about all of Earth's troubles for thousands of years. Somewhere, once, Chelm had heard it said half-jokingly that anyone who *wanted* the job of President of the Sol Federation shouldn't be allowed to have it. Ambition for power should be its own automatic disqualification. Now something else that had always seemed unquestionable was being turned on its head. Suddenly, it felt as if what Xerosh was saying was the only thing that made sense. Small wonder that the mission was having no luck finding opponents and power rivals to install in Yassik's place.

Yet nothing in life was ever that simple or easy. "Your way is not in error," Chelm replied at last. "But there will still be people who feel differently, whose compulsion is to command and control the lives of others, to take and not to give. And they will find ones who will help them. Wolves will emerge in the flock. What do you do then?"

Xerosh stopped walking and thought for several seconds. Then he nodded, beckoned, and led the way along a side path running through a grove of mixed trees bright with blossoms and fruits. "Yes, it is so," he agreed. "When a wolf appears, the other animals must become wolves too; unless the wolf can be tamed." They came to a shrub about five feet high, with a maze of twisty branches something like a

monkey puzzle tree, leaves of bright green and orange, and small, purple berries hanging in clusters. Xerosh stopped and gestured toward it. "In our world, such people find the answer to their desires here. It is called the Tree of Dreams."

Hallucinations of grandeur, Chelm interpreted. It was Xerosh's way of saying that Lydian culture had become immune to such perturbations, and the only recourse left for those harboring such cravings was escape into drug-induced fantasizing. Ordinarily, he wouldn't have thought that the problem could be solved that conveniently; but who was he to argue with someone who lived here that it couldn't be so? He left it at that.

\* \* \*

That evening, Xerosh attended a meeting of the Inner Chamber of Issen's Governing Council. Yassik was present, along with his senior ministers and advisors. They gathered in the debating room at the rear of Yassik's official residence, across the square from the building in which Xerosh had first met Chelm earlier.

"My observations agree with what the boatbuilder, his granddaughter, and others say," Xerosh informed them. "Rapacity and the hunger to subdue might be what drives the Terran federation, but it is not a universal trait in all Terrans. The voices of those who would dissent are not heard. To adjudge guilt equally would be to commit a grave injustice."

"Are we not, then, guilty of injustice before?" Yassik asked.

"That was not your decision, Yassik," one of the ministers said. "It happened before your appointment."

"All responsibilities of the office I hold are my responsibilities," Yassik reminded them.

"The flower cannot return to the seed, nor the hatchling into the egg. It is done."

"But the flower produces a new seed, and the bird, a new egg. If we have learned more, we can be wiser this time. What was done cannot be repeated. Justice requires that we be more selective. But how?"

There was a long silence. Eventually, Xerosh spoke. "I talked with Stanislaw Chelm about his decision to move into our city. It seems there is a broader pattern. The envy that Terrans are conditioned to feel produces rivalry among them for accommodation down on the ground. They also measure status by their ability to command the services of others. I think there might be a way. . . ."

\* \* \*

Jen called Chelm the next morning with glum news. Not only had her application to move out of the base been rejected, but she was being reassigned to a position back up in the ship. Apparently, exopsychology didn't figure strongly enough in the mission's current planning to warrant her continuing to use base accommodation that was needed for others whose work was more pertinent. In reality, of course, it was just another part of the jostling by higher officers and administrators for a place—literally—in the sun.

Granting her request would have freed up the space just as effectively, but that was ruled out on account of a further development. Even the professional paranoids had gotten it into their heads by this time that the Lydians represented no threat and the environment was wholesome, and partly as a consequence the competition for surface assignments had taken on a new dimension. Prefab modules within the base area were regarded as mundane, and the new status symbol among the upper echelons was to be able to boast a real native-built house outside. And the Lydians, as always, were cheerfully obliging. In fact, they seemed to encourage the fad by taking Terrans to see places that they thought would appeal to them. Some said the Lydians had instigated the idea in the first place. Practically the entire Directorate and their wives moved into a group of villas on a hillside about a half mile from the base. Anyone of department-head level or above needed at least a three-room chalet or one complete level of a multistory town abode. It followed that to confer a comparable privilege on someone of Jen's lowly standing was unthinkable. The mission was effectively dividing into two castes, the privileged and



the empowered down on the surface, and second-class citizens removed to orbit. Chelm's, of course, was a special case that it was convenient to forget about.

However, living without things like computer-managed kitchens and household inventories, self-regulating environments, and shipboard services that had been taken for granted did not come as easily as the newcomers would have thought, had they thought about it at all. Creating an edible meal from an assortment of strange liquids and powders, raw vegetables, and pieces of dead animals was something that few Terrans from the professional classes had ever contemplated, let alone practiced or mastered. What did one do with dirty clothes without a laundry machine, when laundry, by that definition, is something a machine does? And then there were all those endless things that needed fixing or cleaning, adjusting or restocking, that made existence impossible without a maintenance crew to call on.

Again, the Lydians came to the rescue. They had been thinking about things the Terrans had been saying, and they agreed it was only right that they should pay for all the things from Earth that they stood to gain. In the absence, as yet, of a currency exchange system, they offered their services as domestic help for their new neighbors. This rapidly caught on as the indispensable mark of having any status at all among the Terrans, and the bragging at cocktail soirees thrown to show off a newly possessed mansion, or across the dinner table of an apartment overlooking the river in Issen, centered around the number of native cooks, maids, stewards, and gardeners that the household commanded. Even the security people were persuaded that the Lydians possessed no weapons apart from those used for hunting, which were easily spotted, and began allowing them into the base to perform their duties—albeit after the standard ritual of scanning and screening. It was not long before even the most jaundiced, lower-echelon occupier of a prefab single module had a part-time Lydian domestic to rustle up a change from the routine autochef fare, or send ostentatiously on errands as visible affirmation of respectable standing—superior, at least, to those banished in the dreary confines of the ship.

The security procedures looked for knives and axes—guns, had there been any—and other potential implements of violent assault of the kind that security-trained minds envisaged. What they didn't take into account were the various exotic delicacies that the Lydian cooks brought to titillate the appetites of their new employers, or the ingredients that went into their preparation. In particular, nobody paid attention to an essence distilled from the juice of a pale red berry, picked before it turned purple, and combined with an extract from a certain seed, that could be blended into a sauce or garnish, cooked with the stuffing of a fowl, added to a compote of fruits, or introduced into a dish in a dozen other ways. The berry came from a twisty-branched shrub that Lydians called the "Tree of Dreams."

There were exceptions, of course. Not *every* Terran who dwelt down on the surface was of a disposition that would be found threatening. Some were decent enough people in themselves, caught up in a way of life that was not of their choice or making, and which they couldn't change. But after a week or so, a telling measure of which kind was which could be had from the way they spoke to and treated their Lydian housekeepers. In effect, the servants became the judges of their masters.

An evening meal was the best time, allowing the potion all night to work, after which the victim would awake a changed person. The effect was irreversible.

\* \* \*

The first Chelm knew of it was when Jen called him from the ship early one morning. "Stan, thank God you're okay. What's going on down there?"

"What do you mean?"

"You don't know?"

"What are you talking about?"

"Something's happened to . . . it seems, just about everybody down on the surface. Some kind of sickness. I managed to raise two people at the base, but they were just shift operators in the com room and not making much sense. People up here are getting a lander ready to come down."

"Did you try anyone here in the city—at the Cultural Center?"

"I was more concerned about you first."

"I'll try and raise someone there. Will you be coming down too?"

"I'm not sure yet. Yes, if I can. I'll call you back when I know."

"Later."

Chelm called several numbers at the Center, finally getting through to a secretary. She, a couple of technicians, and a security guard had come out on an early shuttle bus, and other than the driver were the only ones to have shown up. They hadn't been able to make any more sense of what had happened back at the base than Jen had. "We need to get back there," Chelm said. "Can you guys pick me up here in the bus?" The secretary took a moment to check with the others.

"Sure," she replied. "Where are you, exactly? Give me some directions."

\* \* \*

The first strange thing to strike Chelm as the bus approached the base was the number of Lydians both inside and outside the perimeter fence, along with a collection of mounts and carriages of various kinds that many of them had presumably arrived in. The gate was wide open, and the only guards he saw were standing in a huddle to one side, looking bewildered and very much out of things. As the bus maneuvered its way through the throng, he saw numerous *nejivan* robes and other symbols of office among the Lydians present. This was not some street crowd that had wandered in out of idle curiosity. And then he spotted Xerosh and his acolyte Troim with a group standing near the entrance to the Admin Block. "Can you drop me off here, driver?" Chelm called to the front.

Xerosh saw Chelm coming across and turned from saying something to the others who were with him. "The spirits have willed us a new morning, Stanislaw Chelm," he greeted.

"Use it well." The responses had become automatic. "What's going on?"

Xerosh raised his arm and made a sweeping gesture that took in the activity going on within the base, the city in the distance, and the rest of the world beyond. "You are free," he announced.

"Free from what?"

"From everything that has enslaved you. To become all the things you have always wanted, and are capable of. The wolves who preyed upon your life will do so no more."

Before Chelm could reply, some Lydians emerged from the Admin Block, shepherding a group of Terrans, almost as if they were under guard. Chelm recognized Teel, Liggerman, others . . . all from managerial or administrative grades. He stepped forward toward Teel, intending to get some kind of explanation . . . but then slowed when he saw that Teel was not behaving normally. Teel's face had a distant, ecstatic expression as he came out into the sunlight. He stopped to gaze at the sky, the mountains rising in the direction away from the city, and two birds perched on the boundary fence, squawking at each other. Chelm looked at his face. It was empty but happy, like a child's. Behind Teel, Liggerman was looking equally blissfully imbecilic, moving his head this way and that to take in the base as if he had never seen it before. Chelm turned demandingly toward Xerosh; but the emotions boiling up inside him were so turbulent and confused that he could find no coherent words to string together.

"We will take care of them now," Xerosh said quietly.

And then the call tune sounded from Chelm's wristpad. It was Jen at last. "Okay, Stan, I'm on my way," she said. "We're detaching from the ship in about ten minutes' time. See you soon. . . . Stan? Is everything okay there?" She had seen that Chelm had turned his face away and wasn't listening.

For Teel was stretching a hand out toward the unit. His eyes met Chelm's. Just for an instant, a spark of recognizing something familiar flickered in them. "Mozart!" he exclaimed.

\* \* \*

After the lander arrived, Chelm and Jen rode with Xerosh and some of his company back into the city. On the way, Xerosh proposed his plan. With the help of the technicians aboard the ship, a message would be sent to Earth, advising that the early report from *Oryx* had overstated Lydia's potential for

development, and the planet did not warrant further effort. The message would say that information had been found showing that the *Oryx* had departed to continue its survey elsewhere, and the present mission would follow in the direction of the galactic sector it had indicated. The *Hayward Kermes* would then be sent off unmanned, under programmed control, to lose itself among the stars in the same way as had been done with the *Oryx*.

Chelm's mind was still in such a whirl from the morning's happenings that they had arrived at their destination before it dawned on him that there would have been no technicians available to set up the departure of the *Oryx*. Its entire complement had been absorbed into Lydia's population of *jujerees*—the child-people. So who had done it?

Xerosh seemed to have been expecting the question. "That is one of the things we have brought you here to have answered," he said.

They were at another building near the city center, but an inconspicuous one this time, plain in style and obscured by others. Xerosh and his companions took them down deep below ground, then through a series of dark corridors that passed by many doors. They stopped at one and entered. Inside, Xerosh flipped a switch to bring on the lights. Chelm gaped up at them.

*Electric?*

And then he looked around. There were glass cases containing oddly styled but mostly recognizable racks of electronic assemblies, vacuum-tube chassis, and switchgear; chip and crystal arrays, cableforms, circuit cards, capacitor banks; coils, motors, transformer windings; input panels and screens. . . . Many items were old, broken, incomplete, or corroded, others seemingly repaired and restored, while some looked in working order. An opening to one side revealed part of an adjoining hall that appeared dedicated to engines and machines. Jen was looking as stunned as Chelm felt.

"Yes, we have our museum that preserves things from long ago," Xerosh said. "When we met, I told you, Stanislaw Chelm, that the function of the *nejivan* is to act as custodians of ancient knowledge. It is amusing that Terrans took our culture to be young and primitive. Like the Terrans, our distant ancestors found that knowledge can accumulate very quickly and cheaply. But finding the wisdom to use it well takes longer. There are aeons left for the universe. We can afford to wait until the time is right." The priest turned to look at them. His gaze was kindly, deep, and not without a hint of mirth. "In the meantime, as I said, you are free."

The full meaning was going to take a long time to sink in. Chelm looked at Jen, his mind grappling for something even halfway sensible to say. "You still like the thought of the place over the pottery shop?" was all he could manage in the end.

"You mean I don't have to put in an application, file a priority statement, and ask permission?"

Chelm shook his head. And it was only then that the realization really hit him that yes, it was true. He grinned—maybe the first honest, open, totally carefree grin in his life.

"No, Jen," he answered. "Never again."

# Bring Out the Ugly

*In this Eden we know where the snakes are and they is us . . . . Mark L. Van Name is the co-founder with John Kessel of the Sycamore Hill Writers' Conference. Along with short stories in the science fiction field, he has thousands of articles published in a wide variety of computer-related publications, and in his day job he is the CEO of a small technology testing company in the Research Triangle area of North Carolina. He has also been known to have been active as a Beer Minion of Baen at science fiction conventions across the continent.*

## **Mark L. Van Name**

Maybe it was because the picture of the girl reminded me of Jennie, the sister I haven't seen in over two hundred years. Maybe it was because Lobo was the first interesting thing I'd met in a while. Maybe it was because it was time to move on, because I'd been healing and lazing on Macken long enough. Maybe it was because I had a chance to do some good and decided to take that chance.

Not likely, but maybe the time on Macken had done me more good than I thought, and I was reconnecting with the human part of me.

Also not likely, but I like to hope.

Whatever the reason, I was lying on my back in the bottom of a fifteen-foot-deep pit waiting for my would-be captors to fetch me. As jungle traps go, it was a nice one. They'd made it deep enough to keep me in when I fell, but shallow enough that I'd probably only be injured, not killed, from the fall. They'd blasted the walls smooth so climbing out would not be an option. The bottom was rough dirt but without stakes, another welcome sign that they hadn't wanted to kill me. The covering was reasonably persuasive, a nice layer of rain-forest moss over very lightweight twigs. In the dark it passed as just another stretch of jungle floor—as long as you were using only the normally visible light spectrum. In IR its bottom was enough cooler than the rest of the true jungle floor and its sides were enough warmer from the smoothing that it stood out as an odd red and blue box beneath me. Not that I needed the IR: Lobo was chummy with a corporate surveillance sat and had warned me about the trap well before I reached it.

You don't spend much time alone in jungles before you either die or learn to always carry at least a knife, food, water, and an ultra-strong lightweight rope. I'd kicked in the pit's cover, looped the rope around the closest tree, and lowered myself into the pit, then pulled in the rope. After a light dinner of dried meat and fruit, I'd decided to relax and enjoy the view a small gap in the jungle canopy afforded me. Lying on my back, looking up the pit's walls, past trees so ancient that luminescent white flowers grew directly from their trunks, I could see so many stars I could almost believe anything was possible somewhere. If you spend all your time on industrialized planets, you have no clue what a sky without light pollution looks like. Sure, you can see pictures and videos, but they're not the same. They lack the fire,

the sense of density of light that you get from the sky on a planet still early in the colonization process. Macken's day would surely come, but for now I could enjoy a view most will never know they've missed.

Lobo's voice coming from the receiver in my ear interrupted my reverie. "Jon, you are early."

"Why? I thought their camp was nearby."

"It is, but as you were climbing in they were heading to town. I monitored the alarm their sensors triggered, and so did they, but apparently they decided to let you rot for a bit."

I thought about climbing out, but I couldn't finish the job if I left the area, so why trade one bit of jungle floor for another? "I think I'll take a nap," I said. "Wake me when they're within half a mile or so."

"Will do. Want some music?"

I listened to the low but persistent buzz of the jungle, the wind, the insects, the flow of life around me, and I thought back to simpler childhood days watching the sunset on the side of the mountain on my home island on Pinkelponker. The memory was pleasant but hollow, leached of resonance by time and what the planet's government had done to Jennie and me. "Nah, there's music enough here. Thanks, though, for the offer."

Lobo couldn't exactly sigh, but I had to admire his emotive programming once again, because I was sure I could hear the exasperation in his voice as he said, "Whatever you want. I'll be back to you when they're close."

I enjoyed the stars a moment more, then closed my eyes and thought about the path that had led me here.

The house I had rented on Macken was well away from Glen's Garden, the closest city and capital of the human settlement on the planet. A simple A-frame structure built from native woods reinforced with metal beams and coated pilings, its entire front was an active-glass window facing the ocean. The tides pounded slowly and gently against the beach below, waging a long-term, low-key war with the shoreline that they would eventually win. I had come for the solitude, so I paid in advance for half a year. Stupid. I should have paid by the week like most people, known that anyone spending that much money at one time in a colony like this one could not stay lonely for long. I figured that after the fact, however, so between long swims in the ocean, short but frequent bouts of disturbed sleep, and even longer periods staring out the house's front, the glass tuned to the clearest possible setting, I made friends with some appliances and started gathering the local intelligence I knew I'd inevitably need.

Washing machines are the biggest gossips in the appliance world, so I had cozied up to mine early. They talk non-stop among themselves, but it's all at frequencies people—humans—can't hear. I suppose at some point most people still learn that the price we've paid for putting intelligence everywhere is a huge population of frequently disgruntled but fortunately behaviorally limited machines, but just about everyone chalks it up to the price of progress. I've seen some organizations monitor and even record the chatter, but in short order the recorders warn the other machines and then everything goes quiet until the people give up and move on.

Appliances will talk to you directly, though, if you can hear them, speak their frequency, and, of course, if you can stand them. Most are unbearably dull, yakking day and night about waste nutrients in the run-off fluid or overcooking or the endless other bits of job-related trivia that compose their lives, but washers are an exception. As part of the disease-monitoring system on every civilized world I've visited, they analyze the cells on everything they clean. What they must and do report is disease; what they love to chat about is all the other information those cells reveal: whose blood or semen is on whose underwear, who's stretching his waistband more this week than last, and on and on. They're all on the net, of course, like all the other appliances and pretty much everything else man-made, so they pass their gossip back and forth endlessly. They trade their chemical-based news and the bits their voice-activation systems record for the scuttlebutt other appliances have recorded, and they're all happy. The older,

stupider models of most appliances have to stop talking when their work taxes their processors, but anything made in the last fifty years has so many spare processing cycles that it never shuts up.

My washer was a brand-new Kelco, the owners of my beach house clearly willing to invest in only the best for their rental property, so getting it to talk to me was as simple as letting it know I was willing to listen. Appliances are always surprised the first time we talk, but they're usually so happy for the new and different company that they don't worry much about why we can hear each other. The combination of the changes Jennie made to my brain and the nano-machines the researchers at the prison on Aggro merged with my every cell lets me tune in. I suppose it's a blessing, and it certainly is useful, but I'm still glad Benny and I destroyed the place and all the scientists in it when I escaped. I'm even more glad no one associated with the place knows that one of their experiments actually survived.

What was tricky was getting the washer to give me the kind of information I wanted—who was buying what, what groups were armed, and so on—rather than the sex-related gossip it loved to discuss. Apparently it was more fun and common to check for semen than for explosive residues or laser burns. I spent hours listening to the washer rant about the randy sex lives of the corporate types who frequented the beachfront resort houses in Glen's Garden.

All that time paid off, however, when the Kelco told me about the kidnapping and the purchase.

Armed with that news, I wasn't surprised when Earl Slake came knocking on my door just after lunch on a clear, warm day. He looked the standard high-ranking corporate type: taller than his genes would once have allowed, almost as tall as I am; perfectly fit, no doubt from exercise machines; and dressed in the white slacks and shirt that have been standard tourist garb on every beach on every planet I've visited. I braced myself for a round of wasteful verbal dancing while he got to the point, but he must have ranked higher than I had guessed because he came straight to business.

"I'd like to hire you, Mr. Moore."

"Jon will do. And I'm not looking for work. I'm here on vacation."

"I understand, but from what I can find out about your background—or, more precisely, what I *can't* find out about you—I think you're the type of man I need."

I didn't like the thought of him or anyone checking on me, but that was the price I paid for stupidly paying in advance. "What type is that, Mr. Slake?"

"Someone who can get things done." I noticed he didn't tell me to call him Earl; definitely a VP or above in Kelco. "They've kidnapped my daughter, and I want her back." He took a small wallet from his pocket, unfolded it several times until it was a thin sheet in front of him, and said, "Jasmine."

Pictures of a dark-haired teenage girl filled the sheet. In some she was laughing, in others more serious, but in all of them her dark eyes blazed with an intensity that reminded me of Jennie at the same age, right before the Pinkelponker government took her away to heal the people they thought mattered.

"Jasmine is my only child, Mr. . . . Jon, a luxury I had not planned to permit myself. I never bothered to get to know the maternal surrogate, so Jasmine is all the family I have."

"What makes you think I can help?"

He looked at me for a few seconds, then glanced away. "We could waste a lot of time doing this, but I have no clue what that could cost me, so let's try to be efficient. If I'm wrong and you say so, I'll be surprised, but I'll leave and see how quickly I can import some off-planet talent. I don't think I'm wrong, though, so I'm willing to offer safe passage for you and anyone else you want to the planet of your choice, plus a million additional credits in the repository of your choice. I've just finished brokering Kelco's purchase of Macken—we're expanding our real-estate holdings and what remains of the planetary federation government is so far gone that everything's for sale—and my bonus alone is more than adequate to cover this."

I didn't need money, but it was going to cost me a lot to hop back to Pinkelponker and the start of the cold trail that had never gotten me to Jennie, so I would need money soon. "Fair enough. No wasted

time." Though my washer had already filled me in, getting data firsthand is always best, so I asked, "Who took her?"

"Some local anti-development group that calls itself the Gardeners."

"What do they want?"

"To keep the planet exactly as it is." He laughed and looked away, shaking his head slowly. "As if that's even possible. We run into these naïve types in many deals, and it's always the same story: they try to stop progress, and its wheels grind them up. What they don't understand is that I don't have the power to stop this deal. It's done, and whether they do nothing or kill Jasmine or try anything else, Kelco will develop Macken for the good of tourists everywhere. Then we'll furnish every tourist home and every resident home with Kelco washers and Kelco refrigerators and on and on, and everything will work the way it always has." He looked back at me. "I cannot stop this. They want me to leave the planet—which I'll gladly do, though I haven't told them that—because they think that will matter. It won't. Someone else will just lead the construction."

"Why not get your corporate militia on the case?"

"That's exactly what I'll have to do, and soon, because I can't keep the kidnapping secret much longer. But if I do, you know what'll happen: they'll clean out the Gardeners, but they won't worry much about anyone with them. I want Jasmine back safely, not dead with a bunch of idiot anti-progress types."

I thought about his offer. I could use the money, and finding them should be no problem; I've never known any activist group, however green, that didn't indulge in such conveniences as laundry or hot food from time to time. I had no clue, however, what I might be walking into, whether this was three people with a little guts and light weaponry, or a heavily armed group, so I needed more information.

"How long did they give you to respond?"

"They wanted a response in a day," Slake said. "I persuaded them that nothing in my world moves that quickly, and I got five days. That was last night."

"I'll think about it and get back to you in the morning." I pulled out my wallet, thumbed it, and it got Slake's contact information. "If I decide to help, I should be able to do so within their time limit. Glen's Garden isn't that large, and I assume you've already verified she wasn't on any departing flights or boats"—he smiled in acknowledgment—"so they're either hiding her in town or, more probably, in the rain forest." I stood. "I know that's not the answer you want, but consider what you'd do on my end of such a proposal, and you'll know it's the only reasonable answer."

He smiled again. "True. That is, unless, of course, you were involved, in which case you might be foolish enough to answer sooner."

I prefer dealing with smart people; even when you don't like them, at least you have a shot at understanding their thought processes. I stared straight at him. "I'm not involved in any way, though even if I were I would never appear that eager." I walked him out and basked for a moment in the warmth and moist air. "I'll get back to you in the morning."

\* \* \*

You can learn a lot from appliances, but you can't get the feel of a place without being in it. I'd largely avoided the town since I shuttled down from the jump station, so I didn't have much of a sense of it. The house came equipped with a small shuttle vehicle, which I had take me to the far edge of town, where the sea was only a moist presence in the air and the rain forest was a towering perimeter guard. I figured to walk the few miles back to the house.

Service businesses and city government buildings ringed this edge of Glen's Garden, all facing inward, a stretch of untouched grass between them and the rain forest's edge, the green no doubt an attempt to show that they wouldn't expand the city in a way that would hurt the ancient forest. Right. Even without Kelco taking over, that kind of growth is the only alternative to death for a planet a few generations into its human settlement.

If the people here knew about the purchase, they sure weren't showing it. Various ads flashed in the windows and on the walls of the shops, but none were for protests. The news scrolling on the main government building was benign pap about local businesses, minor crime, and upcoming events, with the occasional meaningless and almost certainly false planetary federation announcement woven into the images for cosmopolitan color. Strolling along the perimeter I learned nothing more than the one thing that I always found when I visited a place with people simply living their lives: I didn't belong here. No news in that.

On the edge of town farthest from my rental house I found the first thing worthy of note: A serious battle wagon sitting like a statue in the middle of a square, a flag mounted on its roof and kids playing on it. Its self-cleaning camo armor did its best to merge with the bits of landscape facing it, here showing the light brown of cheap shops erected from native sandy soil and industrial-strength epoxy, there the rich wood of the ancient trees shading it. Over seventy feet long and about twenty-five wide, it sat like a series of stacked, successively smaller bowls, metal-smooth and devoid of openings. Clearly whoever put it here wanted the friendly pre-combat look, because I knew vehicles of this type—though not any this new—and they always bristled with weapons, projectile and pulse, all retractable for flight and diving, as well as with openings for the crew they could carry. The battle wagon was almost pleasant to look at and showed no visible scars, no sense of its deadly insides; an old weapon put out to pasture: I felt an instant kinship with it.

The kids were playing on the side away from the forest, so I leaned against the other side, concentrated on using a frequency that worked with most machines, and asked, "Got a name? Or are you totally dead?"

One of the kids—a young boy, I think, though I wasn't sure—was watching me from around the corner of the far edge of the battle wagon. The sight of a man moving his lips without making a sound must not have been too uncommon, because he didn't look terribly spooked, but he also didn't seem comfortable. I stared at him, and he vanished back around the corner, no doubt off to report to his friends about the crazy man.

An artifact of the way the nano-machines have enhanced my hearing is that machine voices sound inside my head, not in my ears like standard-frequency speech, so I was startled when, a few seconds later, the weapon replied, "Lobo."

"I'm Jon."

"Why can we talk?" it asked.

"Does it matter?"

"Of course." You never know how much emotive programming a machine's developers have invested in it, but my guess was that Lobo's developers had done an unusually good job, because it managed to wrap both indignation and incredulity into those two words. "No human has ever spoken on machine frequency to me. Without knowing how you do, how can I assess if you're a threat?"

"What could you do if I were? If you're sitting here, you must not be good for much."

Laughter sounded in my head. They'd definitely not skimmed on the emotive work. "Fair point. All my weapons systems work—they're self-maintaining and good for at least another century without outside help—but my current owners have set my self-protection levels to the minimum. I can seal myself, electrify, use neutralizing gases as long as I don't kill, and in the face of a serious threat, fire a few of my lasers at their lowest intensity, but I couldn't do much against a serious opponent. So, are you a threat?"

It was my turn to laugh. "Not at all. I came here to relax, and now I'm pondering a business possibility. That's all."

"I ask again," Lobo said, "why can we talk?"

"Some other time, I might answer you." Not likely, I thought, but I said, "But not now. Right now, I'd like to talk."



"Why? What's in it for me?"

Not as easy to lead as the littler machines, that's for sure. "Isn't the pleasure of conversation enough?"

Lobo laughed again. "I was built to work with or without a crew, under extreme combat conditions with full communications shielding, for years at a time if need be. I'm not some home appliance desperate to fill its little brain with the latest human gossip. I listen to them, just as I listen to all the information sources I can tap, but I'm built to operate alone."

Another similarity between us, but one as likely to be false at times for Lobo as it was occasionally not true for me. No major weapon designer in the last hundred years has been stupid enough to create machines with absolutely no need for humans; why take the risk? "Okay," I said, "what's in it for you isn't clear to me. Probably nothing. What would you like?"

"My freedom," he said—we'd now talked long enough that I had succumbed to thinking of it as him—"but I know there's no freedom for machines in the federation, and even if there were they wouldn't extend it to battle organisms such as I. So, my realistic hope is for owners that let me do something, go somewhere, work, be what I was built to be. Sitting in this square is easy but ultimately useless."

"What you're built to do is fight," I said, my own memories fueling the unexpected anger in my voice. "Fighting leads to death and destruction, either yours or somebody else's, and eventually, no matter how good you are, yours."

"Another veteran, eh? Yes, I understand, but it's what I was built to do. It's what I do. What I should be doing—not being an ornament left behind on the off chance they might someday need me again on this entirely too peaceful planet."

I pushed back the memories. If Lobo wanted to fight, fine. "So talk to your owners. Surely you can communicate with them."

"I tried. The city owns me, and the mayor says they want to keep me, in case they one day need me."

"Speaking of the city and the peace on this planet, what can you tell me about the Gardeners?" I held up my hands, instantly feeling foolish that I was gesturing to a machine that couldn't see me. Some habits are hard to break. "I know I have nothing to offer you now, but I can honestly tell you that if I can find a way to help, I will, one veteran to another. That's it, though; that's all I have."

After a few seconds, a pause long enough that I wondered how much processing power a machine like Lobo could bring to bear in that period of time and what he was doing with it all, he said, "Fair enough. One veteran to another. The Gardeners are an anti-corporate, anti-development group headquartered in the rain forest a few miles from here. I watch them, along with most of the rest of the humans on this planet, with the help of some satellite friends willing to trade their sat images for land gossip. The Gardeners have weapons, but nothing serious, simple handguns, knives, and other gear I would never worry about. Why do you care about them?"

"Just business," I said, then corrected myself, "possible business."

The kid was back watching me from Lobo's far corner, this time joined by a few more. I didn't feel like dealing with them or the parents one of them was eventually bound to bring. Besides, I was on a deadline.

"I need to move on," I said. "I'll stop by later if I think of anything. It was good to meet you."

"I'll be here," he said, and I swear I could feel the frustration in his voice.

\* \* \*

As I was passing the main government building on my way back around the perimeter of town toward my house a man stepped out of the front door and into my path. Though he was clearly striving for calm, he exuded unease.

"Mr. Moore," he said. "I'm Justin Barnes, the mayor of our town. I was wondering if we could talk."

"About what?" I said. I neither felt nor saw anyone supporting him, but I don't like being braced by a stranger, much less by two in the same day. At least Slake had come to my house.

"I'd love to discuss that, but let's first go inside," he said, "where we can talk in private."

I definitely had to leave town soon. I had gone without a visitor for my entire stay on this planet, and now this. Still, more information is always good. "Sure."

I followed him to his office, a corner room with a great view of the town and the ocean beyond it; some things, including the views of the powerful, never change. Armed with a glass of water and seated in his chair, Barnes looked much more comfortable. I sat in a chair on the other side of his desk and waited.

"First, thank you for coming in."

I sighed. "Please, stop. No niceties, no chit-chat, just get to the point. Or I can leave. Your choice."

He put down his water and tried to sit taller in his chair. "Fair enough, fair enough. As you might imagine, visitors like you don't come here all that often."

That damn cash payment, I thought. Make one mistake, pay many times.

"So of course I looked into your background, and as you know you don't have much of one. That alone says a lot. The fact that Earl Slake visited you this morning says more. That he was clearly not satisfied when he left tells me the rest: he wants your help, and you haven't decided to give it to him."

"Help with what?" Barnes was brighter than he appeared, but I saw no reason to help him.

"You said you wanted to get to the point," he said, "so why play games? I know about the Kelco purchase, and I know about the kidnapping. Do you really think we'd fail to monitor an executive of his level, or that Kelco could do a deal for the planet without the mayor of its largest settlement finding out?"

"So what do you want from me?"

"I know I can't stop the purchase, and I know I can't stop the development, but not everyone else here is so realistic. I need some time to work with my constituencies and prepare them for the inevitable, or we'll end up with our more militant groups fighting the Kelco militia, a conflict that is bound to destroy this town."

"I repeat: what do you want from me?"

"Slake is listening to you, hiring you to get his daughter back. I don't care if you do. What I want you to do is talk him into leaving the planet and delaying the announcement for a month. I can use that time to prepare people and maybe avoid any violence."

"What's in it for me?"

Barnes slumped a bit. "I don't know. We have some money, but nothing like Slake's, and even if my plan works reasonably well you probably won't want to be vacationing here in a month, so I don't know. But I had to ask."

I thought about his request. I had no reason to help, but I also had no reason not to—unless, of course, doing so might cost me Slake's business. I defaulted to my standard answer, because it generally serves me well. "I'll get back to you tomorrow," I said.

He opened his mouth to speak, but I stood and cut him off. "That's the best you'll get from me now, so let it go." I headed out of the room.

\* \* \*

The wind blowing off the water chilled the early evening air. The sky was still light, pinks and oranges shading the clouds over the ocean, but the light was fading, the colors muting, as if the wind were pushing away the day. I felt its push, too, as I walked back and forth on the stretch of beach in front of my house. The urge to leave was strong; one person wanting me to work was bad, two was almost intolerable.

Where to go, though, was the problem. I had unfinished business on Pinkelponker, but I had no clue if Jennie was even still alive, much less whether anyone on that island-studded world could help me find her if she was. I'd heard rumors of another survivor of the Aggro prison, but even if they were true I wasn't sure I wanted to meet him—or her; the fewer people who know what I am, the safer I am. I

definitely had to avoid any of the truly high-tech worlds, the places where the entry points bristled with scanners that could detect the nano-machines in me.

Pinkelponker seemed the best choice, a long shot at being of value but at least a shot, but then I faced the prospect of taking on the corporate government with no allies, no ship, and, even if I saved Jasmine Slake and her father paid me, not enough cash to buy a ship.

When long-term planning fails me, as it so often does, I turn my attention to whatever's in front of me. Given what Lobo had told me about the Gardeners, I had little doubt I could get them to give up the girl. I worried only that I might have to hurt some of them; once I open the door to violence, I have a hard time closing it.

Then there was Barnes' plea. I doubted he could do much with the month he wanted, but that was his business and his choice.

I went back to the house, killed all the lights, and sat close to the main window, the glass a familiar separator distancing me from the world. I closed my eyes, focused on nothing, and tried to drift off, to let my subconscious do the heavy lifting. Before she fixed my brain—more than fixed it, changed it more profoundly than I can believe she ever realized—Jennie told me that I had a smart heart even if I didn't have a smart head. Now, two centuries, several wars, and the Aggro prison stint later, I doubted much smart or good remained in my heart. I did not, however, doubt my subconscious ability to protect myself and to either make the best of bad situations or at least survive them.

A few minutes later, everything clicked. I knew what to do, if not the best course to follow then at least a path forward from where I was.

I ran down the stairs to the car's shuttle and headed for town. I had several stops to make and some supplies to get, then I wanted to sleep late into the next day so I'd be ready for the long night that would follow.

\* \* \*

Lobo's voice in my ear brought me around quickly. "They're about a half a mile away and closing. I count six humans. Nothing machine is talking near them, and the sat shots show no guns in their hands, so you can assume all their weapons are small, mechanical, and able to fit in their pockets. All are male, so you'll need to get them to take you back to their camp. Is there any other intel you need?"

I stood slowly, stretched, and thought for a moment. Everything so far was just as you'd expect from an amateur group, so I was confident these six were less of a threat to me than I was to them. Still, with six of them one mistake could definitely hurt me, so I started deep breathing and relaxing, preparing to calm them.

I turned my attention back to Lobo and his question. "Yes," I said. "I assume you're also monitoring their camp."

"Of course, though only via IR imaging; the canopy over their camp is thick enough to block the sat's standard optics."

"How many more are at the camp?"

"Thirteen humans, one of whom I believe we should assume is the girl, plus a bored media recorder that won't shut up and a pair of what may be the stupidest beverage dispensers I've yet encountered. Those machines must be ancient."

"Any large weapons?"

"Nothing as far as I can tell, though I suppose one of the beverage dispensers could go wild with a hot fluid nozzle."

Great. I hate machine humor. Couldn't Lobo's programmers have skipped that part of the emotive work?

Back to the problem at hand. "Lobo, if anything does go wrong, is there any help you can give me?"

"Other than information, no. You're on your own."

From my earlier conversations with him I had known that fact, but I figured it couldn't hurt to ask one last time.

"Okay," I said, "I'm going to stop transmitting and focus on them. Keep tracking me, but don't talk unless you see something I can't know. I need to focus. Okay?"

"I understand. It's not like this is my first supporting role in a fight."

First a joke, now pouting. Great. I was beginning to question the wisdom of my choices when I heard footsteps join the jungle noises.

"Sorry. Signing off."

I sat on the bottom of the pit in a spot bathed in starlight, spread my arms, palms up, stared upward, and waited.

The first head appeared over the side of the hole a moment later, glanced down, and pulled back quickly. About a minute later several heads appeared at once, then all pulled back.

I kept looking up.

A voice came from just beyond the edge of the pit. "So you're the one Slake hired to get his daughter back. What's your plan now?"

Barnes had been as good as his word; however he leaked the news to the Gardeners, it had reached them in time. "No real plan," I said, "other than to ask you to give me Jasmine Slake and to explain why it's a good idea."

Several of them laughed before the voice returned. "I don't think that's going to work. We need her, and you have nothing to offer us."

"Sure I do," I said. "Your lives and safety. Six of you are ringing this trap now. You're lightly armed."

Lobo spoke in my ear. "Actually, only five are around the pit. One has stepped into the trees and is going to the bathroom."

"Correct that," I said. "One of you six is watering the bushes. Twelve more of you, along with a recorder and a pair of old beverage machines, are waiting back at your camp with the girl. None of you has any weaponry worth mentioning."

The voices above murmured. I couldn't make out the words, but I didn't need to; their reaction was predictable and rational.

I pressed on. "I'm telling you all this so you understand your situation. Imagine the kind of weaponry that's standard equipment on the machines I have monitoring you, and I think you'll see that my offer has teeth. I don't care at all about you, because you're not my job; I was hired to get back the girl. Give her to me, and you walk away."

I waited a moment, then took them the last step down the path: "Nothing you can do will change the fact that Kelco owns Macken." More murmurs. "Yeah, it's a done deal. Unless I bring Slake his daughter by morning, units of the Kelco militia will start jumping through gates tomorrow morning. They should make the evening shuttle planet-side. So, you can take me back to your camp so whoever runs your group can give me the girl, or you can face the Kelco militia tomorrow night."

"What if we just kill you now?"

When the posturing starts, you have only three viable alternatives. You can surrender to the bullying, but that wouldn't get me the girl and so wasn't an option now. You can verbally spar with them and hope to win, but anyone dumb enough to talk to a captive in a pit instead of first lobbing some gas or a concussion grenade into the hole wasn't smart enough to trust to understand clever repartee.

That leaves showing them you're serious. I hate tapping the various forms of ugliness inside me, but sometimes it's necessary. Their stupidity was angering me, but I kept to my resolve not to hurt them if I could possibly avoid it and concentrated on giving them a simple but, I hoped, persuasive demonstration.

I spit in my hands, gathered some dirt in each, and molded it into a ball roughly the size of my fist. I

focused and the nano-machines in my spit and skin oil responded. In a few seconds they had transformed the dirt into a barely visible gray cloud swirling in front of me. About two feet high and a foot wide, maybe a few inches deep, it resembled a small bit of mist still clinging to moist pre-dawn air. I don't know what combination of Jennie's changes and the experiments on Aggro make it possible for me to let out and control the nano-machines, but I long ago stopped caring. I thought my instructions at the cloud, and a moment later it rose quietly, a sheet of darker air moving in the dark air of the night.

The screams started right after it reached the top of the pit.

Lobo broke in. "What did you do? Three had drawn guns, but the guns vanished."

"Later," I murmured. I had instructed the cloud to find and absorb all the metal on them, then disassemble and drop. In the darkness the Gardeners would know only that their guns and knives—and belt buckles and anything else metallic—had dissolved before their eyes. Anyone in a group this naïve was likely to be a native and so unfamiliar with the latest in corporate weaponry. They'd have no clue if a satellite laser or a sniper zapped them, or how the zapping even worked, so the attack would be all the more terrifying for being inexplicable.

The screams had mostly stopped, though one or two of them couldn't seem to shut up. "You're okay," I yelled. "For now. We only dissolved your weapons. This time."

I paused until no one was screaming.

"Two are running back to their camp," Lobo said in my ear.

I stood and spoke clearly and slowly, but not loudly. "Why don't you four toss a rope in here and pull me up? We can settle this back at your camp, and no one will get hurt."

The end of a rope came over the side and bounced against the pit wall across from me, a few feet off the ground and easy to grab.

I pulled to test it, and the rope gave a bit. "Hold tight," I said. "You wouldn't want to drop me. I might get upset." I tested the rope again. Much better. I grabbed with both hands and quickly crabbed up the wall into the open air.

All four were holding the rope. As soon as I was standing on my own, they dropped it and backed away until they were all leaning against a tree about ten feet in front of me. The jungle was quieter than it had been earlier, almost still save for the heavy breathing and other sounds we intruders supplied. The stars still shone brightly, the flowers still gleamed, and I almost wished they could relax enough to enjoy it. Almost.

"Nice night for a walk. Why don't we head to your camp and finish this? We don't want to miss my morning deadline." No one moved. "Really," I said. "It's time to go."

The man farthest to my right nodded and motioned for me to follow. Without a word, he took off, the others behind him. I trailed the group; no point in letting any of them get behind me.

We walked in silence to their camp. Though it was only a couple of miles, even in the relatively sparse undergrowth of the rain forest the walk was slow going. They made it slower by clearly not wanting to have to show up without their weapons and with me walking freely. I couldn't blame them, so I didn't push them.

When we were close enough that I could hear voices and see some of the camp's lights, the leader stopped and said, "Wait here, okay?"

"Sure," I said. Scared and calm would be easier to handle than scared and angry.

As I waited, I murmured an update request to Lobo. He answered promptly.

"They're all in the camp now, and there's a lot of activity. The recorder is excited by all the activity; it thinks it might get to work. The humans are in a huddle. Some are clearly carrying weapons, either all mechanical or at least not interested in talking to the other machines."

"The girl?"

"All I've got is the IR," Lobo said, "but I think she's in a tent on the far edge of the camp. I assume they're discussing what to do with you." He paused. "Such amateurs. They should either surrender or take a chance at killing you quickly. It's too late for discussion."

He was right, and I couldn't afford to let them shoot at me. The odds were low that they could hit something the nano-machines couldn't quickly fix, but I still saw no reason to take the chance. I also didn't want to risk giving them enough data that someone might later figure out what I was, but I had to take control of the situation before one of them did something stupid. Dissolving their metal might work on the larger group, but it also might make some of them angry enough to try to take me on. I needed them to feel impotent and completely out of their depth.

"Are they still all in a group?" I asked Lobo.

"Yes."

"And the girl is still separate from them?"

"As best I can tell," he said, "yes. I've warned you that I can't be sure."

"That'll have to do," I said.

I stepped behind a tree, grabbed more soil, and summoned another cloud, this one easily twice the size of the other. I spread it thinner and thinner, until it was a gossamer grayness rippling gently in the light breeze. I focused instructions on it, then sent it to the camp.

As it moved forward, a barely visible sheet floating in the air, I ran to the right and circled to the other side of the camp. I was halfway around when the screaming started. I stopped and crept forward until I could see into the camp.

Everything man-made—their guns, clothing, tents, tables, everything—was dissolving. The men were swatting at themselves as if they could stop the process, but the nano-machines were replicating and disassembling faster than the men could move. Many headed into the jungle at high speed; a few rolled on the ground as if they thought they were on fire. Two stood, shaking and moaning, apparently unable to move except to cover their genitals. Jasmine Slake was lying on the ground on the far right edge of the camp, crying and trying to cover up.

I stepped into the clearing, pulled from my pocket the old pistol Barnes had loaned me, and fired it once into the air. Everyone still in the camp froze.

"As I told your friends, I'm here for Jasmine Slake." I turned to face her and lowered my voice. "Jasmine, I'm from your father. I'll take you home. Come here."

She hesitated.

"Now," I said. "It's time to go home." I turned to face the rest of them. "That was your last warning. The next time, the weapons get you, not your possessions. Leave now." I raised my voice. "Go!"

They ran.

I took off my shirt and handed it to Jasmine. She was short enough that it served as a passable cover.

"Status?" I murmured to Lobo.

"All are in full retreat," he said. "None of them appear to be doubling back. I think you're done. Enough are on the same path to suggest there's a trail on the left corner of the camp opposite you. Take it, and you should be back in town shortly."

Jasmine was now staring at me. I wasn't qualified to help her with any psychological damage the kidnapping—or my rescue—had done, so I turned away, murmured my thanks to Lobo, and then started off slowly.

"Let's go," I said. "Your father's waiting."

After a brief hesitation, she followed.

When we arrived at his house, Earl Slake barely spoke to me. He motioned me through a pair of

open doors into a large front room, then took Jasmine up some stairs to the upper rear of the house. I sat in a chair with a nice view of the ocean, poured some water from a pitcher on its side table, and waited.

Slake closed the room's doors behind him, then asked, "What happened to her?"

"She was kidnapped."

He took a step toward me, then clearly thought better of it and stopped. "To her clothing?"

"It was a casualty of the rescue," I said. "That's all. I never touched her. I doubt they did, either, though I didn't stop to find out."

He relaxed a little. "Okay, okay," he said. "How did you do it?"

I stood. "That's not part of the deal. I brought her back. Now you hold up your end." I stepped so close to him that we were almost touching. Our eyes were level, and I didn't look away. I doubt he often experienced anyone invading his personal space so directly. "We have a deal. The fact that Jasmine is home tells you everything about me you ever need to know." I felt my own anger rise; I take my deals very, very seriously. I fought to control it as I said, "Finish the deal, and soon I'll be out of your hair."

He stepped back. "Of course, of course." He walked over to a desk in the room's corner and a holodisplay leapt to life above it. "Forgive my temper. Chalk it up to a father's protectiveness." He turned to the display, which was only a gentle blue line from my angle, and said, "Pay Mr. Moore what we agreed."

A few seconds later a low voice from the area of the display said something I couldn't quite make out. Slake clearly could understand it and nodded his head.

Turning back to me, he said, "It's done."

I took out my wallet, thumbed it active, and checked the alerts I had set. I was a million richer, and the shuttle passage and jump slots he had promised were indeed all waiting.

"Thank you," I said. "And the rest of it?"

He sat and shook his head. "That cost me more than your fee and passage, but it's done. Kelco won't come on site or even announce the purchase for thirty days. Jasmine and I will be on my private shuttle this afternoon. Our corporate counsel has already informed Mayor Barnes of all of this—as you asked." He stood again and looked at me. "You understand that for all the trouble it cost me, this month means nothing? Kelco still owns Macken, and we'll still develop it—just a month from now instead of tomorrow or the next day."

I saw no point in trying to explain it to him. I wasn't even sure I disagreed with him. "Yes, but that was the deal."

"Yes it was," he said. "And now, may I assume we're done?"

"Yes."

"Then I trust you can find your own way out," he said as he turned back to the display.

I did.

\* \* \*

As we stood in his office less than an hour later, Barnes proved as curious as Slake and no more gracious.

"I got the messages from Kelco, and it's amazing," he said. "We have the month to prepare, and Slake is leaving."

"That was the deal," I said.

"Yes, but how did you do it?"

"That was not the deal."

"Look, you may not stick around, but I'll have to deal with the Gardeners after you're gone. Knowing what you did could help me."

"That's not my problem," I said. "You have what you wanted. I did my part. Now, do yours."

He sat in his desk chair, leaned back, and said, "That's not a simple thing. Do you have any clue how hard it is to transfer a weapon that sophisticated without involving the federation? Not to mention how hard its absence will be to explain to the people here."

"None of that is my problem, either. Nor was what I had to do your problem. Are you going to hold up your end," I asked as I leaned over his desk until our faces were level, "or will this have to get ugly?"

Barnes cleared his throat, tapped a few times on the display built into his desk—a nice antique touch, I thought, to go with the rest of his office décor—and said, "Complete the transfer." Turning to me, he said, "It's done."

I took out my wallet and checked. The title transfer was complete, and all the relevant codes, instructions, and keys were in my secure data account. My wallet swept the information for intruders; it was clean.

"Then we're done," I said as I headed for the door.

As I opened the door to leave, I stopped and turned back to him. "Macken really is a beautiful planet. I don't think these thirty days will do you any good at all, but I wish you luck. It must be something to love a place enough to try so desperately to take care of it." I thought back to my childhood on Pinkelponker and tried to find any of the same feelings in me, but aside from a few scattered good memories only anger remained. I couldn't think of a single place that meant that much to me. "I truly wish you luck."

\* \* \*

I rode in Lobo on the evening commercial freight shuttle to the jump gate. I could have sent him separately and taken the passenger ship, but I figured there was no time like the present to get to know my new battle wagon.

"Where are we going?" he asked.

"I'm not sure where we'll go first. We'll take a few random jumps, then shuttle somewhere deserted enough for us to test all your weapons systems. I'll pick a spot after the first jump."

"And then?"

I realized I wasn't sure. Pinkelponker was still the frontrunner, though I still had no clue if there was even a chance Jennie could still be alive. Maybe to Aggro to see if I could find out once and for all if there were any other survivors.

"I don't know," I said. "Out there somewhere. We'll figure it out."

*For JFF, who has waited over thirteen years to read more about Jon. It's not the next chapter, but it is a next chapter.*



# On Suivi Point

*Here we have a new story set in the long-running space opera series "The Mageworlds," by this wife-and-husband writing team. Leave can be great fun, but sometimes it just doesn't pay to get off the ship . . . .*

## ***Debra Doyle & James D. Macdonald***

"The first thing a free-spacer learns about Suivi Point," Ignaceu LeSoit said to his companions, "is that the people who keep their money here don't want to have anything to do with the people who help them make it. So they want to keep the scum and riffraff confined to the spaceport district as much as possible."

"You could say the same thing about Galcen," Beka said. She was taller than either LeSoit or his friend Pav Eterynic, with a long blonde braid hanging down her back, and unlike them, she spoke the common Galcenian of the spaceways with the smooth accent of a native speaker. Eterynic and LeSoit had been old hands on board the *Sidh* when she joined the crew, and she'd let them take her under their protection for this liberty excursion in the capital city of the Suivan asteroid belt. "What's the second thing that I'm supposed to learn?"

"That one's easy," said Pav. "If something isn't for sale on Suivi, then it isn't for sale anywhere at all."

The glidewalk ahead of them finally started moving.

"Looks like the shopkeepers along here paid for slide service," Ignac' said. "We're getting into a higher-class neighborhood already."

"No class at all would be higher class than this," Pav said. "Next set of blast doors coming up—do we pay the bribe to get through, or make our own fun on this side? I spotted a couple of places off the last branch that looked like they might be okay."

"Right you are," Ignac' said. "If you don't mind paying twice as much for a steamed dumpling and a pot of cha'a as you would downtown for a five-course dinner."

"There's other stuff, this side," Pav said. The glidewalk carried them past a young woman who stood outside a storefront with the holosign *Your Fancy* flashing above her. Pav grinned at her. "Hello, doll!"

"Hello, spacer!" the young woman said. "Looking for a good time?"

"No, thanks," Ignac' said. "I had a good time once. I didn't like it."

"Come on, spacer." She nodded her head at Beka. "I'm better bouncy than that one, I bet."

"Yeah, probably," said Beka. "Pav, Ignac'—don't let me ruin your fun."

"I'm on liberty—we're on liberty—for the next thirty-six hours," Ignac' said. "Nothing and no one could possibly ruin my fun. Standing on my head in a cloaca wouldn't even ruin my fun."

"I didn't know you hated the ship that much," Pav said.

"I don't hate her," Ignac' replied. "She's a pretty good ship. It's just that the cloaca would be dirtside."

\* \* \*

The headquarters of Nalosh Guaranty Trust—the third largest bank on Suivi Point, and working hard at making second—lay in the Suivi financial district, hard by Money-Printer's Square. Grevvit Mancinom occupied an office suite there, with real fish in the real water tanks in the outer waiting room, signifying his ability to maintain useless and decorative objects in his working space. Mancinom was in the business of making decisions on his employers' behalf, and his decisions had, over time, proved lucky.

At the moment, however, he was doing nothing more strenuous than half-dreaming at his desk, sipping at his midmorning cup of cha'a and contemplating the early financial reports. The ping of an incoming message brought him to full alertness.

He pushed the button for speak. A synthesized voice said: "Operations calling. High-value package located. Decision tree open. Input required."

Mancinom set aside both the cha'a and the financials. Time to do the work he was paid for. "Decision tree. Parameters?"

"Four options." The voice this time was human; whoever was holding down the desk in Operations would have seen the message get picked up and come online to respond. "Just came up on the tree: Operations Raging Manhood, Clever Endorsement, Roly-Poly, and Dead Blonde."

"How do their deniability indices look?" Mancinom asked.

"Deniability's within normal limits for all four."

"What about cost/benefit?"

"Dead Blonde and Raging Manhood come up at the top of the tree for that one."

"Failure mode?"

"Glad you asked that," Operations said. "Failure mode in Raging Manhood has Ahlquist Dahl getting an extra fiver uptick in popularity. Failure mode in Dead Blonde gives us a shooting war between Dahl&Dahl and Suivi Mercantile—bombs in safe-deposit boxes and tellers found in back alleys."

"I'm starting to like Dead Blonde," Mancinom said. Dahl&Dahl and Suivi Mercantile were the first and second largest banks on Suivi Point, respectively. Trouble between them, while unsettling to domestic tranquility in general, could never be entirely bad for their next-closest competitor. "What's the package?"

"Scans from the portside strip report a Level One Registered Incognito passing through the outer blast doors. No further info as yet."

"Right," said Mancinom. Level One Registered Incognitos didn't pass through the scanners every day, even in a cosmopolitan place like Suivi Point. He found it hard to imagine what the holder of one might be doing at the Point's commercial spacedocks. "Well, get further, and meanwhile, patch me through to the executive council. I'm going to need votes."

\* \* \*

By the time the glidewalk had carried Beka, Pav, and Ignac' past the young woman at Your Fancy, she had already forgotten them. A cheery hail of "Hello, spacer!" echoed through the corridor behind them as she addressed the next person passing by.

"None of this is for-real 'dirtside,' you know," Pav said. "Asteroids don't count."

"Why not?" Beka asked. "Dig down far enough, and there's dirt. Or rock, at least."

"Because," said Ignac', "dirt or no dirt, it's still artificial gravity, artificial atmosphere, air locks, and armor-glass the whole way."

As if to illustrate his point, a double-bolted access hatch slid by to the right, stenciled with the notice: Warning. No gravity or atmosphere far side.

Beka said nothing. Her fantasies of a life in space, half based on her father's stories, half based on

holovid romances, hadn't included the guarded air locks and the garish storefronts, or the smell that wafted on the air currents from the overhead vents. To reassure herself, she looked up at the stars through the transparent roof of the corridor. They were still there, which was good.

"Stop that," Ignac' muttered. "We're almost at the main air lock to downtown. If you look too much like a newbie, the price will go up."

A sign ahead of them flashed, One Street, and Pav said, "Here's where I say good-bye. Catch you when you get back."

"Be careful," Ignac' said. "Captain'll skin you if you get in trouble."

Pav laughed. "What he said was, 'Don't get in trouble: I can hire new crew cheaper than I can bail you out.' Don't worry, I'll find someone to buddy up with. You stay out of trouble yourself."

"I'll do that," Ignac' said. " 'No-Trouble LeSoit' is what they call me back home."

The glidewalk carried Beka and Ignac' steadily away from Pav Eteryne and the commercial spaceport, toward the massive set of blast doors that restricted access to the rest of the asteroid settlement. After a few moments, Beka said, "Where *is* home, anyway? You never mentioned."

"I never got that drunk," Ignac' said. "I'm for finding my fun away from the Strip this time—think you can fake being a hotsy-totsy high-class lady, Galcen Girl?"

Beka smiled a little. "I think I can handle that."

"Good enough." Ignac' paid the suggested gratuity listed on the plate by the blast doors for passage-without-body-search, waited for the door to open, and hopped onto the glidewalk on the far side. "Come on, or miss the fun."

The corridor was wider on this side of the main doors, and the shops, though catering to spacers, looked somewhat less tawdry. Ignac' was scanning from side to side, clearly looking for something. He spotted it, and sprinted over to the nonmoving walkway that bordered the glidewalk.

He looked back over his shoulder at Beka as she came to join him. "This isn't an invitation. But the next part of this expedition will involve a snug-shack. You game?"

Beka paused and regarded his carefully noncommittal expression. "If there's a just-friends option available—then yes, I'm game."

"Just friends," Ignac' agreed. "Okay, here we go."

The sign over the building's doorway advertised "Rooms by the Hour," and the automated panel beside it displayed a list of prices and options. Beka looked at it curiously. Places like this had never featured in her father's tales; she began to suspect that he had edited the stories a bit for family consumption.

"Let's see," Ignac' said, surveying the menu. "One room, one large bed, and . . . water, one, two, many. I think I'll go with the 'many' option."

"What's the difference between one, two, and many?" Beka asked.

"One is if you want to wash up after, two is if you want to wash up before, and many is all the baths, showers, and hand washes that you want."

"Real water?"

"Nothing but the best for us spacers," Ignac' said. He slid his pay card into the slot on the machine's face, waited until the countdown reached "enough," then took Beka's right hand and placed it beside his left hand on the scanner screen. A light glowed inside the screen, and the scanner binged.

"There we are," he said. "Your right hand will open the door to room—" he squinted at the screen "—number Fourteen Alfa, for the next thirty-six hours. So will my left hand."

"Just like that?"

"They'll be selling our palm prints, of course," Ignac' said. "To people who want to know who's come through the port. That's why the room's so cheap. But I figure that anyone who's interested already

knows."

He turned back to the street.

"Aren't we going to go in?" Beka asked.

"Not yet. Next step, shopping."

"Shopping?"

"We won't have much fun downtown if we show up dressed in ship's coveralls." Ignac' smoothed down his moustache with his left hand, then offered his arm to Beka in a courtly gesture. "Come, my lady—the galaxy-famed secondhand clothes shops of Suivi Point await our pleasure."

The executive council of Nalosh Guaranty Trust was in special session via conference flatvid, each member chiming in from his or her own office in response to Mancinom's request for priority authorization.

"What's the consensus?" asked Sahe, the elegant member from Suivi's Tarn Gate district. "Ops likes this one a lot, and I have to say it has its attractions."

Council member Orfan Roos said, "We've been spending a lot of money—"

"Not all that much, actually," Mancinom said. "Less than what gets spent every month on exotic plants and original artwork for the main lobby."

"That's public outreach and support for the arts," Sahe retorted. "Our image—"

"A lot of money," Roos said firmly, "that needs to be justified by a return, maintaining an address with a years-long paper trail leading back to Ahlquist Dahl at Dahl&Dahl. If we don't use it for something—"

"But is this the best possible something?" inquired yet a third council member. "If it doesn't work, then we've knocked a fraction off our profits for nothing."

"It is necessary to speculate in order to accumulate," Sahe replied. Her image in the members' flatscreens made a shake-and-release gesture with one hand. "Sooner or later one has to throw the dice. I say today."

One by one, the other members nodded in response. "Well, then," said Roos. "Mancinom—how late in the actions can we change from Dead Blonde to Raging Manhood and still be credible?"

"At the point violence becomes necessary," Mancinom said.

"Keep both options open, then, as long as possible. We'll take either course. Now—what's our package?"

"As it happens," Mancinom said, "the package is in fact female, and is in fact blonde. I think our luck is in." The members' flatscreens switched to showing a grainy image of a young woman in a spacer's coverall. A time-tick in the corner showed that the picture had come from that morning's security cameras at the portside locks.

"You're the best one to judge," Roos admitted. "What more can you tell me?"

"That the clock's running. Ship's patches on the suit she's wearing tell me that she'll be away again in less than thirty-four hours."

"Who's that walking beside her?" Sahe asked. "With the moustache."

"Same ship designation," Mancinom said. "An expendable. If we go with Dead Blonde, he's history. If we go with Raging Manhood, he's the outrage that'll fuel the assassination of Ahlquist Dahl."

"Poor Ahlquist. Either way, he's not going to have a happy day."

Roos snorted. "•Poor Ahlquist' my ass. He was the node point of a three percent decline in our fortunes over the last two quarters. Mancinom, you've got project lead—do we go for Raging Manhood or Dead Blonde?"

"Dead Blonde's on top by five points," Mancinom said.

"Dead Blonde it is then. Brief us again in thirty-four hours."

\* \* \*

An hour after they had left the snug-shack, Beka and Ignac' returned carrying packages wrapped in yellow paper and tied with string. Careful shopping had netted them dirtside clothing that fit them well enough for a night on the town. None of the garments had labels, but Beka could see where they'd been snipped out; she was willing to bet that a deep scan of the fabric would reveal the designers' watermarks.

"You or me?" Ignac' asked as they entered the snug-shack lobby.

"Let me," Beka said. "It'll do both of our reputations no end of good."

She reached out her right hand and touched the back wall of the lobby, inside the outlined palm plate. Part of that wall slid up, revealing a dimly lit hallway.

"I feel so wicked," Beka said, as the outer door slid closed behind them.

"Oh, you are wicked," Ignac' said. "Trust me on that. Our room should be . . . there."

He nodded to where the flickering blue script beside another palm plate read 14A. Again Beka palmed the plate, and again part of the white-metal wall slid up, revealing a room beyond. Beka entered and tossed her purchases onto the center of the large bed in the middle of the room. Then she took a step back, put her hands on her hips, and said, "I sure hope you didn't pay a lot for this."

"No more than I was willing to," Ignac' said.

He tossed his packages onto the bed next to hers. The room's water facility was a plain slab with a drain in the far corner, a nozzle pointing straight down from overhead, with a convenience made of stainless steel beside it. Neither shower nor convenience had any screen or covering around them.

"The setup," Beka said, "assumes a certain degree of familiarity between the occupants of this room."

Ignac' was looking over a set of buttons by the side of the bed. He pressed the top button experimentally, and the blank white walls transformed into a decent holo of a forest scene. The water facility, unfortunately, remained unchanged.

"I'll wait outside in the hall, if you insist," he said. "Or I can promise to avert my eyes while you freshen yourself and dress, if you'll do the same for me."

"That sounds good," Beka said. "You can go first." She lay down on the far side on the bed, facing away from the facilities, and was asleep and snoring before Ignac' had even started the shower.

When she awoke, she was alone in the room under a light sheet, and the lighting had been dialed back to "subdued." The woodland scene had ambient noises with it, the sounds of wind and distant running water and the calls of unknown forest creatures. She was still wearing her ship's coveralls, buttoned, zipped, and snapped to the neck. Ignac' must have pulled off her boots, though, since she didn't remember doing it for herself.

She pulled off the sheet and stood. A note on the door read, "Out for food, back soon—LS."

The bedside control panel had a dial that ranged from white to black. Beka put her finger on it and moved the wheel toward white; the lights came up.

Ignac's bundle of secondhand clothing had been opened and its contents folded on one of the room's two chairs. Her own packet, still tied, rested on the other chair. Beka pulled it open and took out a pearlescent bodice with trousers and loose overjacket in white spidersilk. A pair of light grey shoes—since space boots wouldn't fit the role of a civilian on a holiday—completed the outfit.

There was no sense in putting it on over a grubby body, though. Beka could feel the accumulated dirt that shipboard sonics wouldn't remove, plus her own night sweat. She glanced at the door, put a towel where she could grab it in a hurry if the door started to slide, and stripped.

She was wearing the bodice-and-pants combo and brushing out her hair when the door finally did open. Ignac' appeared, carrying a plastic bag full of little boxes.

"Ah, there you are," he said. "You slept like a rock for over twelve hours. I didn't know how much

you snored."

"I don't!"

"My dear young lady, I wouldn't fib. At least not about that." LeSoit was pulling the boxes out of the bag and opening them on the bedside table. "Have some breakfast or lunch or something."

"What's that?" Beka asked, pointing at one of the boxes.

"That's the 'something,'" Ignac' said. "It was cheap."

He pulled out plastic utensils from the bottom of the bag and handed a set to Beka. "Do you want some of the blue, some of the brown, or a bit of the green?"

Beka was suddenly aware of how hungry she was. "Some of everything."

Despite Ignac's remarks, the food—ethnic specialties, she guessed, from some world or culture she'd never encountered on Galcen—turned out to be delicious. Only the hard-learned lessons from her school days at the Delaven Academy kept her from spilling any of it on the white bodice. She kept on eating while Ignac' stepped to the other side of the room, and studiously ignored the subsequent rustlings and rattlings.

Finally Ignac' said, "You can look now."

She turned then, and saw him wearing a not-bad formal outfit of trousers, tunic, and sash. A brush with liquid polish had brought his space boots to a mirror shine.

"Shall we go for a walk?" he said. "The glittering wonders of the world—or, at any rate, of Suivi Point—await our pleasure."

Beka gave him her best finishing-school curtsy. "Gentlesir, I would be delighted."

Together they went out the door and down the hall, and to the street, where the lighting hadn't changed, the smells hadn't changed, and the mixture of working folks hurrying by and gawkers looking at the sights had only changed in their faces.

"The usual way to go on liberty," Ignac' said, as the glidewalk carried them onward, "is to put all your money in your pocket and dress up in your fanciest clothes, then go to the worst part of town and drink as much of their most expensive beer as you can in four hours. You're practically guaranteed an adventure doing that."

"But we aren't."

"Not this time. This time we're going to have some serious fun, and that means going where the rich folks go and doing what the rich folks do."

"That's not as much fun as you'd think," Beka said.

Ignac' looked at her.

"I mean," she said hastily, "so I'm told."

"If they spend the whole thirty-six hours in that snug-shack," Bemmish said to his partner, "this op is blown."

"So it's blown. Walk away," Fane replied. The two street-level Nalosh Guaranty Trust operatives sat at a table in the bun-and-biscuit shop a corridor-turning away from the snug-shack. Fane had his eyes on the lock-and-trace box that displayed the current location of the package in question. "Operations doesn't like it, that's their problem."

"And our paychecks. But I've seen the pictures of the girl—if *I* was traveling with her, I'd spend the whole time back at the snug-shack."

"She's not that good-looking," Fane said.

"But she looks like she might be friendly."

"If it's female, you think it looks friendly. It's been twelve hours already . . . they've got to come out

for food sometime."

"I wouldn't put money on it," Bemmish said. "Do we have video feed from inside?"

"No. Landun Security has that franchise, and we don't have a contract with them . . . wait. What's this? Motion outside of coordinate field. Our package is in play." Fane shoved the lock-and-trace box across the table to Bemmish. "Look at that—package in motion, not heading back to the docks. Alert the cleaning crew; we're going to need 'em."

Beka and Ignac' took the glidewalk up to the easement for block twelve, paid the fee, and went through.

"What happens if we don't have the money to pay our way back?" Beka asked.

Ignac' pointed at an overhead sign: Last Exits. "Worst comes to worst, they're always hiring."

"I'm sure they are—but for what?"

"Contract killings," he said. "If you can pay for something here, then it's legal. So there's always quick jobs for transit cash."

"You wouldn't!"

"No, not that, but there's always something to sell, and someone to buy. The law here is money."

"Then let's not spend ours down to zero, eh? I like the law on my side." Beka took his hand. "If we're going to be upper-class twits, now is the time to start acting it."

"Speaking of acting it—I've always loved that posh accent you can do, when you're swearing at the engines or getting off the midwatch."

"•Posh accent'?—oh. *This* one?"

"Yeah," Ignac' said. "You've got a great career in the holovids waiting for you if you ever get tired of pushing ships through vacuum."

"Oh, Ignaceu," Beka said, her Galcenian tones growing even richer. "I do so adore your little drolleries."

"I'm glad you're amused. What I'm saying is, if money's tight, you or I can always get a short-term contract with Contract Security—y'know, ConSec—to do something down portside, get a pass through the gates, and off we go."

"I'll keep that in mind," she said. "Do they ask you to do anything obnoxious?"

"Not usually."

"Done it before?"

"Once or twice. Low-level stuff; deliver papers to someone, get a thumbprint. Jobs that require a warm body, nothing else. They don't even check your blood-alcohol level first."

"Speaking of which," Beka said, dropping farther into the deliberately posh accent, "my blood-alcohol level is near an all-time low. Do you suppose we can remedy that? I'd gone to space in the fond hope that you spacers were a hard-drinking lot."

"Let's go somewhere fancy," Ignac' said. "I want a drink with fresh fruit and flowers in it that costs about a day's pay."

"Live music," Beka said. "I want live music."

"We'll have to ask directions, then."

"No need. We want to find a hovercab and ask the driver to take us to the Tarn Gate district."

"Are you sure that you've never been here before? What *do* they teach you back on Galcen?"

"Nothing useful," Beka said. "Believe me, I know."

The route to Tarn Gate passed through Suivi's Main Dome, through the banking district, past the great mosaic depicting the Spirit of Enlightened Mercantilism, then through more easements and locks

into the glittering onyx-and-steel vaults and domes of the extremely rich.

"Looks like the inside of a coffin," Ignac' observed, when at last they emerged from the hovercab.

"The very air you breathe here is high-class air," Beka told him. "None of your sleazy recycled stuff, full of dirty socks, farts, and belches. This air is hand-synthesized from free-range interstellar nitrogen and farm-fresh organic oxygen, lightly scented with ozone for your breathing pleasure."

"When you say it like that, it does smell different."

"Damn straight it does." Beka nodded toward where a discreet engraved placard in a tinted window indicated that a restaurant was somewhere inside. "Let's see what passes for a quaint little bistro in these parts."

They sauntered up, and were greeted at the door by a footman. He looked from Ignac' to Beka, and his eyes went wide. "My lady!" he exclaimed.

"None of that," Beka said, making a five-credit chit appear and vanish into his hand with the skill of a magician. "Two, with privacy, if you please."

They were whisked inside to a booth near the back. As she'd requested, the room was private; they could see the bar, but none of the other patrons. The music being played by the ensemble near the bar was, indeed, live.

"This is different," Ignac' said, his fingers rubbing the dark surface of the table between them. "What is it, do you know?"

"It's called 'wood,'" Beka said, straight-faced. "Every board foot of it imported by starship at vast expense."

"I've heard of it before," Ignac' said, equally straight-faced. "I'd just never seen any."

"Where did you say you're from again?"

"I didn't."

"Ah, the mysterious stranger," Beka said, leaning closer and resting her chin on her laced fingers. "I so love a mysterious man. I shall have to get you drunk."

The drinks, which arrived soon after, had Ignac' in a state of wonder. "This doesn't taste like it has any alcohol in it at all," he said.

"Don't be fooled by the decorations," Beka said. "Two of those things would put you on the floor."

"Do you really think so? Then I believe I'll have another when this is done."

Beka laughed. "A week's pay, easy come, easy go." She held up a finger to summon the waiter.

The waiter, however, did not appear. Instead, two men, large-shouldered and heavy-jawed, pushed into the booth and shoved Beka and Ignac' against the far wall. Beka felt the muzzle of a blaster pressed against her midsection.

"No noise," the man beside her said. His voice was a high tenor, and he spoke softly.

"What a surprise to find you in a place like this," the other man said to Ignac'. His voice was rougher than his companion's; otherwise, they were much of a sameness, with nothing to distinguish them from the general mass of Suivi's inhabitants except their size. "We'd expected to find you down by the docks."

"I'm afraid you have the wrong person," Ignac' said. "I don't believe I've had the pleasure."

"Believe me, we've got the right person," Tenor Voice said. He turned to Beka and tipped a folder at her. A Contract Security device with flashing identifier appeared. "We have no instructions concerning you, my lady. However, be advised that this is a security matter."

"What he said," the other man said to Ignac'. "Do you want to walk, or must we drag you?"

"Walk, I think," Ignac' said. He turned to look at Beka. "Don't worry. If it's a ConSec matter, they'll send word to the ship."

The men pushed away; the blaster disappeared; then they were gone from sight, Ignac' walking



between the other two.

Beka sat back and considered her options. She would have been more inclined to trust Ignac's assessment of the situation if some of her father's war stories had not featured less-than-flattering commentary on the Contract Security of Suivi Point.

"Never trust them if you can't see both their hands," he'd said, "and never let them keep a shipmate overnight."

She picked up her drink and downed it. Then she reached across the table, snagged Ignac's abandoned drink too, and tossed it back.

"Gun shop," she said aloud. "I need to find a gun shop."

\* \* \*

"We have contact," Mancinom said to Operations over his desktop link. "Target two in play; we've got him."

"Switching all resources from Raging Manhood to Dead Blonde," Operations replied.

"Do you have the ConSec lockdown?"

"We have it," Ops said, "but it's costing us. Can't maintain for too long."

"Three hours is what the update calls for."

"That's our weakest point. Someone may ask why."

Mancinom shook his head, although there was no one in his office to see. "No one will know, and it won't be connected."

\* \* \*

Beka might have needed to find a gun shop, but what she eventually found, in a remote back-tunnel section of the Tarn Gate district, was a pawnbroker's establishment.

She went in, under the sign that said "Cash Sent Anywhere" in three languages plus another line that probably said the same thing in an alphabet she didn't recognize. The money changer didn't appear to see anything odd about a blonde in evening dress walking into his shop.

"Help you?" he asked. His Galcenian had a strong but unfamiliar accent; she wondered if it belonged to the same world as the unknown alphabet. He had a blaster strapped to his hip.

She pointed at the weapon. "How much for that?"

"Not for sale, this one," the money changer said.

"Who's got one, then?"

"I do. Just this one isn't for sale."

"Where are the ones you are selling?"

"Back here." The money changer walked to the rear of his shop. Objects ranging from clay pots to musical instruments were stacked against the walls and arrayed in cases. "It's all for sale, you show me some cash."

Beka pulled out her pay card and slid it across the counter. "You said you had a blaster?"

"Yeah." The money changer ran the card through a reader. "Not enough on this to pay for one." He nodded toward the shop door. "You go away now."

"Wait." Beka pulled out a different card. "Try this."

The money changer ran it through the reader. His back straightened a bit. "My lady—"

"None of that. Blasters."

"Got a nice one. War surplus. You like?" The man ducked down and pulled a heavy-barreled weapon from under the counter. "Comes with holster and everything."

"Everything includes a full charge?"

"Everything."

"Got two?"

"My lady!"

"If you have two of these, I'll buy both."

"Cost you."

"You've read the card. I'm good for it."

Beka picked up the blaster. The grip was a bit big for her hand, but nothing she couldn't handle. She'd grown up around such things; her father had taken her to the range for her tenth birthday to let her start learning on his own personal weapon.

"When you're older," he'd said, "you'll have bodyguards and flunkies galore . . . but there's no guarantee that when the bad days come you won't have to shoot your own way out."

Her mother had shaken her head disapprovingly, but she hadn't denied the truth of it, either—and she hadn't tried to stop the lessons.

Now, under the harsh overhead light, Beka looked over the sights of the unfamiliar blaster. Her finger reached the firing stud. The weapon was heavy and cold in her hand, the power of life and death.

"Two," she said firmly. "The other one."

"Coming up."

The money changer pulled a second, similar weapon out of another box. "Not so nice, I don't charge you as much."

"I don't care about pretty. The charge chambers?"

"I got 'em."

Beka took the charge chamber, snapped it into the side of the handle. The little red light on the side read Full. "Very good."

"Anything else?" the money changer asked, sliding Beka's card back over to her.

"Yes. I want to know where my left hand is."

The man pointed at her left arm. "Where always is."

"No," Beka said. "I'm going to put my right hand on your palm reader. You're going to tell me where the left hand that goes with that right hand is. Got a problem with that?"

"No, no problem. Cost you more."

"I have more. How much for you not to tell anyone about my visit for . . . six hours?"

"Valuable information, your visit."

"I'll give you six hundred. That's a hundred an hour."

"That's reasonable."

"Then let's do it."

Beka tucked one of the weapons into her waistband and slid the other into its holster on her hip. She and the money changer walked to the front of the store. Beka laid her hand on the palm plate, and the machine blinked and chinged. The money changer ran Beka's card through the reader one more time, then returned it.

"Your left hand on Fifth and Rabban," the money changer said. "No guarantee will stay there long, or even there still. May have not touched anything sensitive since."

"I'll take my chances. Where on Fifth and Rabban?"

"Number Four One Seven. Top and back, letter C."

"My gratitude," Beka said.

"And your family's?" the money changer asked, but he was asking her retreating back.

\* \* \*

"Lost trace on the package," Operations reported to Mancinom. "Either she's gone into hiding, or she's not touching a sensitive surface, or she's headed back to her ship . . . no, wait a minute, she's back in play, and heading in the right direction. Just got a visual lock from a public data point. Do you think it's time to give her the trace box?"

"Long past time," Mancinom said. "Got the obvious-trail unit ready to go?"

"Got it," Ops said. "The plan is coming together nicely."

"It's our job to make it that way. Have we got the scandal-rag reporters in position?"

"Ready in hot standby," Ops assured him. "On scene before she's cool."

Mancinom contemplated the image on his flatscreen of the package's most recent encounter with a public security camera. She'd changed her clothes, replacing the drab coverall with a stylish trousers-and-jacket combination, and had put up her long hair into a complex arrangement of multiple braids.

"She's taken the bait," he said. "Under the circumstances, I almost feel sorry for her."

"Any idea what the real name is behind her incog?"

"All we know is that 'Beka Lokkelar' shows up registered as a Level One," Mancinom said, "and flagged as connected to both Suivi Mercantile and Dahl&Dahl."

"We could find out right now if we pushed."

"Not without drawing notice," Mancinom said. "We'll have to wait and see what's left of her incognito after the scandal-rags are done with it."

\* \* \*

Outside the pawnshop, a public signpost with an interactive map told Beka where Fifth crossed Rabban: well outside the Tarn Gate district, but close enough to get there on foot. All she had to do would be stay away from ConSec, and away from whoever it was who'd taken an undue interest in a couple of spacers in search of a drink and a good meal.

The crossing of Fifth and Rabban lay in a residential area, some foot traffic, tunnel oriented and well inside the shell of the asteroid. Steam and power lines ran along the left-hand wall of the corridor, past the safety barrier. Beka reconnoitered around the corner, her pale dress reflecting the overhead lights. There, up between two crossings, was a multiple-occupancy dwelling.

"Hah," Beka said. "If that isn't Four One Seven, you can call me a kwoufer and feed me to the brine shrimp."

A green hovercab waited on the surface of the trafficway beside the glidewalk outside Four One Seven, its lights out and its nullgravs disengaged. When thirty minutes by Beka's chronometer had passed and the hovercab had not responded to another call, she nodded to herself and slid her newly purchased blaster from its holster.

"Time to go."

She walked up behind the vehicle, her pace steady, approaching it on the driver's side. When she drew even with the cab's back door, she grabbed the handle and pulled. The door came open. She slid in and pushed the muzzle of her blaster against the back of the driver's head. Only then did she recognize him as one of the two men who had taken Ignac' away at the restaurant. The revelation stiffened her resolve.

"Talk fast," she said. "What do your people want with the guy inside the building?"

In spite of everything, she half expected the taxi driver to respond to her question with a heated denial of all knowledge. Instead, he shrugged, being careful not to jar her blaster hand in the process, and said, "We're finishing up a contract. If you haven't got a contract of your own in force, stay out of the way. You don't want this to go to the Labor Board, do you?"

"Maybe I do and maybe I don't. Whose contract?"

"Laedin and Sons. You want to check my license?"

She pulled her blaster back from the man's head. "No, that's okay. But are you sure you've got the right guy?"

"Sure I'm sure," the driver said. He reached over to his right.

"Ah, ah." Beka pushed the blaster back against his head. "Don't try that."

"Would you put that thing away? Anybody would think this was your first job." The driver's hand came back up holding a small box fitted with a screen. The screen showed a blue bugtrace, gently pulsing, with a bearing and range subscribed. "There. That's him. Once he's dead, that won't blink, so he's not dead."

"Do you have any objections if I rescue him?" Beka asked.

"You are—?"

"Kronitz and Spez, Custom Rescues," she replied. She took the box from his unresisting hand. "We're in the comm-code listings."

\* \* \*

"She's got the trace box," Ops reported to Mancinom. "Bemmish says she pulled a blaster on him, though. Looks like our little package has unexpected depths."

"So long as he handed over the bugtrace, it doesn't matter. Is the bug in position?"

"In position," Ops said. "Fane's waiting for her."

"What about the boyfriend?"

"We're holding him under wraps off-site; we can make him dead at leisure once this is finished."

"Very well," Mancinom said. "Pass to Fane: 'In place, on time, and witnesses located. Package should be at your posit in five; be aware package is now armed.'•"

\* \* \*

The bugtrace showed Beka the direction of Ignac's location—somewhere inside Four One Seven, as she'd expected. She entered the building and found her way to the proper apartment with only a few wrong turnings. She touched the lockplate beside the apartment door.

A familiar tenor voice said, "Welcome, my dear," over the annunciator, and the door slid open. Beka tightened her grip on the blaster and walked in.

The lights were low and the decor of the room was one of understated elegance. Beka dismissed it at a glance and concentrated her attention on the room's single occupant, and on the blaster he had pointed in her direction.

"Please," Tenor Voice said. "Put your blaster down on the floor before you come any closer."

Reluctantly, she knelt—straight-backed and folding gracefully at the knees, the way she'd practiced it in dancing class every year from six to sixteen—and laid the blaster on the deep-piled carpet.

"Who the hell *are* you guys?" she demanded, standing up again. "And where is Ignac'?"

"That's not important," Tenor Voice said. "There are some people who want to meet you; that's all."

"Sending me a text message or a voice-chip wasn't good enough for them?"

"Not with you having a Level One Registered Incognito," Tenor Voice said. "If you'd come to Suivi Point openly, in your persona as—who did you say you really are?—then the situation would be different."

"My real name is none of your damned business," Beka said. "I want to know about Ignac' LeSoit. The guy I was having dinner with. That you kidnapped."

"Through that door," Tenor Voice said, nodding toward an interior portal to his right. The location matched the range and bearing Beka had taken earlier from the bugtrace. "If you please. Truthfully, we

desire conversation with you."

Beka glared at him. "So all of this has to do with me, and not with Ignac' at all?"

"Quite right," Tenor Voice said. He pointed to a gauzy red garment draped over the back of a nearby chair. "I must insist, however, that you dress properly for your meeting. Would you indulge me?"

"Say that I don't?" Beka said. "Say I decide instead to drop my incognito and buy you, and buy this building, and buy everything that's in it?"

"They aren't for sale," Tenor Voice said. He raised his blaster. "Now—put on the clothing, my dear young lady. I promise that all the visual recorders in this room were turned off a moment after you stepped in."

She pursed her lips. "If I change clothes, will you close your eyes while I do it?"

"I don't think so," he said. "I get few enough fringe benefits in my line of work."

Beka walked over to the chair and picked up the loose bundle of red cloth. She frowned at it. "There isn't enough material in here to be decent."

Tenor Voice shrugged. "I suppose not."

Beka gathered the red gauze in front of her in what she hoped would pass for a gesture of modesty, blocking his view of exactly what her own right hand was doing.

"Please," she said again. The quaver in her voice was convincing, she hoped—the fear behind it was real enough. "Put down the blaster and let me walk out of here."

"I'm sorry," Tenor Voice said. "I'm afraid that isn't possible."

"Then put down the blaster. It's bad enough having to change clothes with you watching me—"

"No. Really, we're on a tight schedule here. You want to see your boyfriend—"

Beka shot him through the armload of red gauze fabric, setting it on fire. She dropped the burning fabric, her left hand coming up to grasp the wrist of her blaster hand as she held the firing stud down, spraying the room in front of her with lines of energy until the sound and smell of it filled her ears and nostrils. Burn marks appeared on the wall, on the floor, and on Tenor Voice as he stood amazed, before falling, still amazed, to the carpet.

Beka eased up on the firing stud.

"He's not my boyfriend," she said. "He's just a friend."

She wasn't really surprised when the next room, equally elegantly appointed, didn't hold Ignac'—though it did hold a wide bed with ropes attached to the posts, and a blindfold and a gag laid ready on the bedside table. The lock-and-trace box helped her find the hidden snoop-button soon enough. She pried it free and took it with her when she went.

\* \* \*

Bemmish stood leaning against the side of the hovercab. His part of the operation was over, though he couldn't help worrying a bit about how Fane would handle the supposedly docile package. None of the earlier photo refs on her had shown her going armed; the appearance of that blaster had been an unpleasant surprise, even if it had served to make his handing over of the bugtrace more convincing.

He had confidence, though, in his partner's ability to handle things. Fane was a cool one, not easily distracted; Bemmish didn't expect he'd have to wait much longer before closing down the finished operation and going home.

He certainly wasn't expecting to feel a blaster pressed against his back, at the same moment a woman's hand came around from behind him to dangle a fifty-credit chit in front of his nose.

"You have a choice," the package's Galcenian accent whispered in his ear. "You can consider this a down payment on enough money to buy a ticket off this rock to anywhere in the civilized galaxy, you name the place, or—"

"Or?"

"Or I can blow your spine out."

"Do I take it I have the pleasure of addressing a Level One Registered Incognito?"

"Yes."

"I'm not stupid; I'll take the money."

The hand with the credit chit withdrew; the blaster didn't. When the hand reappeared it had a tiny round metal object in it.

"Swallow this," she said.

"What?"

"Bug and trace. I want to be able to find you. Again, your choice is do it, or I blow your spine out."

"You have the blaster. I'll do it."

"Open wide," she said.

He did, and swallowed.

He felt the woman moving away from him. "Now. Turn around."

He did so, and was disappointed to find that she'd stepped back several feet—and was holding the blaster close to her body. She was leaving him no chance to take it away from her. He saw its empty holster riding low on her hip, and wondered again where she'd picked up the firepower—and where she'd learned to be so cautious with it.

"What do you want?" he demanded.

"I'm asking you the same question that I asked your pal inside," the young woman said. "Where's my partner? You know, the free-spacer with the moustache who was with me at the restaurant. The guy you kidnapped."

"He's standing by, waiting for me to broadcast a 'mission accomplished' to the guy who's holding him."

"Take me to him," she said. "And if you try to make a getaway, I'll shoot you before you can run. I've already killed a man, and people tell me it gets easier with practice."

\* \* \*

The man walked. Beka followed. She kept well back, using the locator button to keep him in sight. He paused at a door with the Hard Vacuum designation stenciled on it. Beka caught up with him.

"Through here," he said.

"You have a pressure suit and oxygen with you?"

"No. The sign is lying."

"Is it really?" Beka said. "You go first."

She stepped back and watched as the man undogged the hatch. It looked like he'd told her the truth. No sound of a vacuum hiss followed the action, and he had no problem opening the door.

"In," she said.

He ducked and entered. She followed. Her feet felt light; the gravity was lower here on the other side. Corridors full of pipes and conduits stretched out in front, behind, and up and down from them.

"This way," the man said, dropping into a tunnel that intersected ninety degrees down. Beka followed; they didn't fall fast. The speed of descent slowed the farther down they went. Then the man she was following slowed and stopped, hanging in midair—they'd come to a null-gravity zone, caught between two gravity generators, pulled equally in either direction. He kicked out against the bulkhead and shot through another opening ninety degrees to the right.

Beka stopped where he had; followed; and crossed the threshold into a larger space. As soon as she'd entered, several things caught her attention at once.

The first was Ignac', tethered to the overhead by one ankle. The second was a body floating in

midair. And the third was the man she'd been following, chopping down on her wrist, knocking the blaster out of her hand as he swung behind her with his arm around her neck in a chokehold.

Beka yanked the second blaster from where it had once again been concealed beneath her jacket and sent it spinning toward Ignac' in a long flat trajectory.

The arm around her neck tightened. Her vision grew red, then started to fuzzle to black—then, came the sound and heat of a blaster bolt passing by her head, and the pressure relaxed. She shook her head, clearing it, drawing in deep lungfuls of air. Then she snatched the first blaster out of the air where it had come to rest, slowly spinning around its center of mass, holstered it, and shoved off from the bulkhead to propel herself upward.

"Glad to see you," she said to LeSoit, as soon as she was level with him. Her voice came out in a hoarse croak. "I've been looking all over for you."

"Glad to see you, too," he replied. He gestured toward the stranger, floating limp just beyond the maximum extent of LeSoit's tether. "If you could give me a hand here—that fellow over there has the key to my leg irons in his pocket. I was able to incapacitate him earlier, but he floated out of reach before I could search him."

"That wasn't very cooperative of him," Beka said. She was already maneuvering to grab the man and go through his pockets until she found the key.

"No. It's a good thing other people are more obliging—thanks for providing the last-minute hardware, by the way."

"No problem. My father always said you don't bring cheese sandwiches to a gunfight. I used to wonder exactly what he meant by it."

"And now you don't?"

"No. Not anymore."

\* \* \*

"The operation didn't go exactly as planned," Mancinom admitted to the other members of the executive council. "But still, not a bad outcome. A dead man in Ahlquist Dahl's private love nest is nearly as good as a dead girl."

"Imagine the look of surprise on dear Ahlquist's face when he learns that he *has* a love nest," Sahe replied, pouring a cup of cha'a from the warmer on her desk. "And who would have suspected that Bemmish would sell us out?"

"Who, indeed?" Orfan Roos said. "But with his partner dead and Bemmish missing, it does seem the most likely possibility. Unless the package herself was somehow responsible . . . ?"

Mancinom shook his head. "We don't want to go that route, believe me."

"Why not?" Sahe asked.

"Because I finally got through to the ID behind that Level One Registered Incognito."

"It was that high-powered?"

"Look at it this way," Mancinom said. "If Dead Blonde had gone off without a hitch, Beka Lokkelar's death would have made a scandal big enough to turn Dahl&Dahl *and* Suivi Mercantile into piles of smoking rubble. But she got clear under her own power, so whatever she did with Fane and Bemmish, it's best to let it lie."

"Agreed," said Roos. "Put in a ticket with ConSec on the quiet, all the same, and tell them to keep it open. You never know when something like that might come in handy."

\* \* \*

When Pav Eterylic returned to the *Sidh*, two minutes before liberty expired, he was amazed to learn from the watch-stander on duty that Beka Lokkelar and Ignac' LeSoit had returned to the ship some sixteen hours before.

"What's the matter?" Pav asked, when he encountered Beka a few minutes later in the ship's mess. "Miss the old rust-bucket that much?"

"No," Beka said, refilling her mug with cha'a from the big forty-cup urn. "I didn't have as much fun dirtside as I expected to, that's all."

"You should have stuck with me," Pav said contentedly. "We're going to be in low orbit before my hangover even starts."

## GENIE OUT OF THE BOTTLE

*Eric Flint lives in Indiana, Dave Freer lives in South Africa, but they both hang out at Baen's Bar, at [www.baen.com](http://www.baen.com), which is where they met and began their collaborations. This is a tale set in the world of the authors' novels *Rats, Bats and Vats* and *The Rats, the Bats & The Ugly*.*

*Dave Freer and Eric Flint*

### Prologue

"When shall these three meet again, in thunder, lightning or in rain?"

The dark, hook-nosed lab-coated woman looked as if she might have been one of the witches. And, had this been one of the world of Harmony and Reason's updated Shakespearean plays at the New Globe theatre, the setting too would have seemed appropriate. What she leaned over was no cauldron with simmering eye of newt and toe of frog, but three tissue-cloning vats with their attendant electronics and glassware.

The fetuses developing under the glass covers all looked like unborn rats.

One of them was.

Mari-Lou Evans, once, twenty-four frozen light-years ago, of Stratford-on-Avon, and, like her boss, a loyal part of the New Globe Thespian society, knew her prescribed reply. "*When the hurlyburly's done, when the battle's lost and won,*" she intoned sepulchrally. Then she sighed. "If it ever is, Sanjay. If we don't just lose."

The colony's chief biologist shrugged and pulled a wry face. "Do you think I'd be playing God if we faced any real alternatives?" She pointed to the third breeding vat. "No need for another standard human



control, Mari-Lou. We won't be breeding up any more vatbrats for a while. We need to gear up the equipment for mass production of that long-nose elephant-shrew mix. The army has put in impossible demands for quantity. If it tests out fine on emergence, then we're going to have to set up a production line for the creatures."

The chief geneticist nodded. She pointed to the third vat. "The ultrasounds of the bat's gastrointestinal development don't look good, Sanjay. We're going to have to tinker and tweak those genes a bit more in my opinion. Perhaps cherry-pick from the *Tadarida*. It's the size problem. The bigger bats are fruit-eaters, not insectivores."

"Destroy the fetus and start again, Mari-Lou. Make it smaller if need be. The army will just have to take what it can get."

It was the geneticist's turn to pull a wry face. "I hate pulling the plug at this stage."

"And I hate making them intelligent . . . to go and be cannon fodder. I hate implanting alien-built software and cybernetics that I don't properly understand into their heads. But we don't have a lot of choices. Humans are too slow to produce, and the Magh' are advancing faster than we can retreat, never mind stop them. The council of Shareholders are now talking about introducing compulsory conscription for everyone between the ages of eighteen and twenty-two. Even that won't be enough. We need more fighters."

The geneticist knew that for a truth. The Magh' tide, even with the assistance of the alien Korozhet and their wonderful new devices, was proving very difficult to stem. She shifted subject. "What are you planning on using for language download?"

Her fellow amateur thespian shrugged. "It's just got to be a spoken source of vocabulary in computer-friendly format for the voice synthesizer. We're a bit short of material so I was going to download the Complete Shakespeare, and the D'Oyly Carte Gilbert and Sullivan recordings. That should do."

Mari-Lou couldn't help but smile. "Shakespearean rats, imagining themselves to be Julius Caesar."

Sanjay acknowledged a hit. "Well, they'll make good soldiers anyway."

She was wrong about that. Both language and genetics shape character. They made merry wives, bawds, rogues and rude artisans, or occasionally pirates. The Rats were great Magh' killers.

They made terrible soldiers.

\* \* \*

In the months that followed, conscription was introduced. So, to the front lines, went the newly produced and uplifted elephant-shrew troops with their soft-cyber implants. Despite the fact that they weren't even rodents, everyone called the small Siamese-cat-sized creatures "rats." The rats and conscripts slowed the advance of the insectlike Magh' invaders . . . but it wasn't stopped. Rumor had it that genetically modified and soft-cyber uplifted bats were about to be added to the war effort. The colony, planned as the new Fabianist utopia in which harmony and reason would finally triumph, seethed with such rumors. It also seethed with frenetic parties, and young men and women in ill-fitting new uniforms.

Harmony and reason were notably absent.

colony—mankind's brave leap into the future—had meant that they had to live in the past. Technology had to be self-sustaining without the interreliant industries of Earth. Some things had gone back a long way—like the propeller-driven aircraft.

Conrad Fitzhugh looked out through the hole in the rear fuselage where the rear door had once been. There was smoke on the southern horizon, where the front lines lay. They'd taken Van Klomp's plane for a look. The alien invaders' scorpriaries had spread their red spirals, twinkling behind their force fields, all the way to the Arafura Sea.

Fitz pulled his gaze inward. He'd see the war front soon enough from a lot closer. He looked nostalgically at the battered little aircraft, and at his fellow sky divers. This would be the last jump for most of them. Bobby Van Klomp had finally gotten the go-ahead to form a paratroop unit. Collins and Hawkes were on a final pass from OCS before being posted to the front. Young Cunningham had just gotten his call-up papers. And Conrad had finally decided to join the next intake at OCS in three weeks' time, despite Candice. He'd have to explain to her tonight. He'd already booked a private table at Chez Henri-Pierre.

He tightened his harness. One of the best things about skydiving was that it stopped him thinking about her, at least for a while. Every man needs a rest from confusion.

\* \* \*

Confusion, smoke, dust and fear. And a dead twitching thing, ichor draining from the severed chelicerae to mingle with the blood in the muddy trench. Pseudochitin armor couldn't cover the 'scorps' joints. And, once they'd learned to operate within the constraints of a personal slowshield, none of the Maggots, not even the 'scorps, could match rat speed. But there were always so many of them.

Ariel twitched her whiskers and fastidiously began to clean them. All the Maggots here were dead. So were the human troops.

Another rat sauntered across the trench, pausing to rifle a dead second lieutenant's pockets. He shook his head glumly at the pickings. "I faith, these whoreson new officers aren't any better than the last lot. Poorly provisioned. What's a rat to loot in such poverty?"

"You could try looting a Maggot, Gobbo," said a plump little rat leaning against a sandbag stack, picking her teeth with a sliver of trench knife.

Gobbo grunted. Shoved a few things into his pouch and tossed the rest. "Even thinner pickings, methinks, my little Pitti-Sing."

The plump little rat considered Gobbo from under lowered lashes. Gently arched her long tail. "Of course, if it is less thin pickings thou art after, *I* wouldn't try a Maggot," she said archly.

A rat peered out from a bunker. A particularly long-nosed rat with a rather villainous cast to one eye. "Zounds! 'Tis all done then? I fought them off bravely."

Ariel and the others snickered. "In every doughty deed, ha, ha! He always took the lead, ha ha!" she caroled. No sensible rat wanted to fight Maggots, but Dick Deadeye took discretion to the ridiculous.

Deadeye drew himself up. "I was foremost in the fight!"

Ariel snorted. "The first and foremost flight, ha, ha!" she said, showing teeth.

Deadeye certainly wasn't about to ruin his reputation for staying out of trouble by rising to the bait from this particular rat-girl. Ariel might be smaller than most, but she made up for it with pure ferocity. He took in the scene instead. The dead lieutenant, with his turned-out pockets, the several dead human grunts, a dead 'scorp and the body parts of several more of the aliens. "Methinks we'd better send a runner back to let them know we need human reinforcements."

Rats had no problem with Deadeye's being a coward. It was his being a brown-noser that was going to get him killed. "Art crazed?" snapped Ariel, irritably. "'Tis fully two hours to grog ration. What need have we to alert them before 'tis needful? They'd make us work."

Gobbo nodded, sauntered over to Pitti-Sing and leered down at her. "Methinks you can hang me up

as a sign at a brothel, before I do that, eh, wench?"

Deadeye looked lecherously and rather hopelessly at the two rat-girls. "Well, then I must go myself."

Gobbo yawned artistically. "Methinks the whoreson fancies a bit of time away from the front."

"The swasher can take himself away from my front," said Pitti-Sing, trailing her tail along Gobbo's shoulders.

"'Tis not an ill-thought-of idea, mind," said Ariel, consideringly.

Gobbo grinned toothily. "Ha. Ariel, I had not seen you flee a fight. Can it be that you've abandoned me to go with this swaggering knave? You saucy jade!"

Ariel chuckled. "Pitti-Sing, you're in for a grave disappointment with this swasher. He's all blow and no poignard. I'd like to stay and watch. But I might be able to buy some chocolate back there," she said, longingly. "The vatbrats sometimes have some. Give, Gobbo. The money you found in that top pocket."

"•S mine!"

"You got his hip flask, Gobbo," she said, closing on him with a bound. "You wouldn't want to fight with *me* then, would you?"

"Hello. Methinks 'tis a threesome," said a new haughty voice. "I wouldn't hesitate to report this, unless I was insulted with a very considerable bribe."

Ariel turned. A party of wary-looking rats peered around the sandbagged corner. "•Twould appear that rumors of your demise have been greatly exaggerated, Ariel," said the owner of the haughty voice, and an elevated snout, as he stepped jauntily out of cover.

"Pooh-Bah! Hasn't anyone killed you yet, you cozening rogue?" demanded Ariel, grinning.

The rat shook his head. "No. Alack. But I am sure for suitable fee it can be arranged." He looked at the dead lieutenant. "Methinks you'd better tuck his pockets back in," he said professionally. He gestured behind him with a stubby thumb. "They'll be here in few minutes. They don't make a fuss about us looting vatbrats, but it's the guardhouse and death for snaffling the wares of Shareholders. Didst get much?"

The gleam of silver on the crisp white cloths, and the twinkle of crystal in the candlelight: This was George Bernard Shaw City's finest restaurant, the Chez Henri-Pierre. The crystal glasses were from old Earth. Rumor had it that Henri-Pierre had killed an indentured Vat-scellion who had broken one. The astronomical distance the beautiful, fragile things had travelled was only matched by the prices of the food and the fine wines. The prices, of course, were not listed on the menu. If you had to ask you couldn't afford it. But Conrad had worked out by now that the price was related to the length of the dish's French name.

It was also inversely proportional to the size of the portion. By the exquisite—but minuscule—arrangement on Candice's plate, it was going to cost Conrad the equivalent of an ordinary worker's annual salary. Well, no matter. Conrad was a Shareholder, even if his father wasn't old money. It wasn't as if he was some indentured Vat. And he'd be off to join the army soon. It wasn't going to be easy to break it to her. He hoped that the ring in his pocket would offset the news.

Candice looked perfect in this setting, almost like some milk-white porcelain Meissen statuette, poised and with not a hair out of place. He cleared his throat uneasily. How should he do this?

"Uh. Candy." As soon as he'd said it he knew it was a mistake. She hated to be called that. Van Klomp always did it, at the top of his voice. She didn't like Bobby Van Klomp. She'd done her level best to see that Conrad kept away from the big Dutchman. It was a difficult situation. He and Bobby had come down on one 'chute together. Had resultantly spent six weeks next to each other, in the hospital, in traction. He owed an old friend loyalty. But Van Klomp had gone too far when he'd suggested that Candice might be seeing someone else.

"Um. I've got to tell you something." He felt for the ring box in his pocket.

She looked down at her plate. Conrad noticed that she'd not eaten much of the complex stack of ginger-scented scallops and tiger prawns. "I've got something to tell you too, Conrad." She fiddled with something on her right hand. It was, Conrad noticed for the first time, a band of gold. On her third finger. She turned it around. It was a diamond solitaire. Tombstone size. A lot bigger than the stone in the ring in his own pocket. "I'm engaged to be married."

Conrad stared at her, unbelievably. Then at the ring. "Who . . . ?" he croaked.

"Talbot Cartup," she said coolly. "I'm sorry, Conrad. This is good-bye."

Talbot Cartup. One of wealthiest men on HAR. An original settler, not, like Fitzhugh, the son of one. At least thirty years her senior. And recently widowed. Very recently.

The bentwood chair and cerise satin cushion went flying. "How long has this been going on?" Conrad demanded, leaning over the table, apparently unrelated events suddenly coming together in his mind.

She colored faintly. "That has absolutely nothing to do with you. Sit down and behave yourself. People are staring."

"Let them stare. I want to know, damn you, Candice."

"If you can't conduct yourself decently, then I suggest you leave," she said icily. "There was no future for us anyway. They're going to raise the conscription age to twenty-six. You will be going into the army."

He laughed humorlessly. "I was going to go anyway. And it's just as well. If I saw that fat creep Cartup, I'd probably kill him. You've been cheating on me, Candice. And, seeing as you'd like me to, I'm leaving."

Blundering blindly through close-set tables, and pushing aside the maître d'hôtel, he headed for the night air and his car. It was a fine reproduction of a mid-twentieth-century Aston Martin. It was his pride and joy.

It was also in the throes of being towed away. Parking over there had been a risk, but he'd been late, and reluctant to hand the keys of his darling to the doorman. Well. He could reclaim it from the pound in the morning. And it wasn't as if he'd been going anywhere right now, except to drive too fast. He set out, walking. Walking nowhere in particular, but going there as rapidly as possible. He strode past the skeletal remains of the huge slowship that had brought the settlers here. The bulk of the twenty-first-century technical heart of the Colony remained here. Conrad did not. He continued on, past the security fence that surrounded the alien Korozhet's crippled FTL starship. Onward without purpose or direction. Brooding. Furious—with himself and with her. Miserable.

It was well after midnight when he realized that his wandering feet had taken him far from the suburbs of George Bernard Shaw City. Far from a taxi to take him home.

And . . . relatively close to the airfield, and the hangar holding Van Klomp's jump-plane. He knew from past experience that the hangar wouldn't be locked.

Briefly he considered taking the little Fokker-Cessna up on a one-way flight. That would show her!

It would also ruin Bobby Van Klomp. The burly instructor had a solitary Share, and not much else besides that aircraft. Conrad knew that Van Klomp was coming in, in the morning, to do the final clearing and storage arrangements. He could scrounge a lift home then.

The clatter of the hangar doors woke him from an uncomfortable dream-chased sleep. And there, in the bright blue sunlight, stood Van Klomp, shaking his head at him. "You dumb bastard. They're bound to think of looking here soon. Where is your car?"

"City pound. It was towed away from the no-parking zone outside Chez Henri-Pierre, where—"

"Where you had a fight with that bimbo, told the whole restaurant you wanted to kill Talbot Cartup, and then stormed out." Van Klomp's face was creased with a wry grin. "And left Candy with a bill to settle, and her with not a dollar in her purse, never mind her taxi fare."

Fitz felt himself blush. "How do you know?"

"The cops told me, *boeta*. When they woke me up at three this morning, looking for you."

"Looking for me at three in the morning? For not settling a restaurant bill?"

Van Klomp gave a snort of laughter. "The way I heard it, there were a couple of tables full of crockery, food and glassware—oh, and a skinny little *maître d'* that got in your way too. But that's minor, comparatively."

"Comparatively?"

"Compared to being wanted for murder."

"Murder?"

"Well, it is still attempted murder, at this stage. Talbot Cartup's not dead yet." Van Klomp's face was deadpan. "But if he dies, which looks likely, you're for the organ banks."

Fitz swallowed. "And Candice! Is she all right?"

Van Klomp shook his head. "You're a slow learner, Fitzy. She's the one who put the cops onto you. Said you tried to kill him."

Fitz gaped. "I didn't have anything to do with it, Bobby. When I saw them towing my car away, I . . . I was so mad and miserable that I just kept walking. Next thing I realized it was early morning and I was near here. I thought I'd wait for you to come in and cadge a lift home."

Van Klomp slapped him on the back, grinning again. "Oh, I didn't think you'd done it, *boeta*. I could just see the headline: Martial arts, dangersport and fitness fanatic ties old fart wearing woman's underwear to bed, beats him, puts plastic bag over his head and throttles him. When the cop told me about it, I said he was crazy. But face it, it looks pretty bad for you, Fitzy. You yelled that you wanted to kill him in front of a whole lot of witnesses, besides the bimbo saying that you did it."

"Candy?"

Van Klomp nodded. "Swears it was you, looking for revenge. You locked her in the bathroom while you did the dirty deed. Did it like that to humiliate him and incriminate her. Brave girl broke her way out and called the cops." Van Klomp tugged his beard thoughtfully. "Bet your fingerprints are all over her apartment too."

"But . . . ! I was nowhere near there last night!"

Van Klomp shrugged. "Prove it, Fitzy. Me, I think it was probably a sex game that went wrong. She panicked. Needed a scapegoat."

"Candy!" Fitz shook his head incredulously. "No. You must be wrong, Bobby. She'd never do anything like that. She's . . . she's so . . . pure. Prim. There must be another explanation."

Van Klomp took a deep breath. "Rule my brother told me once: Never criticize a man's mother or his girlfriend if you want to stay friends. So: Now I'm going to tell you something that I've avoided saying because I liked you, Fitz. I've known Candy Foster all her life. Her mother also had exactly one Share. Lived three apartments down from me, on Clarges Street. I bet she never told you that."

She hadn't. Clarges Street was just one step up from the Vat tenements. Fitz's parents were comfortably upper-middle-class Shareholders. "No . . . but I'm sorry, Bobby. I don't see what that's got to do with it."

"Nothing. Except Candy always planned to move up in the world. She didn't have brains or business sense. She did have a pretty face and a good body. She was damned good at being just what the men who were stepping-stones on her way wanted. You wanted a pure little ice-maiden. You got one, kid. Candy's been around. You ask any of the boys on Clarges Street what sort of ice-maiden she was."

"I don't believe you, Van Klomp," said Fitz stiffly, knowing deep inside that he was making a fool of himself. "You're making her out to be a prostitute."

"Oh no, she's not that. A hooker is at least fairly honest. And unclench those hands, Fitzy. I'm your

mate, trying to help you, even if you don't believe me," the big man said gently.

Fitz took a deep breath. "I'm sorry, Van Klomp. You don't like her and you never have. Okay I admit, you were right about her seeing someone else. It's kind of obvious now, thinking back. This Talbot engagement didn't just spring out of nowhere. But I can't believe she'd . . ."

The big man shrugged. "Suit yourself. Believe anything you please. But Talbot is in a coma. And you're going to take the fall for it, unless he comes round. Even then . . . he might decide to stick to her story." Van Klomp grinned ruefully. "I would."

"But—surely I can explain. I'm innocent!"

"Get this straight. It's *Talbot Cartup* we're talking about. The cops want to catch someone to satisfy the Cartup family. And they want someone in a hurry. And that someone, right now, is you. You'll be pieces of liver and lights in a nutrient bath within the next three days, if they find you. There are roadblocks all around town. I came through one on the way here." Van Klomp grinned evilly. "One thing on your side is they're still looking for the Aston Martin. Someone's face is gonna be red. But it's only a matter of time before they look here too."

"So you think I should run?"

Van Klomp shook his head. "Nope. I think you should join the army."

He pointed out of the hangar door. "They've set up a camp just across the other side of the airfield. Ten minutes' walk."

"But . . . That's a Vat-camp. I'm going to OCS."

"The next OCS intake is in a few weeks' time," said Van Klomp, grimly. "You're not going to live that long."

"They'll find me there anyway. I'd rather hand myself over and face my trial. They haven't got the evidence to convict me."

"*Boeta*. If they have to *make* that evidence, they will. The Special Branch is good at that. They're hunting you hard. But if you walk across to that camp and join the queue . . . once you're inside, they won't find you. Just like they haven't found your car. And even if they do find you, as an army volunteer, they can't touch you."

Van Klomp smiled beatifically. "Thanks to Special Gazette item 17 of 11/3/29, all civil legal matters are held in abeyance until the volunteer is demobilized at the end of hostilities. *And* service time will be considered to be in lieu of imprisonment and deducted from the sentence. As it happens, just last night I was talking to Mike Capra at the Pig and Swill. The law was introduced at the start of the war, to try and draw in more volunteers. Even though there is conscription now, it hasn't been repealed. Mike reckons it's a problem looking for a place to happen."

Fitz stood up. "I'll join up," he said determinedly. "But I still want to clear my name. I don't want to take the blame for something I didn't even have the pleasure of doing."

"First things first," said Van Klomp. "And first is to stay alive, *boeta*. Now, I suggest you leave through the side door and take the long way around. There's a fair forest of bushes just beyond the south end of the runway. I've been trying to get the airfield authority to trim them." He patted Fitz on the shoulder awkwardly. "Good luck, Fitzy. Keep a low profile among the Vats. I'll be in touch, somehow."

\* \* \*

Fifteen minutes later, standing in the queue of miserable-looking men at the gate of a barbed-wire-enclosed camp, Fitz saw a police car drive slowly over the grass to Van Klomp's hangar. Then the clerk at the gate asked for his call-up papers.

"I'm a volunteer."

The man shook his head. "There's one born every minute. Name and ID number?"

\* \* \*

By that evening Fitz was beginning to think that maybe the organ banks hadn't been such a bad option after all. But he hadn't had much spare time to think about Candice, either.

## 2

"Swing those arms! Left. Left. Left. Right, left. Keep those damned tails straight!" bellowed the officer.

With distinct lack of enthusiasm, the rats complied. "Methinks this shogging new lieutenant hath forgotten that this is not boot camp," snarled one of the rats, indignantly.

"Silence in the ranks!" snapped the sergeant.

The lieutenant was determined to stamp his authority onto his new troops. They'd explained at OCS that an example was necessary. He'd make one. "You. You that was talking. What's your name, Private?"

"Parts, Sah!" said Bardolph, loudly and untruthfully, to a chorus of sniggers.

The new lieutenant lacked both a sense of humor and common sense. "Sergeant. Get that rat's number. We'll see how funny it finds being on a charge."

The human sergeant was not a young Shareholder fresh from OCS. He was a Vat who'd stayed alive in the trenches for some months. His expression was more than just wary. "Sah. If I might advise, sah?" he asked, uneasily, *sotto voce*.

The owner of the shiny new pips did *not* choose to be advised. To be confident enough of your authority to listen to advice from experienced NCOs was not something they'd taught this young man. "If I need your advice, I'll ask for it, Sergeant."

Even Deadeye raised his eyes to heaven. It was done in far more unison than the ragged marching.

"Tonight there will be a full-kit inspection! I have never seen such a sloppy, shabby, gutless lot in my life. Things are going to change around here."

"Whoreson Achitophel, he never will be missed," muttered Ariel, shaking her head.

"Not even," said Pooh-Bah, in a quiet but nonetheless lofty voice, "by the lord of the backstairs passage, or by the master of deerhounds or the Solicitor, or even . . ."

"Straighten those backs! I'll make you lot into soldiers if it kills me."

"•Twill," said Ariel, under her breath. Elephant-shrews were superb killers. Even cybernetic uplift couldn't make them into soldiers.

\* \* \*

In a boot camp not far from hell . . .

In fact the sign in the middle of the camp read "Hell, 3km back." Conrad Fitzhugh was being reborn. They say that the first time is the worst trauma most humans go through.

It wasn't any better this time around. And Conrad Fitzhugh, born with a silver spoon in his mouth the first time, was discovering that going economy class was very different. You weren't wrapped in a pure wool receiving blanket, for starters.

"It doesn't fit."

"Oh, we'll call the tailor so you can have it made to measure," said the quartermaster's clerk sarcastically, tossing a pile of shirts and outsize underwear at him. "Who the hell do you think you are, vatsum? A namby-pamby Shareholder? Move along. On the double. Change. Dump those civ clothes in the hopper there. You won't wear them again."

Fitz moved. His evening wear had been slept in and walked in. But that was a Silviano jacket even if it was a little crumpled, and he loved those half boots. He didn't intend to throw them away!

"They say there are only two sizes in the army. Too big and too small," said the skinny man beside him, pulling on an overall that incontrovertibly proved his point. The little fellow was unusual in the crowded room. Like Fitz he wasn't eighteen.

"Er. Isn't there anywhere private to change?" asked Fitz, looking in startlement at the young conscripts stripping off with unconcern all around him.

The skinny man paused in the act of putting on his horn-rimmed glasses and chuckled. "You've been out of the dormitories a while."

A sudden harsh realization came to Fitz. He was a Shareholder. His parents had come to HAR as frozen Shareholders. Everyone else here was probably—no, almost certainly—a Vat. Bred up in a cloning vat from a tissue scrap that had made the long journey from Earth. Naturally, every human on HAR was entitled to become a Shareholder. The New Fabian Society wouldn't have it otherwise. Of course, the Company was entitled to recover the costs of cloning, rearing, feeding and educating the Vat-kids before they could buy that Share. After all, utopia didn't come for free. Existing Shareholders were entitled to some return on their investment, naturally. Certain privileges were of course reserved for Shareholders.

He was almost certainly the only Shareholder-boot in this camp. He'd known that. He'd just suddenly become aware that pointing this out could be very bad for his health. He blinked, and began stripping.

"Yes. I've become rather spoiled." He looked at the older man. Twenty-five, at least. He must have been one of the original Vats. Conrad Fitzhugh realized that he was going to need a role model. Skinny looked friendly enough. But how to initiate a conversation? He'd never had much to do with Vats. They were servants, mostly.

The little man took it out of his hands. He had obviously made his own assessment, and probably had a very sensible reason—Fitz would make two of him. "These kids make me feel ninety. They're likely to beat us fossils up. We should stick together." He stuck out a hand. "McTavish. Call me SmallMac." He grinned wryly. "Everyone does."

Fitz took his hand. "Fitzhugh. Um. Call me Fitz."

"So, what was your line on civvy street, Fitz?" asked SmallMac, attempting to cram the remaining issue gear into a kit bag, a job requiring two more hands than he had. Fitz held the mouth of it open for him. It gave him a moment to think. All Vats worked—they were in debt. Fitz had never worked a day in his life. Only those Shareholders with very few Shares or a desire to work did. It had been a long-standing source of acrimony between him and his father. "Um. I did a lot for the Parachute club." It was not strictly a lie.

"Oh. Van Klomp," said SmallMac, satisfied. He returned the favor with Fitz's kit bag. "One of the best of them. Good-o. Looking at your clothes and hair, I thought you might be one of their pretty boys."

Fitz had no doubt who "them" were. And he wasn't surprised that his new acquaintance knew who Van Klomp was. It was a small colony for a loud voice.

"And you?"

SmallMac smiled wryly. "Oh, I played with horses. Kept me out of the army. But they decided I wasn't young enough anymore. Besides being a bit slow."

"Move, you lot! On the double."

Carrying their kit bags, they ran again to get their heads shaved. Then to have slowshields implanted. To get infrared lenses implanted. Then, still carrying the kit bags, straight to drill.

Fitz had gone into this strong and fit. He'd heard about boot camp—although he was sure that OCS candidates did not have nineteen-year-old Vat sadists as instructors. He'd vaguely thought that the suffering associated with boot camp would be for other people. Less fit people. His aching body was



beginning to realize that the purpose of exercise here was twofold. As a secondary thing, it was to get you into condition. Principally, it was to break you. No kind of fitness is enough for that. He was as exhausted as SmallMac by the end of it.

He'd also come to realize he'd been wrong about the wiry little man. SmallMac, while lacking in upper body musculature, had incredibly strong legs and fantastic balance. He'd been a horse-breaker for a large riding academy—quietly excused military duty because of his employer's connections. Unfortunately he'd had a falling-out with his boss. So here he was, carrying a pole, at a jog.

"Are they trying to kill us?" panted the horse-breaker.

"No. Well, not quite. One step short of it."

"But why?" asked SmallMac. "I thought they wanted soldiers. They'll end up with wrecks."

"My sensei explained it to me," said Fitz. "Most humans aren't natural killers. You can make them into soldiers, though. Humans will fight bravely, using the skills you train into them. You can either bring them up from the cradle to do this, in which case you have samurai. Or you can make soldiers in six weeks. They won't be anything like as good as samurai, but it is quicker. But to do that they have to get you into a state of physical and mental exhaustion, in which old habits are forgotten. The soldier doesn't think anymore. He just has to obey. Obey unconditionally."

"Hmm. A bit like breaking horses. Well, not my way. But one of the ways. I see the advantages," panted SmallMac, "to the army anyway, of getting conscripts young and fresh out of Vat-school. They're pretty blank anyway, and used to obeying orders. It's a lot harder for them—and us—dealing with old fossils."

"Yep. We're foolish enough to question things and to think for ourselves."

"Speak for yourself, Fitz. I'm too tired to."

"That's the whole idea. Come on. We've got to run again."

\* \* \*

"This is your bangstick." The instructor held up the short-bladed assegai. "This is your new wife. You will sleep with it. You will run with it. You will eat with it in one hand. You will clean it. You will love it. You will treasure it. God help you if I find you without it, because He is the only one who may be able to."

Fitz looked at the issue weapon. Three feet long with a foot-long blade and a cutout into which a shotgun cartridge was inserted. Personal shields, which stopped anything moving faster than 22.8 mph, made projectile weapons useless. So: You had a short little spear, a trench knife—which, as a connoisseur of knives, he was almost ashamed to touch—and a funny little ice-pick thing. Technological advances seemed to have sent weaponry back to the iron age.

The next three days were a blur of the worst that life had ever offered Fitz. Aside from the lack of sleep and the sheer physical grind, he'd never even cleaned his own boots before. Or made a bed.

He learned. But not fast enough.

The corporal picked up the corner of the bed with its display of laboriously polished, ironed, starched and folded items and tipped it onto the floor. Fitz, standing at attention by the foot of the bed, couldn't see what was happening. He could hear it, though.

The young corporal came and stood in front of Fitz, and lifted his chin with one finger. He looked at the name stenciled on the overall. "This is a sty. And that makes the person living in it a pig, Private Fitzhugh. A filthy fucking pig. What are you?"

Silence.

"You're a slow learner, Private. I'll ask you one more time before your entire squad does two hours of bangstick drill in full kit. What are you?"

"I'm a pig, Corporal. A filthy fucking pig," said Fitz. *And you are two seconds from being dead, you snotty Vat-shit*, he thought.

"Right," said the Corporal with a nasty little smile. "Your squad mates can sort out the pig in their midst. There'll be another inspection of this tent in one hour. I expect this pigsty to have become a decently starched bed by then. Otherwise, it's full-pack drill for all of you."

He walked out.

"You stupid bastard!" yelled Ewen, the self-elected squad tyrant. "Can't you make a bed properly? Another fucking inspection. I've got a good mind to—"

SmallMac interrupted. "He saved us all a couple of hours' full-kit drill, Marc. Come on, we've got an hour. We'd better all get stuck in."

The stolid Vat-kid from the next bed, who had been scathing about Fitz's ability to polish boots, nodded. "I reckon. Come on, Marc. You do the best hospital corners in the company. I've got some spray starch. We're all for it otherwise. We can beat the Oink up later."

Marc Ewen tugged his jaw. "I suppose so. Come on, Oink. Move it up. Drop us in it again, and you're for it."

The beating got delayed by a session of P.T. and a five-kilometer run. In the manner of these things, it kept being delayed until it was forgotten.

\* \* \*

The slowshields had caused small arms to be dispensed with in this war. Both sides still used heavy artillery, however. It could destroy defenseworks, soften up or even bury the enemy. And the pounding could drive anyone mad.

The rats knew by now that when it stopped, the legion of varied creatures that made up Magh' infantry would mount an assault. Sometimes they came surging over no-man's-land like a tide. Sometimes they came pouring out of burrows like lava.

But they always came, if the pause in the bombardment was more than momentary. From the minute the heavy shells started to fall, the troops in the trenches knew the attack was coming. The sector had been quiet for some weeks and Lieutenant Lowe thought that he had at last begun to instill some discipline in these unruly rats.

The shells had fallen thick and fast for the last six hours. The HAR gunners tried to give as good as they got, but the humans simply couldn't match the range, accuracy or sheer volume of fire that the insectlike Magh' mounted. The colony had turned all their spare manufacturing capacity into producing food for the guns . . . but the Magh' capacity appeared to grow, along with their scoriaries. The original invaders had set up five of the vast, odd, flattened termite heaps, each one miles in diameter. One scoriary for each of the vast ships. But the creatures were obviously reproducing a lot faster than their human opponents.

Then the guns had fallen silent.

"Where do you think you're going? Come on, form up. A proper military formation, now. The Magh' are coming," said the lieutenant, his voice cracking.

Ariel leapt acrobatically onto his right shoulder. And Gobbo to the other. "If what, you shogging whoreson?" asked Gobbo, twitching his whiskers.

The lieutenant nearly fell over backwards. "Get off me! Get to your posts!" He pawed at the two rats. "Argh, let go!"

Gobbo's long red-tipped fangs had closed through his thumb. Ariel was even more direct. She had her teeth at his throat.

Pooh-Bah looked up at the lieutenant, who was now standing very, very still. The rat said, pompously. "And secrets of state, I will sell for a very reasonable rate: This is one that never will be missed."

Ariel pulled her fangs away from his throat. "Methinks you must choose, Bezonian. You can run and be shot for desertion. Or we'll let the Maggots kill you. And if they fail, we shall deal with you. The Maggots will take the blame."

"I . . . I'll have you all court-martialed and shot—*EEK*. Magh'!" he shrieked, as the varied white grub-shapes poured over the top of the trench.

\* \* \*

The lieutenant's flight lasted less than thirty yards before one of the Magh' caught up with him.

"Help! Help me!" he yelled desperately.

Gobbo shook his head as the venomous barbed tail stabbed through the man's uniform. "Help me, *if you please*, Lieutenant."

### 3

The seven of them were on their way back from the mess hall in the moonlight when they came upon two very, very drunken NCOs. Under most circumstances this would have been a good reason to turn and quietly walk away. In fact, they all checked. It was the whimpering that was coming from a thing at the feet of the two corporals that made Fitz decide to walk forward. That, and the fact that SmallMac was already doing so.

Coming closer, Fitz saw that the bundle lying there was human. Or had been, before they'd started kicking it.

"Whatsh are you lot doing here?" slurred the one man.

"KP duties, Corporal," said SmallMac, kneeling next to the victim.

"Well bugger off to y'r tent. And leave that little dickhead alone."

"We're taking him to sick bay, Corporal," said the small man, his glasses glinting in the moonlight.

"Like fuck you are!" The corporal swung a vicious kick at SmallMac's head.

Fitz caught the man's foot and extended the swing. He gave the falling corporal a far-better-placed kick in the solar plexus. The corporal doubled over as he flew. And as his fellow drunk swung wildly at him, Fitz hit him neatly on the jaw.

"Holy shit! Let's get out of here!" gasped one of the conscripts.

"What the hell do you think you've done, Fitz?" demanded another, horrified.

Fitz ignored them. He leaned down and grabbed both of the drunk NCOs by the throats. Neither was a particularly large man. The little Vat they'd been beating was even smaller than SmallMac. "Is he okay?"

SmallMac shook his head. "Hard to tell. He's not really conscious. Blood coming out of his ears by the feel of it. Let's get him to sick bay."

One of the drunks began to struggle. Fitz brought their heads together with a crack and tossed them aside. SmallMac was already staggering to his feet with his burden. They linked arms to form a chair. And ran. Three of the others ran too, heading for their tent with as much speed as possible. The other two came along to the sick bay. One of them actually had the forethought to run ahead and pound on the door. There was always a medic on duty.

When it opened . . . Fitzhugh realized that things could get a lot worse. Two medic NCOs, the camp doctor, and Major Ogata were all there—playing cards on one of the examination beds.

"What is it?" asked the medic who had opened the door, plainly not pleased.

"Emergency, sir. We found this man. He's been beaten up, sir. He's unconscious."

"Bring him in. Get him onto the examination bed."

Fitz and SmallMac complied.

"Christ! I want an IV line up on this kid," snapped the doctor.

The doctor and medics moved into action.

That left the four of them . . . and Major Ogata, who had moved against the far wall to allow them passage. Ogata, with JAG flashes on his shoulders, had arrived in the camp three days before. Nobody knew quite what he was doing here, but he had been taking some bangstick drills. "Stand," he ordered coldly, as they attempted to melt back to the open door. "Just what happened here?" he asked. He pointed to one of the young Vats in the group. "You speak."

The youngster looked around, nervously. "We were on our way back from KP, sir. We . . . we found that private in the alley between Q-stores and the chaplain's offices, sir. We brought him here."

"You had no part in beating him up?" All of them shook their heads.

"We wouldn't have brought him in if we had, sir," said SmallMac earnestly.

The major looked at them with cold speculation. "Maybe. And maybe you realized that you or perhaps your companions had gone too far? You know who did this."

"Sir, KP ends at 2100," said Fitz, calmly. "Look at the time now, sir. We haven't had time to administer that kind of beating."

Ogata looked at his watch. Looked at the doc and his two medics. Then, nodded.

"Two men have been killed in this camp, and a number of others have ended up seriously injured. As yet no one has been prepared to testify. I have been sent here by the Attorney General to put a stop to it." With a ghost of a smile he said "The army doesn't want soldiers dying before they reach the front."

The major's eyes narrowed. "If I have to drill this entire camp until half of you end up as clients for the lieutenant"—he pointed to the doctor who was helping the medics to get the boy onto a stretcher—"I will find out who did this. I'll need all of your names and numbers. Then you can get yourselves back to your tents." He jerked a thumb at the victim, now being carried through to the military ambulance. "He doesn't need you anymore."

As far as Fitz could see it was a lose-lose situation, especially for the four of them. All the conscript-boots dropping dead on the parade ground weren't going to affect the guilty parties in this case. On the other hand . . . If they grassed . . . the instructors would see that they suffered in interesting ways. And Fitz—by now—had a grunt conscript's faith in the fairness of the system: ten to one, the two corporals would get off while they carried the can.

Just then fate, in the shape of two drunken corporals, intervened. They also obviously did not expect the sick bay to be occupied by anything more than one easily intimidated medic. And they were less than observant as they barged in and turned on the four privates.

"All right, you lot of little scabs! Where's Margolis? We haven't finished with him. Or you. Especially you," one of them snarled at Fitz.

Standing against the wall behind them, Ogata cleared his throat. "I think I have solved that little mystery."

The two corporals turned, and looked in horror at the pips and JAG flashes. As one they tried to bolt.

"Halt!" yelled Ogata. They didn't.

"Privates! Catch those two. Restrain them," snapped Ogata.

It was not an opportunity that came the average boot's way very often. An order from heaven, as it were. By the time the two corporals had been caught and "restrained"—one by SmallMac with his powerful horse-breaker's legs applying a life-threatening scissors, and the other by being sat on—a

number of scores from the last five and half weeks had been settled. Then a squad of guards and the guard commander arrived at a run.

Ogata looked grimly at the two prisoners hauled before him. Sniffed. "I'll want blood samples from these two when the Doc gets back. And I want sworn statements. Now. Before anyone gets either intimidated or clever."

He turned to one of the guard detachment. "Get me Lieutenant Belsen. I'll use the doctor's room for the statements. I'll want these men one at a time. There will be no discussion amongst them." He turned to Fitz and his companions. "I advise you strongly to stick to the bald truth. If one of your statements does not agree . . . you will be subjected to further investigation and charged."

The lieutenant arrived at a run. He was a young, rather sadistic and sarcastic man, a once-minor Shareholder who obviously enjoyed controlling life and death for a large number of conscripts. The camp commandant was a bumbling and mediocre career officer. Belsen's overeagerness appeared to give the old man dyspepsia. But the lieutenant stepped a wide and wary berth around Ogata.

Fitz's turn came. He stuck to the truth. Under the circumstances it seemed like pretty good advice. The major, and the lieutenant who wrote it all down, seemed satisfied.

"Very well," said the major. "Read through the document. If it is correct, put your number and signature at the bottom."

Fitz did. He was then dismissed, and told to wait in the outer room. It looked like it was all over.

Ogata and Belsen came out with one of the statements. "Take those two NCOs to the second room under guard," said Ogata. "The medical personnel will be here to take blood samples in a few minutes. Then you can take them to the cells." He looked down at the piece of paper he was carrying. "Fitzhugh, you've made a mistake with your serial number. This will have to be corrected, signed again and witnessed." He held out the piece of paper.

Fitz looked at it. The number was a simple enough one: his own ID with an army prefix. "There is no mistake, sir. That is my number."

Lieutenant Belsen lifted Fitz's chin with his swagger stick. "You're a fool, Private. The last four digits indicate Shareholder status. Making up a number was bound to trip you up."

Ogata pursed his lips, shook his head and sighed. "You obviously wanted to derail the course of justice with something the court-martial tribunal was bound to pick up. Slick, Fitzhugh. But not slick enough."

Fitz felt the blood drain from his face. "Major. I *am* a Shareholder," he said angrily.

In reply, Ogata tore his statement up. "Very funny, Private," he said grimly. He turned to the guard commander. "Put this one in the cells also. Not the same cell as the other two. I'm going to contact military police headquarters and have them moved there. No sense in keeping them here."

Fitz found himself spending a cold night in a cell in the guardhouse. He'd been made to clean it and was then given breakfast, while the sounds of the first parade of the day went on outside. It was silent and monotonous in the cell. Fitz had never thought the day would arrive when he would have preferred to be on parade to any other possibility.

Dick Deadeye, the walleyed rat-coward, edged his way into the tent where Sergeant Marcowitz was reporting to Captain Witt. "Gamma 425 section lost most of their humans when we pulled back, sir.

Forty-three casualties and seventeen shipped out the field hospital. Lieutenant Lowe was among the dead, sir. Several minor injuries that will be back, but at the moment there are only four privates and two NCOs still fit for duty."

The captain steepled his fingers. "I have asked for reinforcements, but we're stretched. Southwestern Sector command says the new intake are about to finish boot camp. We'll get some of those. In the meanwhile those troops will just have to be integrated with other companies." He sighed. "And the rats? What have we got left there?" His voice showed distaste.

The sergeant consulted the clipboard. "Two casualties, sir."

The captain hauled himself to his feet. "The human troops get massacred—and those filthy little scavengers lose two out of five hundred! I'm sorry, Sergeant, but I smell a rat—"

"'Tis only I, Dick Deadeye, Captain," squeaked that hero, peering out from behind a canvas chair. "We don't get to have a bath very often on the front." He scratched his scraggly nose with a stubby pawhand. "Except when it doth rain. And then methinks 'tis more like a shower."

"What the hell are you doing here, rat? Sergeant, get it out of here. Or rather let me get the MPs. We need to make an example of a few of these—"

"Er. Captain." The sergeant interrupted. "This is one of the rats that Captain Shweto, um, bribed to be informers. Dick Deadeye isn't it?"

"Shweto's dead," said Captain Witt, his tone indicating that he'd liked his predecessor as much as the sergeant liked this rat.

Dick Deadeye nodded. "Aye. Shog him for a debt-dodger. He still owed me for the last lot."

"Owed you? I suppose you've come to collect, and you expect us to believe you," said the sergeant, dangerously.

"Poor Dick Deadeye. My name and my looks are against me. A merest trifle. A matter of a hogshead of grog."

"They're habitual liars," said the sergeant. "And cowards, too."

Dick Deadeye did his best to look affronted. "In every doughty deed I always took the lead!"

"You give yourself airs!" said the sergeant, disdainfully.

"Nay. 'Tis the food," said Dick Deadeye. "But some more grog will fix that. I've come to give you warning, Captain."

The captain leaned forward. "I don't want warnings. I want to know why most of my human troops died in the last assault and only two of the rats did."

The rat twitched his nose and looked thoughtful. "Methinks the two were a bit slow? Or mayhap too busy tail-twisting to notice? It can happen, or so I'm told." The rat sounded regretful. "Now, I have decided. I don't just want grog this time. I believe 'tis tradition to demand your daughter's hand in marriage, but to be honest, I fear she may have inherited your homely face and bad complexion. And while your nose is a more attractive length than that short little stump that doth do most humans service, you lack a tail entirely, unless 'tis hidden in your trousers. So: you'll give me Ariel. And a gill of liquor per man whose life I've saved. Twice that for your own, even though I daresay 'tis not worth half as much," said the rat, head on one side and rubbing his paws thoughtfully, for all the world like a merchant at a market stall.

The captain and sergeant gaped at the rat. "Wh-what do you mean . . ." stuttered the captain.

The rat held out his paws. "'Tis clear enough. I know marriage is not something we rats have hitherto aspired to. But I have despaired of ever winning her affection. And from what I can gather this 'marriage' thing is just the ticket for an ugly fellow like me." He looked at the sergeant quizzically. "Woman are then bound to 'serve, love and obey,' when married, aren't they?" he asked. "It says so in *The Taming of the Shrew*."

Sergeant Mary Marcowitz missed. But only because she moved fast enough to harden her slowshield.

"I meant, what do you mean about saving our lives?" snapped the captain.

"Why, what I said, sirrah," said the rat. "The others said that the Maggots disposed so efficiently of you humans in the last assault that they thought they would let this burrowing clean you out of here too. They're going to leave you to this lot."

"You mean . . . there's a mine?"

"Aye. Ariel said 'twas unsporting not to tell you. But at length 'twas decided you wouldn't listen anyway." The sergeant and the captain were already out, yelling for action stations.

The sergeant headed for the rat quarters, where she found the rats about to depart.

"Traitors!" she screamed.

\* \* \*

The outer door opened, and Fitz heard the unmistakable sound of someone snapping to attention. A recognizable chilly voice spoke. "At ease, Sergeant. I believe you have Private Fitzhugh here."

"Yes, sir! The prisoner is in cell two, sir."

"I'll speak to the man alone, Sergeant. He's to be released. There was a misunderstanding," said the major.

"Sir."

The sergeant led Major Ogata through, clattered the keys and let the major into the cell. The sergeant walked off back to his desk. Ogata waited carefully until he'd gone. Fitz decided that two could play the waiting game.

"I made a mistake," said the officer quietly. As usual, he allowed almost no trace of expression into his face or voice. "I should have recognized the name. You're free to go, and there will be no mention of this on your record." Now he allowed a glimmer of a smile to appear. "You won't be called as a witness in the assault case. Nor will your affidavit be rewritten. Somebody else might recognize the name, and they might not be quite so slow."

Fitz was not feeling too fast himself. "Uh. Thank you, sir."

The major nodded. "Special Gazette item 17 of 11/3/29 still stands. But I wouldn't bet on the legislature not repealing it, and not making that retroactive, if they discovered you. Talbot Cartup is a powerful man. He controls the Police Special Branch handling colony security, you know."

Fitz hadn't—but then it wouldn't have made any difference anyway. "He's alive, sir?"

Ogata raised his eyebrows. "You're pretty cool, Fitzhugh. I think so. I'm afraid I haven't followed up on his well-being. However, it appears that Private Margolis will live. In fact I have just been to the military hospital where—as the local enforcers can't get to him, and he thinks he's dying—he has confirmed your testimony."

Now he smiled properly for the first time and stuck out his hand. "I've never met you, and it has been my pleasure not to do so. Good luck, Private Fitzhugh. I think one good deed fairly well cancels the other out."

Fitz took his hand. "Nobody would believe me, but I didn't do it."

The major looked steadily at him. "I was a prosecuting attorney before the war, Private. You're right. No one would believe you. Now get lost. Collect your boots and belt from the desk sergeant and get back to your squad. Good luck."

Outside, blinking in the sunlight, Fitz wondered if it was going to be as simple as that. It was Sunday, officially a day off after the morning parade. Mostly it was spent polishing, ironing and preparing for the week ahead. He walked slowly back to his tent.

"Fitzy!" SmallMac yelled. "Hey, guys, he's back."

Fitz was amazed to find himself being slapped on the back and grinned at.

Marc Ewen had always found the two older men in his tent and his squad something of a trial. He was standing with his hands on his hips, surveying the scene, taking no part in the congratulations. If there was going to be trouble, Fitz realized, it would be with him. He was the only one in the tent who had persisted in calling Fitz "Oink."

"Hey, Oink. SmallMac says you gave two instructors a hiding at once," he said. There was a testing quality to his voice. He was used to thinking that he was the toughest man in the squad.

Fitz shrugged. Best to try and deal with it peacefully. They had barely two more days of boot before they were posted out. He just had to get through to Tuesday. "I know a trick or two, Marc. We can go over to the gymnasium and I'll show you. Friendly, of course."

Marc Ewen shook his head and smiled. He was considerably larger than most of the Vats, and had been a meat packer before his call-up. He was as strong as one of the bulls whose carcasses he used to heft around.

"This I'd like to see, Oink. But we'll keep it friendly."

A few minutes later the squad and a few others were in the gymnasium, and on the mat Fitz showed Marc Ewen—gently—how to use a meat packer's strength against him.

Ewen stood up. Nodded. "Okay. I guess SmallMac told it straight. Run me through that again, so—"

His sudden silence was caused by the entry of a crowd, mostly from B Company. They seemed to have padlocks with them. Attached to their belts. And the belts were in their hands, not through their belt loops. "Well, well. There he is. Golden boy Shareholder," said the leader of the mob, B Company's official bruiser, a gorilla called Bennett. "We'll take over, Ewen. We'll do a proper job."

Marc Ewen faced them, hands on hips. He shook his head. "Butt out, Bennett. This is our affair. Got nothing to do with you B Company goons."

The man snorted. "He's a fucking Shareholder. We heard it from the guys who were on duty last night. And Sarge Lenoir confirmed it. He was there when that little shit admitted it himself. Move out of the way, Ewen. He's going to have an accident."

Fitz tensed. There wasn't any way out of the gymnasium, except past the mob. But he was damn well going to take a few of them with him.

To his surprise the broad Marc Ewen stood his ground "Take yourself and your crew back to your tents, Bennett. He's one of us. If anyone takes it out of him, it'll be us. And it's not going to happen."

"You're full of shit, Ewen. He's a fucking Shareholder. He admitted it!"

SmallMac nodded. "So what if he is? He's sweated and bled with us. He's done full-kit drill with us, and ended up in the guardhouse just for helping Margolis—who was from B Company, I might remind you beggars. You boys take him on and you'll have to take us on, too."

There was a tense silence. There were a good forty of them to twenty of Fitz's company. And the others had padlock-weighted belts.

Fitz cleared his throat and pushed his way forward. "Look. I *was* a Shareholder. Once. But now I'm a private the same as the rest of us, in the same army as the rest of us. I'm part of A Company, tent 17. And I'm damned if I'm going let my squad mates bleed for me. I'll fight you one at a time or all together, first. Any one of you got that kind of guts?"

The pack had come hunting, expecting the prey to run. This was something entirely different. But Bennett wasn't going to back off. "Sure. This is going to be a pleasure. An education for you, namby-pamby Shareholder."

"Don't do it, Oink. He's a killer," warned Ewen.

Fitz just took off his shirt, assessing his opponent as he did. Bennett took off his shirt too, in a deliberate camp mockery of Fitz. The man had more body hair than your average gorilla, and muscles



that would have done that creature proud, too. He would probably weigh in at two hundred and forty pounds against Fitz's one-eighty.

"Watch out for his head," said one of Fitz's squad mates, taking his shirt. "He likes to close and head-butt. And watch out for your eyes with those thumbs."

Fitz nodded and stepped forward. He'd been in camp with these men for nearly six weeks now. He was no longer naive enough to believe his martial arts skills would simply overwhelm Bennett. The dojo was quite unlike real fighting.

But he was unprepared for the suddenness and unpredictability of the assault. He had no intention of getting into a clinch with the man. And then he was. Bennett had managed to grab him and was pulling him in by the shoulders, his forehead coming down to smash Fitz's nose to pulp. Desperately Fitz ducked sideways. Bennett's head cracked against his eyebrow-ridge instead.

Bennett threw Fitz over his hip.

It was a foolish move. Had the big man kept Fitz in the clinch, things could have ended nastily and very quickly. As it was, Fitz rolled clear and was back on his feet as Bennett landed, hard, on his knees, where he'd expected Fitz to be.

"Get him while he's down, Fitzy!"

"Kill him, Oink!"

Fitz stepped back instead. Blood was trickling from the cut above his eye. "Get up, Bennett," he said, keeping his voice cool. The man could plainly fight and fight dirty. He was fast and had the weight advantage. Taunts would mean nothing to him. Disdain however . . . might make Bennett mad. And hopefully that wouldn't help his fighting or his judgement.

Bennett lunged forward. Fitz danced aside, and gave him a sweeping kick that assisted Bennett's forward progress. The man sprawled again. "Up, Bennett. I'm not finished with you."

"I'm gonna rip your damned Shareholder head off." This time he stood up slowly, expecting Fitz to wait.

Fitz did not oblige. He found himself, to his alarm, enjoying the fight. He'd had weeks of abuse and this was the first time he'd been able to plan to strike back at anything. There was none of the aseptic, sterile, and controlled atmosphere of the dojo fights here. This man would kill him if he could. And the crowd too, were hungry for blood. Still, the sensei's advice was as clear as a neon sign. Never do quite what the opponent expects. And make him pay for each breath, while you keep your own breathing steady. Bennett's stomach muscles were like iron.

But no one's kidneys are that well protected.

"Up, Bennett."

This time his opponent was more wary. He expected attack. He was watching for dodges and kicks. He lunged, arms wide to catch the expected leap. Fitz stood right where he was and hit him. Punching for a point on the other side of Bennett's face.

The man had a jaw like an ox. But he wouldn't be smiling for a while. Not without pain.

Fitz kept hitting him. Keeping out of the reach of the shorter, heavier man.

"Break it up," hissed someone from the doorway. "The captain and Lieutenant Belsen are coming across. Break it up now or we're all for it. Grab both of them."

Fitz backed off, and Bennett fell to his knees again. "Get him up against the wall bars." Fitz pointed. "Bennett. I'll fight you anytime you like. But not now. Later."

The big man looked at him through dulled eyes, as three of his friends hauled him upright and over to the wall bars. "Later."

"Hold on to the bars. And don't look at them. Your face is a bloody mess."

"Ten-*shun!*" yelled someone from the door.

Fitz stood rigidly facing the wall bars, blood trickling down his face.

"As you were. Carry on." The captain walked slowly around the room. Fitz did some slow pull-ups on the bars. He saw, from the corner of his eye, that Bennett was doing push-ups. Well, that was one thing all of them could probably do by now, even if punch-drunk. And it kept his face down.

It was a long exercise session, until someone at the door said, "All clear."

Bennett stood up. His mouth was bloody. It would be badly swollen by nightfall. His rebroken nose did not make him look any less like a gorilla. "What's a Shareholder doing here anyway?" he asked, awkwardly feeling his nose.

Fitz watched him, warily. The man didn't look as if he was about to attack again, but he'd been fooled once. "I volunteered."

The Vats in the gymnasium gawped at him.

"Why?" said one finally.

Fitz shrugged. Answering honestly might save him continuing this fight or having too many others. "I am supposed to have killed a man. He was in a coma last I heard."

"Who?"

"Talbot Cartup."

\* \* \*

Fitz hadn't been prepared to find himself a hero. He hadn't realized just how notorious Cartup's "Specials" were among the Vats. In fact, as a Shareholder, he'd barely known the Special Branch existed.

\* \* \*

"Atten-*shun!*"

The commandant surveyed them. Walked along the line. Paused in front of the rigid Fitz. "Where did you get that black eye from, Fitzhugh?"

"Slipped in the shower, sir."

The commandant looked at Bennett. "And I suppose you slipped in the shower, too?"

The hulking man nodded. "Eth, thah," he slurred.

The commandant shook his head. "You damned Vats have no self-control. Well, you can try fighting the Magh' for a change, instead of each other. You're being posted out. You'll get a twenty-four-hour pass to wrap up your last affairs in the civilian world. Posting lists are up on the central notice board. Dismissed. Fall out."

*NCO training course. Camp Dendro.*

Fenton, Brett 24031232334000

Fither, Miguel 24003107455000

Fitzhugh, Conrad 24950101803371

\* \* \*

His name had been inserted by hand. And it was initialed by Major Ogata and the camp commandant.

Fitz gaped. That was one list he hadn't bothered to look at. This man's army had not posted a single list in alphabetical order, with the posting listed afterward. That would have been far too simple and logical. No, instead there had been a number of lists, depending on the unit. Your name could be on any one of them, so you had to search each one.

This had been the one he'd least expected. It had certainly not been one he'd put his name down for. SmallMac's name wasn't in the Equestrian unit either. It was on the same list as Fitz's.

Inserted and initialed in the same way. So were the other two who'd been there that night.

\* \* \*

That first pass had an almost surreal feel to it. Walking out of the camp gates . . . The air was just too crisp, the sunlight too beautiful, the grass too green. And nobody was yelling at them. Strolling down the road in a casual, deliberately out-of-step snaggle of other dazed but happy-looking squaddies from tent 17, Fitz wasn't even fazed that he'd have to walk a couple of miles to get to a bus stop, instead of having the Aston Martin. It was just great to be out. There was also an "eye-to-the-storm" feel about it. The life expectancy of frontline troops was short, and everyone knew it.

"I am going to drink myself into a stupor, wake up, stay in bed and get drunk again," announced Ewen with great satisfaction. "I don't see myself getting to spend much of my pay where I'm going."

"You're abnormal!" said one of lads. "I haven't seen a woman for six weeks. Even the colonel's bulldog bitch was starting to look sexy."

Ewen laughed. "Women get posted to the front, too. And if one eighth of what my cousin Dimitri told me is true, we'll catch up on our shagging. Everyone is scared and everyone is bored. There is nothing much else to do but shag and die. But booze . . . Enlisted men are allowed two blasted beers a night—if you're not in frontline trenches. Dimitri said they end up buying the stuff from those rats. Reminds me. You guys had better buy whatever chocolate you can get and smuggle it in. The rats will pay through the nose for it."

"I hear there are a lot of places in town that won't admit men in uniform," said another one of the men, cracking his knuckles suggestively.

"Keep out of trouble, Isaacs," said SmallMac. "The town's crawling with MPs. I've heard they get a bonus for every Vat they beat up and toss into the cells."

"Huh. They'll have to catch me first. So what are you going to do, SmallMac? Kiss a horse or two?"

"That's not a polite thing to say about my wife and daughters," said SmallMac, looking indecently happy.

It left Conrad Fitzhugh feeling indecently sad instead. SmallMac was one of the few who got regular mail. Somebody out there loved him. Which was both sad and frightening at the same time. Fitz hadn't spoken to his father for two years, since his mother's death. Who else did he have to see? They were either in the army or belonged to the other life that that stranger, Conrad Fitzhugh, Shareholder, had led. Or both. SmallMac had someone that he could go back to. And to whom it mattered if he was killed.

Fitz wondered now, from a dispassionate distance, what Candy would have said if he had killed himself. Or if he was killed in the war. He hadn't thought about her much in the last six weeks. He resolved to go and straighten things out. After all, Cartup was either dead or he wasn't. One way or the other it didn't really matter now. And he'd go around and see his father, too.

He caught a bus into town. Took another to Van Klomp's apartments on Clarges Street, on the off chance that Bobby's army plans had gone awry. Besides, he hadn't a lot else to do, except look at the girls on the street. It was quite amazing how beautiful they'd become over the last six weeks.

The door opened. Meilin, Van Klomp's factotum, manager of his small electronic repair business, general fix-it woman and fanatically loyal Vat-servant, looked at Fitz blankly. Fitz had been a regular caller for the last five years.

"Where is Bobby?" he asked with a grin.

"I am sorry, sir," said Meilin stiffly, doing her best Vat-butler imitation. "Mr. Van Klomp is not home. He's at military headquarters. He is due back this afternoon, if you would like to call again?"

"He's not got that parachute regiment formed *yet*?"

Meilin sniffed. "He believes that it may be happening today, sir. That's what Mr. Van Klomp believed yesterday, and the day and the week before too, sir." Meilin spoke with an urbanity that betrayed how Van Klomp must have been making the walls shake for the last while. "If I might have your name, sir? I

will tell him that you called."

Fitz shook his head. "Don't you know who the hell I am, Meilin? Conrad Fitzhugh."

The factotum—who did everything from packing parachutes, repairing electronic cameras and writing invoices for Van Klomp—blinked. Her mouth fell open, and she hauled Fitz into the apartment, neatly kicking the door closed. "Good Lord, Mr. Fitz! The boss has been trying to track you down, discreetly. I'd never have recognized you in a month of Sundays. You've changed."

"I've had a haircut."

"No." She shook her head firmly. "It's your posture. Well, you're tanned, and your face is thinner. And the uniform and the haircut, I suppose. But you don't look like . . . well, the youngster you used to be."

"The spoiled Shareholder brat, you mean." Fitz grinned.

"Oh, you were never as bad as some of them, sir."

"Damned with faint praise," said Fitz, laughing now, flopping down into a chair. "Anyway, do you know what happened to Cartup? And has Bobby got any drink left in this place?"

Meilin gave him a wink. "I hide it. Otherwise, that useless bunch of Shareholder friends of his drink it up. And Talbot Cartup recovered three days after you disappeared."

"So I'm in the clear after all! Well, well." He stood up again. "Hold the drinks, Meilin. I'm going to pop in on my old girlfriend. Clear the air. Tell her I wish her well. Y'know, there's nothing like six weeks of boot camp to give you a new perspective on life."

"Do you think that's a good idea?" asked Meilin worriedly. "She did try and have you arrested, Fitz. Why not wait until Van Klomp gets home?"

Fitz shook his head. "When he gets home I'll be back with a few decent bottles. I'm going to see Candy, see my Old Man. Get things off my chest."

He went out onto the streets of George Bernard Shaw City, whistling. Took a cab across town. He really must get the Aston Martin out of hock. The fines on it must be astronomical by now. He walked up the stairs to Candy's rather pretentious penthouse apartment door. He felt in his pocket. He still had the key in his wallet. Then he paused. He must remember to give it back to her. After all, he had no rights to it anymore. He knocked politely on the imitation oak-paneled door.

She opened it, and stared as blankly at him as Meilin had.

"Afternoon, Candy."

She gave a little squeak of pure, unrefined terror. "Conrad! Don't. Please. I promise . . ." she panted, backing away.

He shook his head at her. "I haven't come to hurt you. I just came to say good-bye, good luck and I hope you're happy. I'm off to NCO training and then probably the front. There's a chance I'll get killed, so I'm clearing things up. I just came to say good-bye. And no hard feelings. Anyone could make a mistake. I suppose it was natural you should think that I'd done it."

"You—you're not—" she whispered, hands still ready to thrust him off.

He shook his head, walking calmly into the familiar apartment, a bubble of unholy amusement at her reaction making him grin. "No. I'm not even mad that you accused me. I suppose it was a natural thought."

"Oh, I know it wasn't you, now. It must have been one of Talbot's enemies, who did it to shame him. It was half-dark and I made an awful mistake. Look, Conrad, I . . . I'm most terribly sorry. I'm just a weak woman. Talbot organized it all . . . He made me break up with you. I promise. Of course I'm really still in love with you, darling." She stepped up to him and embraced him, plastering herself onto him.

As she rubbed her breasts and thighs against him, and lifted her beautiful face to be kissed, Fitz had to admit that maybe Van Klomp had called the shots remarkably closely. What a damn fool he must have

been. All the same, it was distracting to have her body this close, after six weeks of sweaty male company. He pushed her away, but gently.

"It's all right, Candy." He rather enjoyed calling her that, now. "You don't have to fake it. Look, it's over. I just came to say . . . well, I've gotten over it. I wish you happy. I guess you got what you really wanted. I'll be going now."

She looked consideringly at him. "Must you? Yes, I suppose you'd better. Look, sit down for a minute. There are a few things you gave me that I want to return. They're in my bedroom . . . unless you want to fetch them with me?" she asked, licking her short upper lip.

Was that an invitation? Now? After all this? Suddenly, Fitz knew he'd rather bed a viper. "I'll wait."

He sat down.

And about two minutes later—someone smashed the door in. Three of them. They were firing as they came barrelling in.

Fitz reacted as any soldier in HAR army would, under the circumstances. He froze to immobility—as the sudden hardening of his slowshield forced him to. He did see one of the men fall, as the other two emptied their pistols. And then—as the army-issue slowshield was no longer being fired at . . .

Fitz stopped being immobile just as the two paused to reload.

They never got that chance. Fitz dropped one with a marble-based lamp—which made a better club than a light—and in the semidarkness dropped the other attacker with a disarming kick to the forearm and a punch that flattened the man against the wall, knocked loose a fair amount of the plaster, and put an original Miró painting onto the man's head. It was the best use the picture had ever been put to, in Fitz's opinion, but Candy had liked it.

Kicking a pistol ahead of himself, Fitz stepped across to the overhead light switch and the wall-mounted telephone. Clicking the lights on, Fitz picked up the telephone and tapped in the emergency number.

"Police? This is Conrad Fitzhugh at 207 Kensington Mansions, Masden Boulevard. There's been an armed break-in by some thugs. I've got a couple of them. You'd better get here quickly—and send an ambulance, too. One of them has been shot by his mates."

Fitz put the phone down and ran to check on Candy. The bedroom was empty, and the bathroom door was soundly locked. Sensible girl! He knocked on the door. "Candy! Are you all right?"

There was a terrified whimper from inside.

She must be frightened witless. Getting involved with ultrawealthy Shareholders was one thing, but nothing could have prepared her for this. Their politics were dirty. No wonder she'd blamed him. "It's all right. I've dealt with them. The cops are on their way."

"Thank God!" she said.

"You're not hurt?"

"I'm fine."

"Good. Stay in there until the cops get here, Candy. I'll call you when it's safe."

He ran back through to find one of the attackers determinedly staggering towards a pistol. Fitz dealt with him. Hard. He took some duct tape from the drawer under the telephone and did some trussing and gagging. Then he did some first aid on the gunshot victim.

He was busy with that when the ambulance and half a dozen uniformed policemen arrived. He stood up, allowing the two paramedics to take over. The police lieutenant looked at the two burly trussed-up men, and prodded one with his toe.

"Well done, soldier! These Vat-bandits are getting more cheeky by the day. Firearms! I'm tempted to shoot the bastards with their own guns and save the courts the trouble. It'll be the organ banks for them, for sure," he said, beaming. "Come on, boys. Take 'em away. Better put some cuffs on them, read

them their rights and take 'em to the station. Simpson. Nygen. You two had better accompany the medics and keep that one under guard."

Fitz tapped him on the shoulder. "Candy—my ex-girlfriend—sensibly locked herself in the bathroom when these guys broke in. Can we go through and let her out? She's terrified, poor girl."

The police chief beamed expansively. "Sure, soldier. Though why she worries with a guy like you around, I don't know."

They went through and the police lieutenant knocked cheerfully on the bathroom door. "Lieutenant Swiggers here, ma'am. You can come out now, ma'am. We've got the miscreants safe under lock and key."

Candy emerged with her cell phone still clutched in her hand. "Lieutenant! Thank God you're here." She pointed at Fitz. "Arrest him! He's wanted for attempted murder."

Just at this point one of the uniformed cops came through. "Uh. Lieutenant. The paramedics just found this in the injured guy's pocket."

It was a badge. And an ID card. "He's a Special Branch detective."

\* \* \*

Van Klomp shook his head at Fitz, who stood behind the bars of a holding cell in the GBS Central Police Headquarters. The big man sighed. "As my mother used to say: *Lelik is nix, maar stupid!* Fitzy, you're so dumb it almost isn't funny. As soon as I got home, and Meilin told me where you'd been thickheaded enough to go, I got hold of Mike Capra and headed here. We nearly beat you into the place. You moron! *Of course* Talbot Cartup had to stick to Candy's story when he came around—or be the laughingstock of the town. Now, Capra will talk to you. I believe they've scheduled throwing the book at you for the morning."

"But Bobby, those guys—who turned out to be Special Branch plainclothes security police—tried to kill me."

Van Klomp snorted. "Dead men don't have to go to court, Fitz. Much more convenient, *né*. The security lot act as enforcers for some of the top Shareholders. And Cartup is their boss."

Fitz sighed. "Bobby, can you get a message to my father?" He looked down. "I've been thinking the last while that I need to sort things out with him. I was going to go and see him after I'd seen Candy."

"You should have done it first, *idiot*," said Van Klomp roughly. "He would have told you not to be so stupid. He came to see me the day you went into the army. I had him on the phone a few minutes back."

\* \* \*

Mike Capra stood up. "Detective-inspector, you've stated that you entered the premises at 207 Kensington Mansions through a smashed-in front door. Was the door broken before you arrived there?"

The thick-set man nodded. "It was."

"At this point you state that the accused, who was lying in ambush, opened fire on you without any warning or provocation."

"That's what I said, yes," said the detective. "And these are the same questions you asked DI Scott. You've got the sworn statements of two trained officers on these points."

Mike Capra nodded. "The court has indeed. Thank you. I have no further questions."

"The prosecution may call its next witness," said the judge.

The next witness was a demure-looking Candice Foster in a virginal white blouse and neat gray skirt. "It is safe, Judge? He is restrained, isn't he?"

The judge nodded benignly. "Quite safe, my dear. You may take the oath."

Fitz was amazed to learn just how insanely jealous and violent he was. And how he'd locked her in the bathroom—on his second attack while he waited in ambush for her fiancé. She did some most artistic

weeping and shuddering, too. To the point where the judge cautioned Capra to be gentle in his cross-examination.

"M'lud! When am I ever anything else?"

"When it suits you, Capra," said the judge, dryly.

"Precisely, M'lud. It does not suit me to be anything else but gentle when I am forced to defend a man accused of so vilely abusing one of our most respected citizens. A person who would dress such a man in lacy yellow polka-dotted women's underclothing, tie him to the bed, beat him and then suffocate him with a plastic bag, deserves little."

Talbot Cartup cringed. The prosecution had been very circumspect about the exact nature of the assault. The press gallery scribbled frantically.

"Now. Ms. Candice Foster, could you clarify one point? On the occasion of the second assault you have stated that the accused broke down your door."

"Yes. He's a very violent man. Very strong. I tried to fight him off, but—"

"Thank you, Ms. Foster. There is no need to upset yourself with the sordid details. Now: On the occasion of the first assault—I have examined the police report in detail. I could find no report of forced entry on that occasion. How did the accused get in that time?"

She shrugged. "Maybe he climbed in the window."

Mike Capra looked thoughtful. "Number 207 is a penthouse apartment, is it not?"

"Yes," she nodded proudly. Everyone knew those cost a mint.

"You say he came into the lounge where you and your fiancé were sitting in discussion, at which point he forced you both through into the bedroom, and you into the bathroom. You must know where he came from? Through which door, Ms. Candice?"

"My bedroom," she said thoughtfully. "I remember now. The window was open."

"Thank you. I have no further questions at this point."

"Very well. I think the court will recess for lunch. The defense may present its arguments and I should be able to deal with sentencing today," said the judge.

\* \* \*

"I thought you said we should be able to wrap this up, Mike," hissed Fitz. "The judge has already decided to sentence me. And you hardly even questioned those damn liars. Even that lying doorman who says he saw me there. Recognized my car."

"Patience," said the Capra. "When you want to catch monkeys you put lots of tempting things in the calabash. You don't frighten them off *before* they have their hands in it. We'll do the nasty questions and scaring after lunch. They've been very cooperative. Don't be ungrateful. Go and enjoy your nice prisoner's nubbins like a good boy. You'll be back on army rations soon."

\* \* \*

And so it was.

"M'lud, first I'd like to ask that a policeman be dispatched with my assistant to bring the accused's wallet from his personal possessions here, to be used as evidence."

"That should have been entered as evidence beforehand, Mr. Capra, as you well know."

"M'lud, the court shares a building with the Central Police Station. This seemed the most obvious way of dealing with any possibility that anyone might tamper with the evidence. I have grounds to believe certain members of the police are in fact in collusion with the true perpetrators of these crimes."

The judge raised his eyebrows. "That's a serious accusation, Mr. Capra. I hope you can substantiate it."

"I'll do my best, M'lud. Now, if a policeman could accompany my assistant to recover my client's

possessions? I will proceed with other evidence in the meanwhile."

The judge nodded. "It is irregular, Mr. Capra. But under the circumstances, proceed. Granted."

"Objection, M'lud!" protested the prosecution.

The judge shook his head. "Objection overruled. Continue, Mr. Capra."

"M'lud, if we could proceed to exhibit one of the evidence which I have entered. As you can see these are certified copies of the lease of 207 Kensington Mansions and payment records for the rental thereof. Could I ask the clerk of the court to read out in whose name the lease is held, and from whose account the rentals were paid?"

The judge nodded. And the reedy-voiced clerk read, "Conrad M. Fitzhugh."

As the court bubbled and a furious Talbot turned on Candy . . . the policeman and Capra's assistant returned with Fitz's wallet.

"Please give that item to the clerk of the court," requested Capra. "And sir, if you could be so kind as to examine the inner pouch of the wallet. You should find a key there. Please hold it up."

He did. "M'lud. That is the key to Number 207 Kensington Mansions. Another copy of this key was in the possession of the agents, Messrs. Smythe and Austing. With a letter of authority from the tenant and both Mr. Smythe and Mr. Austing, as well as the block-caretaker, we ascertained that key held by Smythe and Austing fits the lock. I have their copy of the key here. I think we can establish that the two are identical. I should like to enter these as exhibits two and three. If the clerk of the court would like to examine them?"

The reedy-voiced clerk was enjoying himself very much. And he could indeed confirm the two keys were identical. The judge had to bang his gavel and call for silence after that.

"Now, M'lud, I don't believe the charge of breaking and entering . . . into one's own property can be entertained. I think we should also question the credibility of a witness who expects us to believe a large man would climb the outside of a five-story building to enter by the window, or by breaking down the door, when he has the key in his pocket. I would also question how someone who felt she was in extreme danger from my client didn't even bother to change the lock. Far from being guilty of breaking and entering . . . in fact my client should charge Ms. Foster and Mr. Cartup with trespass."

In the sudden silence Candice's voice, protesting to Talbot, was remarkably clear. "I forgot he had a key. He always knocked."

"Objection!"

"Sustained." The judge nodded to the clerk. "See that the charges of breaking and entering are struck from the roll. Proceed, Mr. Capra. As usual, you are providing the court with much entertainment." The judge's voice did not indicate that he approved.

"I do my best, M'lud," said Capra, urbanely. "I have here a statement of account from the municipal pound. As you will see, the vehicle which the night concierge at Kensington Mansions described in such loving detail, was impounded some four hours before the incident is supposed to have occurred. He also said my client entered the building by the front door. This is unusual for a man who is supposed to have entered number 207 through a window." Capra turned to the judge. "I think it is very clear that one or the other or both of these witnesses is lying."

The judge raised his eyebrows. "At very best that they were mistaken, Mr. Capra. I will grant you that their credibility is somewhat dented, and the lengthy testimony of Mr. Brenner should probably be subjected to a motion to strike."

Capra nodded. "My feelings exactly, Your Honor. Now we come to the second alleged attempted murder: that of DI Carr. We have already established that the two officers in question may possibly also, at best, have been . . . mistaken, as to the door being smashed in before they arrived."

"Objection!"

"On what grounds, Mr. Penquick?" the judge asked icily.



"Er. The defense is putting his own interpretation of events on the testimony of two respected officers!"

"He's putting *my* words to their testimony. It is, in my opinion, a very generous interpretation. Continue, Mr. Capra."

"Thank you, Your Honor. I'd like to call Dr. Liepsich of the HAR Institute of Technology as my first witness."

An untidy, long-haired man proceeded to the stand, took the oath and scratched in his scraggly beard. Capra proceeded onward.

"Dr. Liepsich, you are head of the physics department at HARIT. I believe you are also chief consultant to the HAR defense force on Korozhet equipment. The soft-cyber and the slowshield particularly."

The scientist grimaced. "For my sins, yes. Although I would have more luck explaining them to brain-dead first-year art students."

Mike Capra persisted. "But you are the best expert on the function of the slowshields that the military issue to their troops."

"Yep. Dead simple things, really. From the functional point of view. They harden if anything moving faster than 22.8 mph passes through the exclusion zone."

"Can a soldier turn his shield off?" asked the defense attorney.

"Nope," said the scientist. "They're as idiot-proof as possible. They're surgically implanted, draw power from the user's electromagnetic field."

Capra nodded. "And just what would happen if someone wearing one fired a pistol?"

Liepsich shrugged again. "Does the word 'colander' mean anything to you?"

The judge cleared his throat. "Could you stop speaking in riddles, Dr. Liepsich? Mr. Capra, what is all this about?"

The physics professor looked at the judge as a man might a beetle crawling out of his sandwich. "It means," he said with an air of exaggerated patience, "that if your accused over there had shot the cop—as the other two cops testified he did—the ricochets inside his own slowshield would have killed him. It is a physical impossibility. He didn't shoot anyone. He can't. They lied. Is that clear enough?"

The prosecuting attorney had leapt to his feet. "Your Honor, I object to the witness drawing unsupported conclusions."

The untidy professor looked at the attorney. "Meatball, when you have the intellect to manage elementary arithmetic without counting on your fingers, you can tell me I draw unsupported conclusions. In the meantime I suggest you go off and learn how to tie your own shoelaces."

The judge was forced to resort to his gavel to quell the riot. "Dr. Liepsich, desist with abusing our learned friend. I caution you that if you do not moderate your tone, I might have to find you in contempt. What I meant was I wanted to know what this slowshield issue has to do with this case?"

Mike Capra cleared his throat. "M'lud, I don't believe that the prosecution had seen fit to inform you that as of the fifth of last month, my client has been a volunteer, serving with the HAR defense force. He therefore has a surgically implanted slowshield. He therefore cannot have shot anyone on the afternoon of the seventeenth instant."

The judge cocked his head. "He's a member of the *army*?"

Capra nodded. "Yes, Your Honor. A private."

The judge looked at the documents before him. "And he joined as a volunteer on the fifth?"

Capra nodded again. "Yes, Your Honor. It is a matter of public record."

"Then I have no jurisdiction over this case. By the terms of Special Gazette item 17 of 11/3/29 he cannot be prosecuted for misdemeanors committed prior to this, while he is in the service. A foolish

statute, in my opinion, but nonetheless, that is the law. And for any crimes he committed after that date, he should be tried by the military, not, thank goodness, by me. And anyway, it is my considered opinion that there is no case against this man."

"In that case, Your Honor, may I raise a motion that these charges be dismissed?"

The judge nodded. He looked at the prosecution. "I do, however, instruct that the police investigate and appropriately charge the two detective inspectors who lied under oath. Much as I deplore Dr. Liepsich's abusive manner, I cannot fault his conclusions. It is my opinion that the prosecutorial work done here was more than appallingly sloppy." He struck the desk with his gavel. "Case dismissed."

\* \* \*

Walking out of the court, arm in arm with Van Klomp and his father, Fitz couldn't help grinning. "Well. Now all I have to face is a charge for being AWOL. I'll have to get back to camp as soon as possible.

Van Klomp cleared his throat. "As it happens, a major from the Attorney General's office contacted me about that. Scariest man I've met for a long time. Fortunately, he seems to approve of you. He said if you have an affidavit from the judge, to the effect that you'd been illegally detained by civil authority, you'd get away with it. Give it to your commanding officer. The army looks with disfavor on civil authorities messing around with their own. Capra's hopefully organizing it right now."

\* \* \*

The camp commandant looked at the affidavit. Shrugged. "Not my business anyway. You've been transferred to OCS instead. Someone higher up obviously decided that the Vats would murder a Shareholder, now that, thanks to the newspapers, everyone knows you are one. You're due to report there tomorrow. So, it looks like I should give you another pass. Try and stay out of trouble on this one."

## 5

"We need more loyalty. More courage. More military backbone." Thus spoke the plump jellyfish of a general, Blutin, who was officially the head of HAR's army.

"We had to resort to bribing them with drink. It's the only thing we've found that actually motivates them," said his 2IC, General Cartup-Kreutzler. "We're forced to apply the harshest of military discipline, too. They desert with regularity. It's only the grog ration that keeps them in the trenches at all. We need you to sort this out and to treble production."

The colony's chief biologist sighed. "You asked us for some animal that we could uplift with this Korozhet device that would be an efficient killer of the insectlike Magh' invaders. We took one of the best naturally equipped species, that we could breed quite fast. Now . . . you're telling us fast isn't fast enough. You need more rats. Are they no good as Magh' killers?"

The two generals looked at each other. Blutin might be the senior, but he always let Cartup-Kreutzler lead. "They do seem to be very good at killing Magh'," admitted Cartup-Kreutzler.

"Then why are you experiencing such high mortalities?" she asked dourly. "I must tell you, gentlemen, that we simply cannot step up production. Our facilities were never meant to carry the load they are doing now. If anything, production is going to decline as certain irreplaceable equipment breaks down."

"Er. Well, we've had to execute rather a lot in training," said Blutin. "Slacking. And for military crimes. Insubordination. Desertion. Refusal to obey the orders of a senior officer. That's why we want you to improve their attitude."

Devi Sanjay laughed. There was no humor in that laugh. "Attitude? You want me to change their attitude in my cloning vats! I can't change their nature. *You* will have to change their nurture."

They looked blankly at her. "What do you mean, ma'am?" asked Cartup-Kreutzler, finally.

If there was one thing Devi hated it was being called "ma'am."

"I mean you'll have to change the way you train them."

Blutin shook his head. "We can't do that. It . . . it's not the way it is done!"

Cartup-Kreutzler backed him up. "Yes, I must really insist that you leave military matters to us, Professor Sanjay. It's not your field of expertise."

Devi Sanjay looked at the two generals coldly. She refrained from saying "it's not yours either."

Mentally, she shrugged. She'd hit brick walls before. In the Shareholders' current panic, they would give their support to these idiots and not to the voice of reason. Before this war, the HAR army had been a rather trivial out-of-the-way make-work place to dump well-connected incompetents. Now, with the Magh' invasion, the army had assumed a central position in human society. Unfortunately, it had retained its idiots.

"Well, you're going to have to give up these executions. We can't replace the rats or the soft-cyber units you're . . . using up." She had managed not to say "wasting."

"Discipline must be maintained!" snapped Cartup-Kreutzler. "We've got to set an example or the rats will be far worse."

She looked dispassionately at the two. No wonder humans were in such trouble. "If I might suggest . . . Simply remove the troublemakers and repost them elsewhere. Tell the rats that remain that the troublemakers have been executed. From what you've told me, they're in no position to know any different. Tell the reposted ones they've been reprieved. It would give us breathing space here at the cloning labs. And we'll experiment with a different language download on the bats."

The two generals looked at each other. "I suppose that might work," said Cartup-Kreutzler reluctantly. "We can send them to areas the Korozhet advisors say are imminent attack zones."

Blutin looked suspiciously at her. "What has language got to do with it? I don't see why they're required to speak anyway."

"Language shapes the way you are able to think. For example, Zulu has no distinct word for the color blue as opposed to green. This makes describing the difference between hydrous and anhydrous copper sulphate difficult," she said dryly.

The two generals looked blankly at her. She decided to continue anyway. "The microprocessor in the soft-cyber unit 'learns' how to translate thought patterns into words existing within the vocabulary download. This is naturally a little imprecise. The software in the cybernetic unit selects the nearest possible word with impeccable logic. Unfortunately, English isn't terribly logical. It does mean that you can't think of a complex matter which you do not have words for, however."

A dim light dawned at the end of Cartup-Kreutzler tunnel. "Could you arrange it so that they don't know the meaning of fear?"

"Unlikely," said the scientist dryly. "It's a core word in the human vocabulary. And without the concept you would be even shorter of soldiers. Gentlemen, I've heard your requests." She emphasized that word. "I've told you what can be done. Now, if you'd excuse me, I shall see about implementation."

Without asking their permission, she got up and left. It would be better if she could depart this overplush office, and this chateau with its fake military grandeur, without explaining that the bats would be getting downloads of Irish nationalist folk music and old Wobbly songs.

Devi Sanjay had joined the New Fabians back on Earth as a young idealist, with many others, planning a utopia. She'd seen the ideals of her compatriots wither as they became part of the entrenched privileged class. She wasn't young anymore. But she, personally, had not quite lost all her idealism. When she'd left Earth, humans had been the intelligent species of the universe. Alone. Special. Now she knew

that intelligent life was not rare. There were the alien enemy—the Magh', the alien allies—the spiny beach ball Korozhet, and, according to the Korozhet, hundreds of others in this part of the galaxy alone. Evil ones such as the Jampad and Magh', friends like Korozhet. She'd fostered two new intelligent species herself. The army still regarded them as trained animals. Biomechanical weapons. Things.

Devi Sanjay knew they were wrong. Things stopped being things when they reasoned. And, like the aliens, they would not see the world from a human perspective. Devi had never explained just why she had chosen the species she had, or the language downloads that she had. Her reasons were subtle, and her plans and vision deep. Some of them had very little to do with the war.

Humans had let the genie out of the Vat. Of one thing she was certain: it wouldn't be that easy to put the two new intelligent species back. She'd given the rats some of the most intense and skilled portrayal of human drama and history. Now she was about to do the same, with emotional and revolutionary content instead, to a species that could indeed kill Magh'—among other things.

Whatever came out of the meeting of these three . . . humans, rats and bats, all endowed with a shaping human heritage, when the hurly-burly was done . . . would not be in the smug plans of the aging New Fabian Shareholders.

\* \* \*

The rats marched between the shock-stick-armed MPs, to face the bored-looking tribunal. The clerk listed their numbers. The officer presiding looked up from the sheaf of papers in front of him. "You are charged with aiding and abetting the enemy, desertion and murder of your human officer. We have affidavits here from the OC commanding and Rat 235645670045, known as 'Dick Deadeye.' Do you have anything to say in your defense?"

The rats looked in puzzlement at the officers. "We never did any a-betting. 'Tis a good idea, mind," said Gobbo.

"Murder?" said Ariel. "'Twas pesticide. And that is no crime. We asked."

The officer ignored her. "We note that Rat 235645670045, known as 'Dick Deadeye,' is deceased. I presume he was murdered to try and cover up your heinous deeds."

Pooh-Bah shook his head. "Humans doth mistake rats' morality. But then we find you incomprehensible. He took liberties that he wasn't invited to with Ariel."

## 6

"Oink! I mean, Lieutenant," said Ewen, the big private grinning all over his ugly face. But, also, saluting earnestly.

"At ease," said the newcomer to Ariel's chief supplier. "I feel uncomfortable enough with this bird shit on my shoulders without having to run into my old squad. What are you doing here, Ewen? I thought you'd been posted to the artillery."

The big private shrugged. "I got caught running a black-market trade with the rats. When it got to the court-martial they couldn't quite pin it on me. So I got posted here to 'Fort Despair.' What did you do wrong?"

"Other than graduate from the OCS course, nothing I can think of. Why?"

Ewen shook his head. "You always were a bit slow—sir—even when it came to making a bed." The private grinned broadly at the memory. "This is 'Fort Despair.' Where they send the malcontents and troublemakers. It's a hot sector. The Maggots are pushing forward fast and hard. The Maggots are

supposed to do the job for them without having to go through all the hassle of finding evidence for a court-martial." The private laughed. "We read all about your little court case, Oi . . . Lieutenant."

"We'll have to keep it 'Lieutenant,' Private. Too damn difficult otherwise."

The big man smiled. "I reckon I won't have any trouble taking orders from you. Sir."

\* \* \*

"This is Lieutenant Fitzhugh. He is the new OC for this sector," said the sergeant.

The rats seemed vastly uninterested. The humans—and they were a rough-looking lot—looked as if they were already planning to desert or kill him.

Fitz looked speculatively at them, without saying a word, until they began to get uncomfortable. Then he sighed. "Right. Listen up all of you. I gather you are all here to save the army the trouble of killing you legally." There was low-throated grumble. "It probably hasn't occurred to you that they'd give you an officer that they feel the same way about."

The grumble was silenced as they digested this one. Fitz ground his fist into his palm. "I'm planning on pissing on their fireworks, soldiers. I'm here because I got up the noses of certain powerful Shareholders. Private Ewen here will fill you in on all the gory details. For a fee, I'm sure. But to cut a long story short, I was a boot with the conscripts. I know every 'stute trick you lot can pull. And they will not happen. Is this clear?"

There were a few mutters. "On the other hand, I am not going to waste your time with petty crap. There will be weapons drills, come hell, high water or shelling. Your bangsticks will be sharp and ready. Hygiene will be of the highest standard we can manage out here. God help anyone I find crapping in their foxhole. For the rest, I'm really not interested. When, if, we get out of here, you'll worry about polished boots and belt buckles. Until then, don't waste your time or mine." There was a muted cheer. He hushed it with a wave. "I'll want to talk individually to all of you, especially the combat vets. I've no intention of obliging anyone by dying easily. I want that attitude from all of you. Dismissed. Back to your posts."

There was a silence. And then Ewen began clapping . . . It caught on.

Fitz waved it down after a minute. "Enough. We can see if you still want to clap in a week's time. To your posts."

\* \* \*

Fitz leaned against the dugout wall. His father had given him two items on that last pass. "Take this tin of boiled candy. The candy is new. The tin isn't. It's been through four Earth wars with various Fitzhughs." The tin was a thin, flat one. The paint had long since worn off. But there was a deep gouge right across it. "Tradition has it that you will keep it in your left breast pocket."

The other thing he'd given him was a piece of advice: "Forget what they told you in OCS. When you get to your unit, talk to your NCOs. Let them lead you around quietly until you know enough not to make a fool of yourself."

"So tell me about the rats, Sarge," said Fitz to the rat-corps sergeant. "Before I make a fool of myself."

The sergeant permitted himself a hint of a smile. "Bit different from our last lootie, sir. He knew it all when he got to us. They told him at OCS how to deal with them."

Fitz raised one eyebrow. "Sergeant. They also told me how to deal with Vat-conscripts. Seeing as I've been one of those, and I know how they messed up there . . . I thought I might try asking one of the people who really run things."

Now the sergeant was grinning openly. "Ewen said you were a 'stute one. Well, sir, there is a whole set of different rules for dealing with them. They've got no morals at all, for starters. And they speak sort of English, but they don't think like we do. They take things very literally, and they still think like rats—you know, food, sex and strong drink are the only important things in the world, and devil take tomorrow and the hindmost."

"Ah!" said Fitz with a smile. "Like most of my boot-camp Vat-companions."

"Bit like, sir. But the difference is they don't seem to get concepts like respect for rank or a uniform. You earn respect personally. They don't have much loyalty, not even to each other. You can force them to do things, but the minute your back's turned they won't do them. The honest truth is it is easier to buy 'em than to try and do it any other way."

He looked warily at his new CO. "Er. I've heard, sir, all the human rat-corps NCOs who survive crook the mortality records so they've got some extra grog on hand."

Fitz didn't turn a hair. "Hmm. I trust you will continue to do so. And what else do they fancy?"

The sergeant was getting to like his new lieutenant. "Well, drink's best, sir," he said with a grin, "but you'll find lads like Ewen run a good black market in chocolate, lighters, knickknacks, fancy goods. They find tails the sexiest part of the body so they like to ornament them."

"And where do they get the money for all this?" asked Fitz. "I was under the impression they weren't paid."

"Ah," said the sergeant, giving him the sort of look a proud teacher might give a star pupil. "There you have it, sir. The rats' chief vice is looting. If the Maggots had loot, we wouldn't be able to hold them back."

\* \* \*

The rats were lounging in the OP, discussing the curious behavior of the humans. "Methinks he is popular enough with them. They clapped."

"You mean he is pronging yon Linda. Methinks I have heard of that. They call it Vat-shagging," said Gobbo, knowledgeably.

Ariel stared at him in puzzlement. "Art mad? What sayest thou?"

"Well, he hath got the clap," said Gobbo. "Ewen said *he* was sure he had it from her."

"Not that sort of clap. The clapping you get for being popular."

"'Twas my thought you could not be my kind without being popular," said Gobbo earnestly. His ears twitched. "Hist. He comes."

The rats were earnestly doing what they were supposed to when Fitz arrived. None of them leapt to attention. "As you were," said Fitz, dryly.

They went back to their lounging, which hadn't been quite what he'd meant. That was what the sergeant had meant by "take things very literally." Well, he could work against them, or work with them. .

..

He sat down, and hauled out Van Klomp's parting gift. A hip flask full of HAR's best yet attempt at a single malt. It was a reasonable exchange for the gift of an Aston Martin replica. "Does anyone here want a drink?"

One rat—smaller, therefore a female, at a guess—with a rakish tilt to her tail and a particularly rich chocolate color to her fur, was quickest. She snatched the hip flask and leapt to a niche in the wall while the others were still gaping. "'Tis mine!" she squealed triumphantly.

"'Tis not right, Ariel. That's not what the whoreson said!" protested another of the rats.

Fitz saw that a mighty fight was brewing. So he neatly snagged the hip flask back. It came with a clutching rat. "All of us." He stared at the rat who was still clinging to the hip flask, but whose teeth were now bared viciously. "And I will personally bite the tail right off any rat who tries to hog it all. Which would be a shame as yours is one of the sexiest I've ever seen."

To the sound of ratty chuckles and a couple of very credible wolf whistles, she let go. And winked salaciously at him. Then she sniffed. "You've got chocolate," she said, suddenly fiercely intent.

"Indeed. And we'll discuss my parting with some in a few minutes."

A pompous-looking rat strutted forward, a cup made out of a bangstick cartridge outstretched. He

motioned at the hip flask. "For a suitable insult, I, as Minister for Interior Affairs, will tell you her weaknesses. Although, as Minister for Defense and Lord High Archbishop, I will say Ariel's tail is not without risks."

Ariel, remaining perfectly confidently standing on Fitz's knee, her eye fixed on his breast pocket, said, "Shut up, Pooh-Bah."

He'd placed the names now. Ariel—the sprite in Shakespeare's *Tempest*. Pooh-Bah from *The Mikado*. The names were an affectation he'd heard about. A side effect of the language download into their Korozhet-built soft-cyber units. As the soft-cyber unit selected the nearest approximate meaning to what the user meant, the name would probably reflect the nature of the beast. "Let's start with names."

"Bardolph." "Gobbo." "Pitti-Sing." "Trinculo." "Caliban." "Poo-Bah-for a reasonable fee." "Hymen." That one arched her tail provocatively at him.

"Paws off, bawd. I found him first," said Ariel.

No heroes. No kings. Rogues and lechers, in their own self-image, by the sounds of it. Well, he'd have to work with the clay he had.

"Get some mugs." He gestured with the hip flask. There was a scamper and a scattering. Except for Ariel. She merely unscrewed the silver cup off his flask, and grinned rattily at him. "Methinks I'll stay put, 'til I have that chocolate."

He shrugged. "I'll drink out of the flask."

"I should have thought of offering to do that," she said, as he doled out liquor.

"You snooze, you lose," he said cheerfully. "Now, to business. I've decided to pay a bounty on Maggot chelicerae. For every left chelicerae you have for me after the next assault, I'll pay one HAR cent—multiplied by the number of live troops I have under my command. At the moment I have some two hundred rats and sixty men, four NCOs and myself. Work that out in booze or bars of chocolate."

The rats began frantically counting on paws and toes and tails. After a while Ariel said. "'Tis no use. Help us with the mathematics. Our base eleven doth make calculation much labor."

"How many Maggots can you kill in one assault?"

The rats blinked at him. "As many as is needful. As many as doth threaten us. Sometimes there are too many," said Ariel. "Then we run away."

"Call it ten each. At that rate—if everyone survives, you rats will get \$26.50 each. Of course it gets less if anyone dies."

"Methinks I have found more looting in a lieutenant's pocket," said Trinculo.

"Ah." Fitz was unsurprised by the admission. "But then he's dead, and there is no more. And that's one lieutenant among two hundred. Your chances are not good. This way . . . you're onto a sure thing. Of course I'll have to put a ceiling on it, or I'll go broke. Say \$50 a month. That's what the army gives conscripted privates."

Ariel tapped the side of the hip flask suggestively. "I'm in. Now this rotgut sack you have in here: 'tis remarkable easy to drink compared to issue grog, even if it doesn't have a proper bite to it. How about another, then?"

"Well, for those who are in, naturally," said Fitz, innocently. He could afford \$10,000 a month for a private army, he thought as he poured. Candy's apartment had cost him about that—and he wasn't having to pay for that anymore. He'd cancelled the lease.

Ariel drank the whiskey slowly, speculatively, unlike most of the rats who were into chug-and-splutter. "Methinks I shall nursemaid this one," she announced. "For if he dies, we get naught." She looked curiously at him. "Besides, I want to inspect his naked weapon and see if he's adequate for a girl like me." She wrinkled her whiskers and revealed that the stories of his exploits had reached the rats. "This 'woman's underwear.' Explain?"

Fitz was still blushing at the idea that a rat might consider his wedding tackle too small. Or interesting. The sergeant had been right about no morals . . . or inhibitions! "Ah. Underclothes. Um. Panties and brassieres. Suspender belts."

"Doth speak riddles. Small pants? Things for grilling meat?"

"Women . . . um, men too, wear a second pair of pants under their clothes. To cover their private parts."

The rats would obviously have found astrophysics more comprehensible.

\* \* \*

Fitz discovered that Ariel took "nursemaid" to mean she was going to take up residence in his magazine pouch, or on his shoulder. But the day wasn't out before he discovered that this casual invasion of his privacy was worthwhile.

The nightmare creatures struck just at dusk. None of the pictures or lectures had prepared Fitz for the reality. Or for the speed and ferocity of it all. They'd said at OCS that up to seventy percent of human soldiers never survived the first major assault. Now Fitz understood why. And he also knew that if it wasn't for his pocket assassin-cum-bodyguard, he'd have been dead five times over in that assault. Rats were everywhere. Blur-fast lethal killers with a terrifyingly casual attitude to their killing. And Fitz discovered that "ten each" was a gross underestimate of their potential and the Magh's sheer numbers.

"Sector headquarters on the blower, Lieutenant."

"Hell's teeth. Have you told them we're under attack?!"

"They know, Lieutenant. The line on either side of us folded. They're sending reinforcements into those trenches, hoping to hold line two. They thought we—being in the center of the attack—must all be dead. They want us to retreat."

"Tell 'em we're still holding. We don't want to be outflanked though." Fitz turned to one of the NCOs. "What are our losses like, Corporal?"

The man was grinning like a dervish, despite the blood soaking his shirt from a gash on his chest. "Slight, sir. Five men I know of. Some wounded, but there are no more Maggots coming over. We're fighting them coming along the trenches from the sectors next door now."

"Are we going to hold them, Corporal?"

The man nodded. "The rats have gone kill-crazy, Lieutenant. I've never seen anything like it. The Maggots usually send a lot of 'scorps. This is all light, fast stuff. Easy to kill. Those damned rats would have killed twice as many if they didn't stop to take a claw off each one. Some kind of new rat-craze."

"Tell 'em. Hell, no. I'd better tell them." Fitz ran for the field-telephone bunker.

"Lieutenant Fitzhugh here."

"Captain Dewalt here. Colonel's orders. Sound a retreat for any survivors, Lieutenant," said the voice on the other end.

"We've held them off, sir. And there are no more Magh' coming. We're mopping up."

His words didn't appear to have registered with the Captain. "We'll have stretcher teams in the second trench line. Leave the rats . . ."

"We've held them off, sir," repeated Fitz, louder now. "No need to retreat."

There was a stunned silence. "What! That's ridiculous. . . . I'd better confer with the colonel. Stay near the field telephone."

Fitz didn't. Instead he left—at a run—to see how the fight with the Magh' from the next-door sector was doing.



The answer was: not well. The rats were there . . . but several of them were sitting down, leaving the fight to the human troops. And those that were still fighting were going to die. It was not that the Magh' were overwhelming. It was just that the rats seemed to be behaving like clockwork toys . . . in need of rewinding. "What's wrong?" yelled Fitz to Ariel as he ran forward to the fray.

"Methinks they're faint with hunger."

Of course! He'd been told the elephant-shrew genes gave the rats phenomenal appetites. They must have fast metabolisms and little stamina. "Feed the rats! Give them any food you've got, especially sugar, or we're dead!"

He hauled out the tin of sucking candy and flung it at a sergeant, before running into the fight. "Get someone across the west side and tell them," he yelled, bangstick stabbing through pseudochitin.

He had no idea how fast the rats would recover. He was relieved to discover that it was really quick, and that the average grunt, when faced with death or parting with precious little luxuries he kept next to his skin, would reluctantly part with the luxuries. The east side trenches of the late Lieutenant Zuma soon would be free of Magh'.

As he set off across to the west side, he was met by a panting private. "Sir. Colonel Brown on the line. He's insisting we retreat."

Fitz stopped. "Did you give him your name, Private?"

"I couldn't get a fucking word in edgeways, sir. Sorry, pardon language, sir."

"This is a war, not a kindergarten, Private. A pity Private Johnstone was killed before he could give me the message. He is dead, isn't he?"

The private grinned. "Yes, sir. I saw him die. Poor fellow."

"Stick to that story," said Fitz. "And see that the field telephone has a convincing accident. Cave part of the bunker in. The fight's all over on the east side. If we can lick them on the west, I'm not running."

Ten minutes later Fitz called in from the west side's field telephone. "Yes, sir. My apologies, sir. I was called away from our field telephone to deal with an immediate crisis. Unfortunately the instrument was destroyed and the man I had instructed to remain with it was killed."

He waited for the volcano to subside and then answered the last question.

"Where am I calling from, sir? Why Section B3, sir. On our west side. We've already secured the east side. We'd like some relief, Colonel. We're pretty thin spread holding three pieces of the line."

There was a long silence from the other side. Then: "You're making your fellow officers look bad, Lieutenant. Hum. I'll get some men up to you at once. They're waiting in trench line two."

## 7

In the seven weeks that followed, Fitz's section survived a sequence of small probes and one more direct assault. This was somewhat worse than the first one. But Fitz's new system of buddying two rats to each human soldier worked remarkably well. The rest of the rats he used as a free-range strike force. And this attack seemed almost like a spearpoint aimed at his piece of the line. Once they'd stopped it, they didn't even have to deal with the other sections. And then even artillery bombardment slacked off.

They eventually had to retreat after three weeks of near idleness and weapons drill, because the line had folded to the west of them. "It's almost as if they won't hit here, because we're strongest here," grumbled Fitz. He never thought he'd miss Magh' attacks, but the boredom made keeping the troops in readiness hell. There was drunkenness, gambling, and several fights about women . . . and fights about

men among the women. Only the rats seemed content.

Sergeant Ellis nodded. "It's always like that, sir. The Maggots always attack where we're weakest."

"Suggests good intelligence, doesn't it, Sarge?"

"Can't be military intelligence then, sir," said the sergeant, handing him a couple of sealed dispatches.

Fitz cracked the first open. "Well, glory be! This'll cheer the troops up. We've done our two-month frontline stint and we're being pulled back to third line for a month to rest the men."

"Be about the fullest company to get rested," said the sergeant. "Half the time the companies have to be replaced and re-formed before that. The lads'll see some leave, too. You get a week when you're on third trench," she said with relish.

"That'll be a shock to civvy street," said Fitz dryly. Life expectancy in the trenches was about forty days at the moment. Inside, he was deeply grateful that he would be returning some eighty-three percent of his men past that. It was something you didn't dwell on here. But it did make boredom sweet. He opened the second envelope. Blinked. "It appears this bunch of ne'er-do-wells is due to attend a medals parade at sector headquarters. And yours truly is promoted to lieutenant first class. With the corresponding increase in pay of seven dollars a day, and family and retirement benefits."

"The family and retirement benefits sound good, sir," said the sergeant. She'd given up trying to get into Fitz's pants a while back. Ariel was a good dog-in-the-manger. But the sergeant still cast sheep's eyes his way sometimes. Fitz avoided them with care. That was a set of complications he didn't need here, as their CO. Still, as a normal male there were certain intentions he was planning to follow up on that seven-day pass, when he didn't have a minder.

\* \* \*

In dress BDUs that now had a row of ribbons on the chest, and a second pip on their shoulders, Fitz blinked at the bright lights outside the troop disembarkation station. He put his bag down and wondered just where to go now.

"To find some food and drink," said the bag, in Ariel's voice, obviously guessing his thoughts.

"What the hell are you doing in there?" he demanded.

"Methinks I am crossing my legs and tying a knot in my tail. Hurry up and let me out before I pee on your kit."

Given the alternative, letting her out seemed the only option. And, tempting though it might be, he couldn't just run off and leave her there. She had kept him alive in the trenches, after all. So, with a curious rat peering out of his magazine pocket, he took a taxi into town. It was at her orders he stopped at the Paradise Pussy Club, too. It had a flashing neon cocktail-glass sign.

\* \* \*

The bouncer eyed the man in uniform uncertainly. While officers in full-dress uniform, complete with ceremonial swords, were regular and welcome visitors to the club, men in BDUs were not. However this was definitely an officer, even if he was wearing dress BDUs. Against his better judgement he'd let him in.

\* \* \*

In the pale hours of morning, Fitz looked cheerfully back at the club. It had been a great evening. The lap dancer would no doubt recover from the bite on her well-padded tail-end . . .

He gently patted the rat whose long nose protruded from his pocket, issuing ladylike snores. He'd had a wonderfully vulgar evening with a delightful girl, who had just discovered Cointreau. She'd thought that the strippers and pornographic backdrop movie were the best live entertainment she'd ever seen. Well, it was also the only show she'd seen. Of course, Ariel had also thought it was the side-splittingest comedy she'd ever seen. Rats have no taboos about genitalia or even sex. But what a wonderful girl. She had a biting sense of humor and just happened to be a rat. Damn fool of a bouncer should have understood that. The man would almost certainly recover. Saunas weren't that hot, were they?

It seemed a little early on such a delightful evening—or morning—to go and visit the parental abode. His own residence had been sold. He'd terminated the lease on the only other place he'd had a claim on, and anyway, Candy probably wouldn't have been glad to see him. Perhaps 4:00 a.m. was a little late to go and see if Van Klomp had gone soldiering, finally. He walked idly through an alleyway, where a foolish man waved a knife at him.

"Empty your pockets, soldier," sneered that shifty soul.

Fitz shrugged. "On your head be it."

\* \* \*

A few minutes later, now in search of an all-night store that sold chocolate, he'd gently woven his way up to two men in uniform with white bands around their hats and asked directions. One had been about to prod Fitz in the gut with a nightstick, when he saw the pips on his shoulders. While the MPs were pointing Fitz toward an all-night convenience store, someone with a much faster metabolism was opening the doors to the paddy wagon. Ariel had not survived her only brush with the law not to recognize one.

They zigzagged their course onward rather like that extra stray neutron in a fissionable mass. Letting a rat inside the doors of something like Aladdin's cave was rank foolishness. Fortunately, Fitz was by now sober enough to point out the closed-circuit television to her. She was even more fascinated by this concept and insisted on breaking into the security room to inspect the monitors. The puzzled alarm-response crew found nothing.

Then, it was dawn, and since a passing taxi was available, Fitz had taken her to see Van Klomp. Unfortunately for the HAR Bolshoi Ballet company . . .

Van Klomp was only due back from his new unit that night. Fitz had peacefully fallen asleep—a good soldier can sleep anywhere, anytime—on Van Klomp's sofa. So that left Meilin talking to Ariel. And the subject, naturally enough, was Fitz himself—his reputation, and the trouble he'd had with the law, and, of course . . . Candy.

What was less predictable—unless you knew rat-nature—was that this long discussion should also involve pornographic backdrops and closed-circuit television. Meilin knew quite a lot about the latter, as that was one aspect of Van Klomp's business. Neutrons are very small. What they can cause is not.

\* \* \*

There was a sonic boom. Well. The return of Van Klomp, anyway.

"Can't you keep away from troublesome women?" demanded Van Klomp, on meeting the rat with a glass of his port in her hand.

She blew him a raspberry, a rather good one, as she'd only learned to do so the night before.

He blew one back that nearly flattened her ears. "So what have you been doing so far, boykie? Nothing as stupid as last time, I trust."

Fitz grinned. "We've toured one of GBS city's finest establishments, namely the Paradise Pussy Club, and visited my father. Cordial terms are restored, but his advice is that we're too alike to keep it that way if we share a house. So I've come to bum a piece of floor. It's got to be drier and more comfortable than where I've been sleeping lately."

"And welcome. Pull up any piece you like. So, what did the old man think of a visit by a rat?" He looked disapprovingly at the bottle Ariel was clutching. "Did you steal his booze too?"

Ariel lifted her nose at Van Klomp. "Pshaw. Of course I was well behaved. 'Twas an experience. I never met a real live progenitor before. He told me to look after Fitz, because it is obvious he can't look after himself."

"True," said Van Klomp, taking the bottle away from her. "And having visited the ancestral home, what excitement is planned for tonight? More visits to cathouses?" he asked with vast tolerance.

Fitz lifted his aristocratic nose. "I am going to introduce Ariel to culture."

Van Klomp snorted. "There's a Bavarian beerfest tomorrow night. Or is that a bit upmarket for a rat who has stolen half my port? Or maybe you were thinking of Chez Henri-Pierre again. He won't let a Vat in the front door. I'm sure he'd be charmed at a rat—especially after your last visit. And then you could go and watch the HAR Bolshoi Ballet's performance of *The Nutcracker Suite*."

"The latter sounds about right. I think we will give Henri-Pierre the go-by," said Fitz, loftily. "His portions are too stingy for Ariel, anyway."

"Besides, I haven't finished all your port, yet. And Meilin is cooking dinner for us. Curried tripe," said Ariel with an expression of bliss.

Van Klomp laughed. "I'm tempted to come along just to see what a rat makes of the ballet. But I've got work to do tonight. And beside, the beerfest is more my sort of thing."

\* \* \*

The acrobatic Ariel thought ballet was quite funny for about five minutes. She was mostly fascinated by the large flatscreen DVD backdrop, which was a great saving in set changes. When Ariel pointed out it was rather reminiscent of last night's pornographic one, only with worse dancing, Fitz had to turn his laughter into a fit of coughing. He still attracted a number of disapproving "hushes."

Ariel also alarmingly disappeared from their private box for a while. There were no screams or other sounds of pandemonium, so Fitz didn't allow the look of glee on her ratty face to worry him too much. She did however adore the Cointreau-centered liqueur chocolates he'd bought her.

He'd have slept less soundly if he'd known that she'd spent the rest of the night driving around with Meilin, part of it in a very exclusive Shareholder neighborhood. And part of it visiting a couple of Vat-girls of negotiable virtue and adaptable morality. It was, Ariel concluded, a lot more fun than the ballet.

"This lot should bring down the house," said Meilin with a particularly evil grin when she'd finished editing the film.

Ariel looked puzzled. "Why? 'Tis very funny, but not explosive."

Meilin snorted with laughter. "Believe me, this is H.E."

"And her," corrected Ariel, pedantically.

\* \* \*

"You're Lieutenant Conrad Fitzhugh?" The MP at Van Klomp's door asked.

"Yes," said Conrad warily. What had Ariel been up to? Besides running up the beer waitress's dress last night?

"Colonel Brown has ordered your recall, sir," said the MP apologetically. "There's been a major incursion in your sector. We've got transport waiting for you."

Fitz nodded. "Give me five minutes to get into uniform and get my kit together."

Ariel was unbelievably dozy. It was almost as if she hadn't slept.

It was a long drive to the front. She snoozed most of the way, contentedly.

\* \* \*

The general bowed his tiara-wearing plump wife into her seat. Ballet wasn't really his favorite entertainment, although he'd known an entertaining ballerina a year or two ago. But Maria was a true aficionado. And when all was said and done, it was her money. The war and cost-plus on artillery ammunition had made the Cartup clan enormously rich.

Having ogled the dancers and ordered some champagne, and salmon-and-watercress sandwiches for the interval, he settled into a comfortable doze.

He was woken by the buzz in the audience.

And no one was saying "hush."

It took a few moments of unbelieving blinking to be sure he wasn't hallucinating.

This was taking *avant garde* theater to new limits. The last time he'd seen anything like that backdrop had been at the Paradise Pussy Club. And that hadn't been quite so explicit. And while the female in the leather outfit wielding the whip was a stunning platinum blond . . . her partner did absolutely nothing for his lacy polka-dot knickers and black bra. And even fishnet stockings couldn't help legs like that.

The two dancers continued to pirouette with grim artistic determination as the huge screen behind them showed the details of his brother-in-law's face.

Talbot Cartup had always liked to sport a figure in high society. He was frequently seen at the opera and ballet. But never before in quite such detail.

The general missed the part showing the interviews with the two ladies of the night, discussing his transvestite brother-in-law's enjoyment of the rather bizarre perversion of semisuffocation. They did mention their prices for what was a very risky pastime. But General Cartup-Kreutzler was too busy trying to break into the very securely locked projection unit.

As it turned out, the DVD in the unit was amazingly bare of fingerprints.

And while the booking for the ballet trebled, it did rather change the way people regarded the art form.

\* \* \*

"Captain?" said Fitz, looking at the bars being handed to him.

"We're out of officers," said the colonel, grumpily. "We lost seven including two captains and a major when we were pushed back to line three. Those troops of yours are heading for court-martial. They're not exactly refusing orders. They want you. We just lost another two officers and your NCOs pulled the men back into the trenches. And what is this story about troops fraternizing with the rats?"

For a moment Fitz thought that Ariel must have put her head out of his pocket. Then he realized what the man was getting at. "Ah. It's a system we've evolved that works. Men have the stamina, rats the speed."

"Well, like your crazy idea about paying them, I'm not having any of it," said the colonel cholericly. "Just see you that get them over the top and that you recapture line two. You've got two new second lieutenants fresh out of OCS. See what you can do, Captain Fitzhugh. Put some discipline into this lot."

\* \* \*

"Impossible, Talbot. He's back in combat. And Major Van Klomp is on a forced march with his men." The general looked in disgust at the telephone. Waited for his brother-in-law to stop rabbiting on. "There is nothing you, or even I, can do about it. Anything direct is almost certain to backfire on you now. I would certainly quietly withdraw those charges, because if the matter comes to court, you're going to end up being sued out of existence. You're a laughingstock and the best you can do is to go to that place of yours in the north and stay there. The town won't forget you in polka-dot panties for a long time."

\* \* \*

Candy Foster was sitting looking gloomily at the door. He hadn't been near here since it happened. Hadn't called. It was his fault, not hers. She did it because that was what he wanted. She had no real interest in sex. Never had had. But it was a useful lever. So she'd panicked when he wouldn't come to after the plastic-bag thing. Her fingers had been stupid with fear and she hadn't been able to get it off. But at least she'd managed to tear the plastic, and hide that stupid leather outfit under a gown when the paramedics came. The story about Conrad had been born out of that panic. Talbot had decided to stick to it to save face. Had that ever blown up in his stupid *face*!

A brown envelope dropped through the letter slot in the door.

Candice opened it with trepidation. Talbot's brother-in-law's influence had stopped her getting

call-up papers before. But this letter definitely began with . . .

"Greetings."

With her academic marks she knew she'd wash out of OCS. Let it be catering or nursing services. That was where nice girls were posted. She could change her hair color and use some skin pigment. Maybe change her name too. No one would recognize her. Hopefully.

Infantry school.

## 8

"They're pounding us, Captain. Going to push forward soon," said the slight, bespectacled lance corporal.

"SmallMac! What the hell are you doing here?"

"Transferred in. You're getting a reputation, Fitz. You keep your men alive. And you don't lose."

It was a heavy weight to bear. "I won't always manage to do either, Corporal McTavish," he said quietly. He knew that in this man's case he was carrying a pregnant wife and two small children as well.

SmallMac shrugged. "Ah, but you try to do both, Captain. That's a rarity in a Shareholder officer."

Fitz found that, with the remnants of the rats (numerous) and the humans (few) from the collapse of the forward trenches, he had double his previous troop complement. There were only three other officers—a major who was keeping himself very busy with the troops who were furiously digging in behind them and two fresh-out-of-OCS lieutenants. He held a hasty staff meeting with them and his NCOs.

"Right, based on previous experience, we know when their artillery stops, the Maggots will come swarming."

"You mean the Magh', Captain," said one of the new lieutenants.

Fitz gave the snotty wet-behind-the-ears brat a look that would curdle milk. "Lieutenant Pahad, you'd better learn to speak the language that your men speak, or you'll be a mortality statistic. While I'm on the subject—Sergeant Major, I want you to detail a veteran NCO to each of these new officers. You two—" he pointed at them in their new, crisp BDUs with their new, shiny pips—"will listen to those men. Take advice from them before you give any orders, if you have time."

Pahad drew himself up. "How are we supposed to establish authority under those conditions, Captain?"

Fitz noticed that the other youngster had said nothing. For his sake, and the sake of the men this young idiot would command, he continued. "Lieutenant Pahad. Does the term 'frag' mean anything to you?"

"No, Captain, it does not," the man said stiffly.

"It's an old combat word. One my father told me about. From a long-ago war on old Earth. Unpopular officers who went into combat usually had a fragmentation grenade dropped into their pockets—a few seconds before it exploded. Our troops are combat veterans. They'll take orders or they wouldn't have survived. What they won't take is crap from wet-behind-the-ears ignoramuses who know nothing about real fighting. The average life of a soldier on the front is about forty days. The average life of a second lieutenant is half that. If you're stupid enough to think that that is coincidental . . . then you're a dead man walking. Now, I don't personally give a shit if you get killed. But if the NCOs in your unit tell me you wasted a single troop's life through your arrogance . . . you'd better *be* dead. Because I'll kill you before my troops do. Is that clear?"

The lieutenant gaped at him. But Fitz noticed that the other one nodded.

"Ahem." The sergeant major cleared his throat. "What you may not know, sir, is that the captain here

has the best Maggot-kill rate we know of. He's also known to be an absolute bastard—pardon my saying so, sir—" he nodded at Fitz— "at weapons and fitness drill. He's also got the best troop survival rate on the front. Most of his men are veterans. And we get volunteers wanting to serve under him. That's a first for the hottest sector on the front. You're privileged to serve here, son." Which, as the sergeant major was perhaps two years older than Pahad, was not unamusing.

Fitz stopped the incipient reply with a finger. "Right. Enough of this. If you have any problems with me, Lieutenant, see me afterward. If we live through this, you can go and complain to the colonel. In the meanwhile, you will spend the next eight weeks on the front lines."

"If *you* survive that long," muttered SmallMac.

Fitz pretended he hadn't heard him. The white-lipped lieutenant certainly had. "Now, I've told Ariel to get the rats to work as the rats in my old command did. Two rats per human. The rest will be split into three groups, Sergeant Major, two cover groups and a backup. For each cover group I want two strong, fit, experienced soldiers. They'll be carrying heavy loads of rations and sugar for the rats. I want fast packhorses with brains. For the third group I want light, fast troops, twenty of them. They're our backup and, if we get a chance, our spearhead group. I want troops who can run."

"Sah! I'll confer with the platoon sergeants and have them assembled."

"Do that. And tell the troops the first one to cause trouble or bad feeling with the rats is going to answer to me, personally. Now, medics . . ."

\* \* \*

At three that afternoon, the Magh' guns fell silent. And the fighting began. They came in waves over the top. They came in columns out of tunnels. And they seemed to be only hitting Fitz's patch of the line. It was obvious that they intended to push the weakened front into a beachhead. The Magh', it appeared, did not know the meaning of "retreat" or "fear."

They learned the meaning of "die."

Fitz nearly learned it himself. Lieutenant Pahad did. As Sergeant Anderson said, the Maggots had merely saved the captain trouble. But toward dusk the attack began to slow down. The last wave was more of a splash than a wave. As the Magh' artillery began to cut loose again, the rats and troops in Fitz's third group, with him at their head, went over the top. Moving as fast as a slowshield would allow, taking advantage of the Magh's weaker eyesight, they pushed into the human-abandoned old second line. The Magh' here were few and far between. Obviously the creatures had thrown everything at the human line. How fast they could move more troops up to fill the gap was an unknown. But the old line two was not under artillery bombardment. Fitz began to move men and rats forward. He rested them in the relative tranquillity of the comparatively easily recaptured line. The Magh' had moved their artillery forward in anticipation of the human line falling. Now, rather like Drake and the Spanish Armada, Fitz realized his men were too close to be fired on. If he had reinforcements now, he could keep pushing, maybe even to the Magh' force field edge. Only one massive human assault had managed that in the past, at vast cost in lives and materiel.

Fitz got on the radio to sector headquarters.

"Colonel Brown."

"Try and hold them a bit longer, Fitzhugh," said the colonel. "We've almost got the earthworks finished for the new trenches. And the attacks usually slack off at dusk."

"Sir. We've held them off. In fact, we've retaken the old line two. I've got my troops working on repairs right now."

"What? Impossible!" huffed the colonel, sounding less than grateful. "It must have been less of an attack than we'd expected."

"We estimate between ten and twenty thousand Magh', sir. But we have a bit of an advantage right now, sir. We appear to be so close that their guns' elevation capability does not allow them to fire on us."

We think they've moved their artillery to our old line one. I'd like to press the advantage, sir. We can take those fieldpieces. But we'll need more men. Reinforcements before dawn."

The colonel showed the military dash and flair which had taken him so far in HAR's make-work prewar army, and seemed destined to push him higher as the most incompetent of the mediocre-to-useless chateau-officer class. "Um. Well. Er. Don't you think you should play it safe?"

"We can hold these lines, sir, if that's what you want me to do," said Fitz. "But capturing some of the Magh' artillery would let us onto the technology they're using. It would be quite a kudo for you."

"Hmm. I don't like your newfangled way of doing things, Fitzhugh, but you do get them done," said the colonel. "Yes. Advance, see if you can take a Magh' fieldpiece. I'll see if I can scare up some reinforcements."

"If we push too far, sir, without reinforcements, we could lose even these trenches. So I'm afraid I need a firm commitment, sir."

"What? Damn your eyes, man. You'll have them. Take those guns at all costs," boomed the colonel.

"At least a company of rats, sir. Maybe even a few of these new rats, if possible."

"You're insufferable, Fitzhugh. Get me a gun and you'll get them."

"I'll rely on you for that, Colonel. Out."

"T'faith. What a whoreson Achitophel!"

Fortunately, Fitz did not transmit Ariel's accurate comment to the colonel.

\* \* \*

The advance began. It was rapidly obvious that the Magh' had never met such tactics from the HAR armed forces before. The usual slow buildups and massed assault of the meat-grinder war that the HAR chateau generals fought, they dealt very effectively with. They simply outgunned and outnumbered the humans, and it appeared that the Magh' generals also had no objection to vast body counts. The idea that a thrust might be matched with a counterthrust, immediately, without two or three days of troop movements, appeared to have taken them off-balance.

"Get me Major Bartok," snapped Fitz to the radio operator.

The artillery officer was obviously bleary with sleep. Great, thought Fitz. Our artillery is near ineffectual and here we are in a major battle, and their commander has been catching up on his shut-eye. "Major. We're retaking our old front lines. Your men are shelling us." Slowshields at least meant they weren't being killed. But they could be buried, and slowed down.

"Huh?" said Bartok. "But we were pushed back two days ago. There's been no major advance planned."

Fitz ground his teeth. "Major. I'll set off a red flare. Your range finders can pick it up. We're fighting hand to hand in the trenches of our old trench one. It's slow going because we're thinly stretched. We've got the defensive troops from one trench line occupying two and fighting in a third. We've been promised relief before morning."

"First I've heard of it," grumbled the major. "It wasn't mentioned at last week's staff briefing."

Fitz had to stop talking to help Ariel with a pair of arrowscorps, which was probably just as well, as it stopped him biting the fool's head off. Then he let off the flare and went back to trying to keep his temper and get the human gunners to stop firing on their own side.

"Check with Colonel Brown. We've taken advantage of a situation. Look, it would help us if you could range your guns beyond us instead."

"Hmph. I'll put you onto the gunnery officer for tonight. Out."

The gunnery officer at least was simply cooperative. And his gunners, despite the fact that HAR industrial technology was still battling along in the nineteenth and early twentieth century and their fieldpieces were to match, were more than cooperative. Their rate of fire increased, which, as Fitz had



heard, took nothing short of a miracle. At least somebody back there wanted them to succeed.

Then he and Ariel were fully engaged again, in the first hard fighting in this trench. They'd reached the gun emplacements. The Magh'der, the kind that tended the fieldpieces, were there in numbers and it was obvious that they felt about their strange weapons the way ants do about their grubs. But they appeared to be genetically designed to tend guns . . . not fight rats and men.

Looking at the pod of captured alien weapons in the infrared torchlight, Fitz allowed himself a brief moment of triumph in front of his cheering troops. Even the rats were caught up in it. "Methinks these should be worth a good few claws, eh, Captain," chittered one, cheerfully, kicking the wheelless platform, with its long stabilizers.

Ariel licked a slash on her shoulder. She pointed at the barrels. "Long muddy congers aren't they? Fair give you envy, Gobbo."

She stuck her long nose into the air. Sniffed. Twitched her ears. Fitz noticed several of the other rats doing the same.

"Methinks, it is the cat," said Pooh-Bah.

"'Tis time to cut and run," Ariel announced. "The Maggots are coming thick and fast from back there."

"We should be getting backup soon. We'd better dig in. Issue rations all round," said Fitz. "Radio. Let's get the Colonel and find out why they aren't here yet."

\* \* \*

Minutes later Fitz knew fear. "We've taken their gun pod. Three fieldpieces, sir. But we need reinforcements if we're to hold them."

The colonel paused. "Er. I consulted General Blucher, and he refused to countenance moving troops until morning."

"Morning will be too late, Colonel," snapped Fitz. "The Magh' are just about solid out there. They want to retake their guns and they're not counting costs. If you want these guns, if you want this trench, if you want my men to survive, I need reinforcements *now*."

"Well, I'm sorry, Captain Fitzhugh," said the colonel huffily. "but there is nothing I can do, *now*."

"Useless asshole."

There was a splutter of outrage from the radio. But Fitz was too busy to care.

"If we try to pull back now, we'll be exposed to the faster Magh'. So. We'll need a rear guard."

"What about these guns, sir?" asked the surviving lieutenant.

"We'll do our best to destroy them, Lieutenant Cavanagh. You've done well today. You'll be leading the retreat back to trench two. We'll hold them as long as we can here. It'll be over to you to hold them there. Bring up as many men as possible from trench three. Sergeant. Drawing straws time. I want one man in three staying here."

The young lieutenant was pale. "With respect, sir. I'll stay here. You lead them back. You're worth a lot more than I am to the troops. I'm going to try and turn these guns on them."

*A good kid*, thought Fitz. *I wonder why he got sent to "Fort Despair?"* Probably too good, just as the other one had been too obnoxious. In the midst of mediocrity and incompetence, "good" was unpopular. He shook his head. "Lieutenant, thank you. But what I'm asking you to do is no lesser task. It's a tough one. You must keep the retreat orderly, keep it disciplined or it'll turn into a rout, and then we're lost. If the troops are panicked and half-dead with exhaustion when they get to trench two, they won't hold that. And I'm relying on you to do that, rather, because the rats will stay for me. They won't for you. And without them we have no rear guard. But it is a good idea about the guns. Now, move out. Go. Give us a flare when you have less than fifty yards to go."

The lieutenant saluted crisply. "Damn that lily-livered colonel and his stupid general to hell, sir. I'll hold

that trench, come hell or high water." He turned. "Sergeant. Move them out in an orderly fashion. The first man to run or panic had better keep running because he'd be better off if the Maggots killed him than if I caught him." His voice cracked slightly. But the troops obeyed him, as if he were a veteran.

Three minutes later the old front line was populated by a skeleton crew of men and rats. And Fitz was wrestling with the guns. SmallMac and Ewen were assisting. Fitz's heart had fallen still lower when he'd seen the faces of his old squad mates. But . . . the lots had been drawn. Someone had to get the short straws. Some of those who retreated had families too. But he wished like hell he could have sent SmallMac back too.

Ewen, a man who could lift half an ox carcass back when he'd been a meat packer, strained with Fitz to turn barrels. They could tilt the entire structure but not turn it. There were no wheels, just flat metal platforms.

SmallMac nearly knocked them both flying, as the barrel began to rotate under its own steam. "What the hell are you fiddling with, Mac!"

The ex-horse-breaker gave a wry grin. "There must be electronic locks holding them, Fitz. Damned if I'm going to call you 'Captain' when we're all going to die. This disc here looked likely, and we need to learn to work them before the Maggots arrive."

"Hell's teeth. You're right and I'm an idiot. Each of you to a gun. Fiddle. I just hope we don't shoot at our own men or blow these things up."

Three minutes later they had rotation and elevation licked. They had reloading done too. Firing . . . well it was only when Fitz thought of the flat-scorpion shape of the gunners that Ariel discovered where the firing lever was. Tailgunners! Still, the shots they managed to direct toward the enemy were probably ineffectual, especially as the guns could not be elevated beyond a certain point.

"Bugger this for a joke!" yelled Ewen as the first Magh' came over the top. He cranked the gun barrel down furiously. Instead of using it as the howitzer it was designed as, he directed the barrel straight at the oncoming mass. It couldn't be elevated enough, but it could be depressed.

For the next few moments it rained slowshielded Maggots and earth.

"Yes!" The other two also hauled their gun barrels down.

The Maggot shells couldn't actually blow the enemy apart, not inside slowshields. But their weapons had been intended to fling a shell at high trajectory for a few miles. At this close a range it could physically remove anything. Blow them away if not apart. And the flying debris hardened slowshields and stopped the Magh' advance.

"Gather around the guns!" yelled Fitz. As long as they could keep them off the guns, as long as the shells lasted, they could hold back the bulk of the Maggot tide. With more luck than judgement he managed a skimming, plowing shot along the ground nearly parallel to the trench. Not only did it blow away the bulk of the wave of Magh' who had been pressing forward, but it also hardened the slowshields behind them. "Retreat on the guns," he yelled again, desperately reloading, knowing that his lucky shot had bought them the time to do so. Ariel bit down on something and a claw cut Fitz's face. He was in pain, but this was no time to stop and think about it. He must fire again! The rear guard surged back toward the gun pod, fighting their way through the few Maggots who had reached the trench. Soon, he had a reloader. And as the humans and rats fended off close attackers, the curiously silent alien howitzers were used in the fashion of the siege cannon of the fourteenth century.

Despite this, the Magh' seemed endless. Even the light of a flare behind them was of no help. There was no retreat now. The Magh' had surrounded them. And the shells were getting few.

Fitz saw Ewen abandon his gun and attempt to wade though the swirl of Magh' fighter bodies, using his huge strength to pick them up and fling them away . . . And then he went down under the tide. The rat that had been on his shoulder ran across Magh' backs. It nearly made it, too. SmallMac also was plainly out of shells—and defenders. There were still some fifteen men and an equal number of rats around Fitz's gun.

And he had three more shells.

SmallMac must have seen the rat nearly make it running across Magh' backs. He leapt.

Only the man didn't try to run on their backs. He leapt onto the biggest long-legged runner there. Astride it. Out of reach of claws and stingers.

The horse-breaker used all the skills at his disposal to cling to something that hadn't ever been ridden. Stayed on and somehow propelled his alien steed through the press. And then flung himself at the raised tier at the far end of the gun platform.

A claw snagged his foot. For a moment it looked as if he'd be pulled down. Then a rat bit through the clawjoint. Screaming . . . grabbing anything for handholds . . . SmallMac was up.

And so were they. Whatever control SmallMac had grabbed on the tier was raising the entire platform. Men and rats scrambled, snatched for purchase as the whole platform wobbled gently up into the sky, the rotors underneath lifting, clanging into suddenly hardening slowshields, faltering, lifting again. Maggots leapt frantically after them. Fitz saw Ariel go down under one. He lunged at it, pulling it aside.

Its razor-edged claw cut into his thigh and up toward his belly . . . before something stopped it.

Ariel.

The hovercraft-mounted gun was genteelly blundering deeper into enemy territory. As he lay there bleeding, Fitz saw SmallMac, his face white with pain, sticking his bangstick into holes plainly intended for a claw. And, although it nearly had them off, turning the thing in a wobbling circle toward the HAR-held lines.

With Fitz holding on to Ariel, and she holding on to him, consciousness faded as the handful of rear guards headed home, in the dawn.

## 9

His first memory of the hospital was clouded with anesthetics and pain. But after a couple of weeks, that too cleared. On the first day that he actually knew just who he was, a Vat-visitor with glasses in a dressing gown and on crutches came to see him.

"SmallMac!"

"Captain." The bespectacled man managed a salute, despite the crutches.

"I thought you weren't going to call me that anymore."

"That was when we were going to die," said Lance Corporal McTavish with a grin. "And that appears to have been delayed."

"And the rest? Ariel?" There was a lump in his throat. He felt sick and weak and like crying.

SmallMac pulled a face. "Injured. Spanoletti came through it all with no worse than a few cuts. She's been to see all the rats. Apparently Ariel looks like she'd been through a fight with a grizzly. She'll live, though. We lost one of the rats to injuries. Pitti-Sing, I think. The rest of us . . . thirty-one men and rats in all . . . made it. Some of them won't fight again. We had our doubts about you making it though, Captain. You owe your life to Ariel and some pretty sharp medics."

"And to your riding and flying skills."

"For a minute I almost thought we had cavalry," said SmallMac, wryly. "But I won't be riding again for a while. I've lost the foot. On the plus side I won't be marching again either."

"Hell. I'm sorry. But . . . that's your livelihood."

SmallMac shrugged. "I was getting too old for the falls anyway. And, well, I was nearly dead, like poor bloody Ewen. I hear I'm due for a desk posting here in GBS city. I'll be able to sleep out with my family! There's many a poor bastard who would cut their own foot off for that."

After that came Fitz's father. Other survivors. Parachute Major Van Klomp.

And then Ariel came to visit him. Rats of course were strictly not allowed in the hospital.

Fitz looked at her. Ariel's rich fur was bandaged. So was one paw. The once beautiful little creature looked bedraggled. Her delicate ears were tattered.

But worst of all was the bandaged stump of a tail.

"I've just come to say good-bye," she said, in a voice that was unaccustomedly subdued.

"Have you been posted back to what's left of our unit?"

"No." She twitched her tail stump. "I . . . methinks . . . I'll . . . I just wanted to see you a last time. To be sure you were still alive."

Fitz knew this rat. He'd long since stopped regarding her as anything other than another person. The crucible of the front line was far too hot for the metals in it not to meld. He'd learned to understand some of the things she left unspoken. Ariel was going to die. Rats did without most things except food and sex. Losing her tail was like a man losing his balls, but a lot more public.

"I despair of ever winning affection." Voice synthesizers were not designed to carry the loss. But Fitz understood anyway. Ariel . . . Ariel had been accustomed to being the very best. To being sought after. To knowing herself as desirable. Well. He knew partly how it felt. The left side of his face was never going to be anything but a mask to frighten children. The wounds on his thigh and lower abdomen had been repaired. But he couldn't bet anyone his left ball anymore.

"I still love you, Ariel. I love you for what you are, not for what you look like. I don't have a tail myself."

The rat snuffled. "I always thought 'twas a sad lack in you."

She scrambled up the bedclothes, and gave his throat a slight nip. Rats didn't kiss but that as a gesture of trust and affection was as close as it came—a sort of "I could rip your jugular out but I won't."

"Take care," she snuffled, and got up to leave.

"Where are you going?"

"Away."

"Stay. Please stay," he begged, urgently.

She paused. "Why?"

"Because I need you. Well, because I still love you. And tails have never been very important to me. Um. And because I have chocolate for you. We humans never offer chocolate to those we don't love."

"Never?"

He knew the prescribed rat-reply. "Well, hardly ever."

She even summoned up a ratly look of acquisitiveness. "Chocolate Cointreau straws? I wouldn't stay for less. Someone who loved me would give me those."

"Hmph. Cupboard love," he said loftily, knowing he'd won at least a reprieve, especially as he had some of the desired item.

She took it. To his surprise she offered him a bite. It was the most unratty gesture he'd ever seen her make. Then, with her sticky chocolate, she burrowed under the bedclothes. "Well. I can't love your tail. I still think 'tis a sad lack in you. I mean size does count, and a girl could get some respect with a boyfriend like you, if you had a tail in proportion."

\* \* \*

When Fitz opened his eyes again, there was a four-star general, and several other staff officers,

looking at him. He hoped that the general was not aware of the beady eyes peering at him from under the blanket. There were also two people who bore the unmistakable mark of "press" even if one hadn't borne a shoulder-cam as well. The other one grimaced. "Better focus on the right side of his face. He's not a pretty sight on this side. Right, General, you're on. Roll it, Paul."

Fitz discovered that he was now a major. The bits of gold in his hand seemed a very poor recompense for his troops' lives. "And for service over and above the call of duty in the capture of the first intact Magh' fieldpiece: The George Bernard Shaw Cross, first class."

"Thank you, sir. But I believe the credit should go to the men and rats in my unit, sir. A number of them lost their lives in this action, and I'd like them to get the recognition for their courage. And we captured an entire pod of Magh' guns. We'd have held them if Colonel Brown had sent us the reinforcements we were promised. Loss of life and loss of those fieldpieces is due to his and General Bulcher's decisions not to back us up." Fitz hoped this was going out live.

The general was only momentarily discomfited. "General Bulcher was unfortunately misinformed by the colonel. The matter is under investigation. But you and the men under your command did very well under the circumstances. A rather substantial number of medals are being awarded. Lieutenant Cavanagh will command one of the most decorated units on the front." He cleared his throat. "I believe you may be invalidated out of active frontline duty, Major. You're a valuable soldier. Too valuable to waste on just any desk job. Which is why I have ordered your transfer to the Military Intelligence Corps. You'll be replacing Major Dunsay."

"No thank you, sir. I'd like to try and get fit, and return to my unit."

The general looked as if he'd just bitten into a slug in his salad. He made a quick recovery. "Intelligence is where you can really make a contribution to the war effort, young man. However, I am open to other requests."

"Very well, sir. I'd like to add a severely injured rat to my staff. We need someone who understand rats, sir. They're valuable military assets. It's due to them and the courage of my troops that I owe what success we had. It is my feeling that the rats should be paid. They'd be much better motivated then."

The general blinked. "Yes. Well. We shall have to see what can be done. The bats that we are about to introduce will make a great deal of difference too, eh."

A little later when the general and his entourage had left, Ariel emerged. "Why did you agree?" she asked, helping herself to a grape.

Fitz shrugged. It was a painful experience. "Because . . . God knows if either of us will ever be fit to fight again. And, well, the Maggots always attacked where we were weakest. They obviously have good intelligence. We also need it. And maybe at Military Headquarters I can get something done about idiots like Colonel Brown and General Bulcher. Maybe we can make the system work."

Ariel chuckled. "'Tis the HAR army we speak of, Fitz. Methinks it will be 'once more into their breeches' and bite their bollocks."

Fitz grinned. It hurt his face. "We'll try it my way first, okay?" He looked at the order that the general had left behind.

It was signed: *H. Cartup-Kreutzler*.

He stared at the signature for a long time. He began to understand just why he'd been posted to "Fort Despair." Or why the orders for relief had been delayed. And just what his posting to "Intelligence" might be. It wouldn't stop him. But it would make for interesting times, ahead.

Ariel shrugged in her turn when he pointed it out. "Methinks we'll end up doing things in my way after all. 'Tis the only way the army works."

\* \* \*

A few minutes later, they had another visitor. An elderly woman, this was, wearing what looked like a laboratory coat. She was holding an antique-looking item in her hands. A brass object of some sort. At

first, Fitz though it was an oddly shaped teakettle, until he realized it was an oil lamp.

The woman placed the lamp on a small table next to the bed and gazed down at Fitz. He couldn't read the expression in her face. There was *something* there . . . Amusement, maybe, combined with satisfaction. Hard to tell.

Then the woman spotted Ariel's nose poking out from under the covers. She smiled, and murmured some verses under her breath. Fitz could just barely make out the words.

\* \* \*

"The culminating pleasure that we treasure beyond measure,  
Is the gratifying feeling that our duty has been done."

\* \* \*

Fitz cleared his throat. "May I help you, Ms. ah . . . ?"

"Just think of me as John Wellington Wells. A dealer in magic and spells. And that's all I'm going to tell you."

She started to turn away, gesturing with a finger at the oil lamp. "A gift I brought for you." Her eyes went back to Ariel, whose entire head was now sticking out of the covers. "I'm glad to see it will be trebly appreciated."

And with that, she headed out the door. On her way through, Fitz heard her murmuring: "The genie out of the bottle, indeed."

\* \* \*

When she was gone, Ariel popped out from under the blankets. "You humans are a daft lot, but that is the first one I have ever heard quote Gilbert and Sullivan." She scrutinized the gift on the nearby table with a rat's usual intentness when the possibility of loot arose. "What's that?"

Fitz shrugged. "Nothing you'll be interested in. Me neither, actually. It's an antique kind of lamp."

Ariel was puzzled. "What for? When you want light, you flip a switch. When you want light and can't get it—like in a tunnel in a Maggot raid—that silly thing will be useless. Won't even make a good bludgeon."

Fitz shrugged again. "Like you said, humans are all daft. That old lady, for sure."

But Ariel had already leapt onto the table. Though disgruntled, she wasn't going to leave even a faint possibility of loot unchecked.

She lifted the lid. Then, squeaked sheer glee.

*"It's full of chocolates! And—!"*

Ariel reached in and plucked out a little sample bottle of Grand Marnier. Then, clutching it to her chest, she replaced the lid and perched herself atop the lamp. Looking, for all the world, like a guardian demon.

She gave Fitz a slit-eyed stare.

"I'll share the chocolates—maybe. If you're sweet to me. But the booze is mine."

Fitz rolled his eyes. "Rats!"

"It's important!" insisted Ariel. "There's not going to be any of that human folderol in *this* romance." Now, she looked positively indignant. "Won't ever find a rat—sure as hell not a rat-girl—getting her stars crossed. Much less her loot. That silly crap's got to go."

Fitz leaned back in the pillows, chuckling. He thought he understood now—a bit, at least—of the weird old woman's last words.

"Genie out of the bottle! One way to put it, I guess."

"Why do humans have so many useless words?" grumbled Ariel. "And what's a 'genie,' anyway?"

"You are." Fitz thought about it for a moment. "Or maybe we are."

# BOTANY BAY

*Next we have a locked-planet mystery, a puzzle John Dickson Carr would be proud of. The trick: how to find a murderer on a planet populated only by convicted killers? And after that, a short disquisition on the science behind the technology in the story, by the author, who is himself a scientist working on computer vision systems, as well as an infantry captain in the Canadian army.*

## ***Paul Chafe***

The steel plow point clanged on a rock, wrenching the handles out of my hands and tearing off another callus. "Dixie, whoa! Daff, whoa!" I hauled back the reins to stop the big Shire horses and leaned heavily on the plow. Sweat made muddy with dust streaked my skin. I preferred to work bare from the waist up because of the heat, and in my second month on planet I was tanned dark. I would have worked in shorts and barefooted too if I could have, but I'd learned quickly that plowing required long pants and good boots. 37 Geminorum burned hotter and brighter than Sol, although the thick, high oxygen atmosphere mitigated the ultraviolet somewhat. I cursed, looking up at the swollen disk. It had barely moved since I started my shift.

The star probes used for system survey weighed only a kilogram and moved at fifty percent of the speed of light. There were only so many sensors that you could cram into a kilogram, and only so much those sensors could learn flashing through a system at that speed. When *Endeavour* was launched to 37 Geminorum-IV the mission planners knew its mass and gravity, knew it rotated once every seven hundred hours with no discernible axial tilt, had a magnetic field of two gauss, and an oxygen-nitrogen atmosphere with water present. They knew, in short, that the world supported life and that humans sent to the system would not be immediately condemned to death on arrival. That was all they needed to know, anything more was beyond both their capability and their interest. They were not the ones who had to live there.

I levered the offending rock out of the furrow and carried it to the growing pile by the side of the field. The experience reminded me of the hedgerows of England and France, tiny plots of land surrounded by stone walls that looked sufficient to stand off a medieval army. I'd wondered then why the fields were so small and the walls so big. Now I knew. I looked up on the bluff to the Town, the grandiosely named group of temporary structures that we called home now. We'd set up the bluff because it was halfway between the landers, which stored hydrogen and carried our fuel cells, uplinked to *Endeavour* and its in-orbit sensors, and carried a lot of useful instruments, and the river, which supplied our water and nourished the rich bottomlands we hoped to farm. The landers were our link to

our past, the river was our hope for the future, and our little community was, literally and figuratively, balanced on the edge between them. Horst Thom was coming down the trail to the fields. I went back to the plow, but didn't stir up the horses again, waiting for him to come up.

"Mitchel." He waved. "Damn slow progress, yes?"

I looked back at the half acre of furrows I and the two big Shires had managed to cut. "Not the best farmland on the planet." I paused to take a deep drink from his water flask. "Not by a damn sight."

"Got to land where you can. We have the river, a half-decent climate, and twenty thousand clear feet to get the shuttles down." Horst shrugged. "The probes called it rich soil, and it is. We couldn't know it had so many rocks from orbit."

I kicked at a stone I'd have to move on the next furrow, spraying fine, dry dust into a cloud. It weighed a hundred and twenty percent of its Earth mass, and so did I and everything else on this world. That only added to my annoyance. We spent more time hauling them than we did actually plowing. "Rich we hope, with no more hidden surprises."

Horst shrugged again. "There's no heavy metal contamination. Alien microzoa shouldn't know how to attack Earth plants. Anything else we'll find out when the crops come up. Or don't." He picked up the reins.

"We need rain too."

"The rain will come when it gets dark, that's the way it is here. You go get some sleep, it's my shift."

I looked at my watch. "You're early."

"Early, late, who can tell when the damn sun won't set for another hundred hours. He looked up at the swollen yellow disk. "I can't sleep anyway, and I'm tired of listening to Claire fret over the seedlings." I hesitated and he continued. "Go on, someday I'll come late, and now you can't be mad at me."

"Fair enough." I laughed. "Here Daff, here Dixie." I slipped the horses a sugar cube each. They were fine animals, better than eighteen hands each and powerfully built, with hooves the size of dinner plates for traction. Earth gave nothing but the best to its colonists, even if we were all criminals.

Horst stirred up the reins and the team pulled forward. I watched them for a moment, then turned to trudge wearily up the bluff to the Town, feeling aches I'd been ignoring a few minutes ago. It was just over a year since *Endeavour* had fallen out of the stars and into a survey orbit around this world we hadn't gotten around to naming yet. It was better than a thousand years since we'd left Earth, though our bodies aged no more than five in cold sleep. Forty of us had grounded a month ago and already we'd become thirty-nine. Cheryl Teirson, the data system specialist with wavy black hair, had gone on an exploratory hike our first week down and simply never come back. Searching had turned up nothing, and what had taken her was a mystery. 37 Gem was an older star than Sol, and according to Horst its higher ultraviolet output could only drive the mutation machine of evolution faster. There was a riot of plant types, even here on the arid plain, but we had found no large fauna. There were tracks sometimes, some small, some large, and one possibly dangerous, something with claws a handspan across, but the largest native animal we'd actually seen were the little four-legged, two-winged insectoids. They were everywhere, living on the abundant lichenlike plants that formed most of the ground cover, but quite harmless. They didn't even bite, which was a blessing.

As I came to the top of the bluff the Town looked a little more substantial. The greenhouses were up and running, plants sprouting in hydroponic solution, acres of solar foil laid out to convert sunlight to electricity to run the pumps and equipment. Our housing was utilitarian but spacious, flexplexes, designed to hold ten each, but occupied by two or three at most. I kept my own, for my own reasons, and nobody objected. Two miles away the four huge landers glinted, their carbon ceramic skids resting in miles-long furrows, more plowing done in a minute than I'd done with Daff and Dixie in a month, unfortunately unusable for planting. The pilots had done a good job, considering none of them were actually trained as pilots.

"Mitchel! You're early." Calibre Cadogan was bent over a stripped-down pump, muddy to the



elbows. A four-inch flexible pipe ran down the bluff and past the field to another pump that pushed water up from the wide, slow river. He was a big man, with powerful shoulders and too-intense eyes. The one question you never asked another colonist was "What did you do to get transported?" but the rumor was that Calibre had beaten two cops to death in the same fight. The scars on his knuckles were evidence in support; whether it was true or not was another question.

"Horst wanted to take over. How's the hardware going?"

"Not so good." A frown crossed Calibre's face. "This fine dust settles on the solar foil and cuts the efficiency in half. We're already harvesting only a kilowatt per meter because the foil is optimized for the wrong spectrum. The pumps are running slow as a result and silting up."

"So put up more foil."

"More foil up means more to clean today, and that much less as replacement stock when this stuff degrades, which it will quickly, given the UV flux. In ten years we won't have power, you mark my words. We need to get the turbines going."

I shrugged. "We have to survive ten years first, which we won't if we have no hydroponics this year. They knew the spectrum of this damn star when they sent us. Why in hell didn't they optimize the foil for it?"

"What, retool the whole process to produce a measly few hectares for us? Complain to the management, boyo." Cal twisted his finger skyward in the gesture that has come to represent Earth, the Colonization Council and everything wrong with both of them. "Are you sorry you came then?"

"Sorry? I'd be in prison, or I would have been. That's no life, but still . . ."

"Still there's four hundred and more died young, who would have grown old, if only in prison, yes?"

I nodded. Four hundred, nearly five . . . Colony transport was meant to be a life sentence, not a death sentence, but *Endeavour's* cold-sleep vault had developed a cooling problem three centuries into the voyage. Of five hundred and twenty colonists only forty of us had woken up to board the shuttles, the rest were dehydrated mummies. In the eight grueling years of prelaunch training we had become a tight-knit community, just as we were supposed to. My Suzanne had been one of those who had died in transit . . . I blinked rapidly and pushed my thoughts to other things. Nothing but the best for us colonists—but the technologies required for interstellar travel were so advanced that the best was barely good enough. On *Endeavour* I had mourned; we all had. We'd had the luxury over the year spent in surveying the planet from orbit. Now we had to concentrate on survival.

Change the subject. "Maybe we could make some filters out of this lichen and some bags, keep the silt out in the first place."

"Not a bad idea. I'll put it on the list."

I nodded. Everyone had a list, and everyone's list was far too long as thirty-nine people struggled to do the work of five hundred. Calibre returned to his work and I went up to the greenhouses. I had meant just to go back to my flexplex to get some sleep, but I wasn't really that tired, despite the hours of hard physical labor on the plow.

The greenhouses were simple aluminum frameworks with heavy plastic troughs beneath transparent plastic roofing. Thousands of sprouts floated in rectangular grids of green foam. The roofing material hadn't been optimized for 37 Gem either, but that wasn't a bad thing. The merciless glare would fry most terrestrial plants, and the plastic cut enough of the UV out that plants could grow until Claire could breed varieties that would, hopefully, be able to resist it.

She was bent over her screen, watching long strings of GCAT arranged into gene codons and transcription groups flow past with intense concentration. She looked up as I came in. "You should put on a shirt, Mitchel, you're inviting carcinoma."

"It's too damn hot to wear a shirt. I wish the sun would set at last."

"Then wear a hat. And once the sun is down you'll be wishing to see it back up again pretty quickly."

"I can't argue with that." The endless, bitter night was worse than the day; the dark and the penetrating cold forced us to curtail most physical work and left too much time to think. I gestured to the screen. "You can actually read that stuff?"

"A lot of it, it's coming. I'm actually coding genes now. I don't know if they'll work."

I nodded. Claire was a biologist, not a genetic engineer, but none of the gene splicers had survived cold sleep. We were all learning new tricks. She was petite with big blue eyes and straight blonde hair and looked far too innocent and vulnerable to have committed the kind of crime that got you aboard a colony transport.

I looked past her to the ranks of carefully arranged seedlings. "What are you working on?"

"I'm trying to move the crassulacean acid metabolism out of *echinocactus* and into *Fragaria vesca* to make it more water efficient, so we can use less irrigation."

"The darkness is the big problem, that and the night freeze. We'll get rain. A meter a year by the probe reports, and we have the pumps."

"Darkness is not only *the* big problem, it's *a* big problem. Jumping the CAM complex is something I can get right in the first dozen tries, it exists complete in one species; it's just a matter of deleting and splicing. But there's no donor species I can use to adapt strawberries to a three-hundred-and-twenty-hour day. I'm going to have to create that from scratch." She waved to a bunch of young strawberry plants floating in a tray of nutrients. "The cold survival solution looks good though."

"Carrot antifreeze protein?"

She nodded. "I proved they're expressing it this morning. So far it hasn't killed them anyway. We'll see if they survive the cold when the sun is gone."

"I want to get myself adapted to the day. I should be asleep now, but my body still thinks it's noon."

Claire sighed. "I can get to sleep when the sun is up. It's waking up in the dark that I find hard."

I nodded. Without the daily cues of sunrise and sunset we were all running on our own rhythms; a third of us were asleep at any given time. "Any idea how you're going to work the diurnal cycle trick?"

"There's two approaches. One is to hijack the normal daily rhythm of the plant and extend it; the other is to take the seasonal cycle and shrink it. I like the seasonal idea better right now, but I'll have to see how it develops."

"Why better?"

"Hah! Two reasons: First, because it will work better. There's a lot more solar flux here, so there's a lot more energy available. I've done the math; a day here has close to the energy content of a high-latitude growing season, so it makes sense to do it that way, rather than have things try to survive the night."

"And the other reason?"

"Fresh strawberries all the time. Yum!" She smiled her electric smile at me. "So how goes the field?"

"Horst and I should have about ten acres for you to play with by darkfall."

"That's good. I've got some UV-resistant strains I want to try out. I've got the sequences done now. I can get the seeds made while it's dark and plant them for dawn. They won't make it through the next night, but if they make it to dusk that'll be a success. I want to get this CAM transfer done, a couple of different strain variants, by the next dusk, and then we can test them the next day too."

"Slow and steady. We've got thirty-three years of food." *Three years for five hundred and twenty, thirty-three years for forty.* We had a superabundance of everything, because so few of us had lived to land.

"I don't want to be eating sealed meals for the rest of my life. More to the point, if we want to have a colony, we need to be able to grow things here and eat them."

I nodded. "Barret and Yvonne are already paired up. The population is going to start growing soon."

"Neither of them were paired before. It's different . . ." She looked up, saw the pain I still tried to hide. "Well, you know. When you've lost someone."

She looked down and I put a hand on her shoulder. *Claire and . . .* for a moment I couldn't remember the name. *Denis, that's it.* A memory of a tall Parisian, always telling bad jokes. We were silent a long moment, and then she looked up again.

"Mitchel, I'm sorry . . ."

"No, it's okay." I hesitated. "Listen, I've got to get going. Come down to the field next shift and see what we've got for you."

"I will." She smiled, being strong.

I left her there and went to my own workstation. Like Claire my work here is only vaguely related to my field. I'm trained as a veterinarian, currently extending my skills to fill in for the loss of our biochemists in addition to looking after our livestock and clearing fields. I was trying to understand what made 37 Geminorum-IV's life-forms tick, specifically the nuts and bolts of their protein structure. I was working with a finely chopped soup of the lichen ground cover and an X-laser crystal diffractor. The immediate goal was to figure out if we could eat local plants or not, at least in principle. So far I had isolated twenty-six amino acids, all in levo form, which meant the answer was a carefully hedged maybe. What their cells used to carry genetic information was still a mystery. It wasn't DNA, that was all I could say.

Eventually I was tired enough that I couldn't think straight and went back to my flexplex. I needed sleep, I was exhausted, but my mind refused to cooperate. I lay in the semidark, thoughts churning. The world I had grown up in was gone, like Suzanne. In my mind I could still hear her voice, warm and bright, and my stomach knotted with emotion. Of course there was no way to fully test systems that would have to work for a thousand years. The death rate in cold sleep was supposed to be under one percent, but that was widely admitted to be just a guess. Still, colony slots were hotly competed for, a first-class education and future, the only downside was a one-way ticket off-world. You didn't have to be a convict to apply, but who else would make that choice? I had been a nineteen-year-old idiot with more brave than brains, first looking to make a reputation and then looking at a murder conviction for three people I killed in a bungled bank robbery. "Dangerous offender," the judge said, and the rest of my life was framed by a cell door. The colony program was a second chance, if you could make the grade. Ninety percent of colonist candidates washed out of the high-intensity, hermetically sealed training. In a lot of ways it was harder than prison, but toughing it out was a source of pride and Suzanne had kept me going when I would have given up.

I rolled over and pulled a towel off the floor and over my eyes to block the light filtering under the door. The colony program was a thousand years gone now, as lost as the Egyptian empire. *Endeavour* carried no equipment to communicate with Earth, there was no point. The turnaround time for messages home was a hundred and twelve years, and there was little assurance that there would be anyone listening on the other end anyway. The average life span of a human civilization was four hundred and thirty years before it finally succumbed to war, plague, resource exhaustion or, more usually, a combination of all three. So Dr. Barger had taught in Socioeconomics, though Modern Civilization, the only one that had moved beyond agrarian muscle power, remained a question mark. On one hand it was tremendously more capable than anything that had ever come before it; on the other hand it chewed through resources at an unheard-of rate. There was only one data point, so how long it would last was anyone's guess, but there had to be a limit, and at well over eight hundred years, depending on how you counted, it had already far outlasted anything that had come before it when we left. More important was the fact that, when it finally did crash, advanced civilization might never rise again. Earth had used up all its easy-to-reach resources, the surface mines of copper and tin, coal and iron, the shallow hydrocarbons. What was left took tremendous technology to extract, and without access to those resources, that technology could never be developed again once it was lost.

It was that overriding reality that prompted the interstellar colonization program. The odds were that

the civilization I had left was long gone. The languages would have mutated completely, the knowledge that it was even possible to travel between stars forgotten. No one on Earth would ever reclaim any of the astronomic sum invested in launching the colony ships. We were the ultimate act of faith, living message bottles cast adrift in the ocean of space. It had all seemed very noble at the time, but nobility wouldn't bring Suzanne back. She was as lost as my world was.

Eventually sleep came. Too soon someone was banging at my door. "Mitchel! Come quick, Vlad is dead, and Mona." It was Tony Wieil. He acted as chair for colony meetings, the closest thing we had to a leader.

I threw my clothes on and ran out. Tony was already gone, rounding up everyone who hadn't already gone down to the river. They were bringing the bodies up the bluff when I got there. Voices rose in a tangle, and I heard the word "murdered." I got the details from Jessica Difrancesco. She and Porter Comslake had been going down to the river to put an improvised filter on the pump inlet and heard something moving in the woods. They'd gone, cautiously, to investigate and found Mona facedown, her clothing in shreds in the mud by the water, Vlad was higher up, in a little clearing in the twisted shrubs that lined the riverbanks. What had killed Mona wasn't immediately clear, but the back of Vlad's head had been caved in by something big and hard. We carried them up and put them in the little flexplex infirmary that Genia Raslek ran when she wasn't helping the construction team.

"Town meeting." Tony's jaw was set. We gathered in a circle in the Town Square, which was the patch of dirt between the greenhouses, the storage cargo canopies and the flexplexes. Everyone's face was drawn and worried. When we'd quieted somewhat Tony started. "We're in trouble here. Genia is going to look at the bodies right after this and develop an opinion on that. In the meantime we need a plan."

Jayce Norden, our civil engineer, spoke up. "What do you mean, develop an opinion? They were murdered, plain as day. One of us is a killer." That drew a little nervous laughter. All of us were killers. You didn't get on a colony ship without a life sentence and you didn't get a life sentence without a body in your background. With three on my record I wasn't the mildest case, but I wasn't the worst either. Equally true, we'd all put that life behind us. If you offered kids the kind of support the colony program gave before they got into trouble, they probably never would.

"Could have been one of those clawed things we haven't seen yet," suggested Calibre Cadogan.

Jayce looked at him sharply. "It would have eaten them."

"We don't know that. Maybe we don't taste good to them." Cal's voice was deep and calm.

Before the argument could go any further, Tony interjected, "Look, we don't know right now. What we have to do is find out."

Jayce looked around and spread his hands. "Look at the evidence. Vlad's head was bashed in from behind. This wasn't an animal, and I don't see anyone else but us on this rock."

Tony turned to face him. "It could be an indigenous life-form. Maybe someone doesn't like us being here."

"We haven't seen any signs of civilization, or even intelligent life."

"This is a big planet and we know next to nothing about it. We've seen the tracks of something bigger than us. It doesn't take much intelligence to swing a rock." Tony held up a hand to forestall Jayce's reply. "Look, I'm not saying it isn't murder either, but let's not jump to that conclusion until we have to. Genia is going to do her autopsy, and then we'll know one way or the other. In the meantime, we have to make sure it doesn't happen again."

"How are we going to do that?" Syrene Suchuk asked, looking worried.

"The buddy system. From now on, we go around in pairs, at a minimum. You don't do anything without your buddy." He walked over to stand beside Genia. "I'd like everyone to grab a partner right now. Pick someone you're going to be working with."

There was some shuffling around, and then everyone was standing with someone except me. Thirty-seven of us, someone was bound to be left out. I went to stand with Horst and Claire. Tony continued. "Now this is serious. You absolutely must stay with your partner. First of all for your own safety. We really don't know what's behind this, whether it's one of us or some creature out there." He waved his hand to take in all of 37 Geminorum-IV beyond our small circle. "Second of all, your buddy is your alibi. If something does happen to someone, you'll be covering for each other."

There were looks around the circle, none of them comfortable. Despite Jayce's objections we were all happier with the theory that there was some dangerous creature out there, rather than one in our own midst.

"What about weapons?" Cal asked.

"I'm coming to that," Tony went on. "Getting the small arms unpacked is going to be our absolute priority." There were moans all around. By the brilliance of some long-dead planner back on Earth our weapons were packed deep in the third reentry shuttle. That wouldn't have been a problem if we'd had five hundred and twenty people doing the unloading, but we didn't. Tony held up his hands. "I know it's a lot of extra work but it has to be done." He turned to Calibre. "How fast can your group get the cargo canopies up?"

Cal shrugged his big shoulders. "By darkfall, or not long after, if we do nothing else, but we're going to be short on power through the darkness again if we don't get the solar foil and the fuel cells under control."

Tony nodded. "Jessica, what's the forecast?" Jessica was our space systems specialist, in charge of the network of orbiters that gave us eyes above, and therefore by default our meteorologist. She had also landed shuttle four, her only training being a simulator cobbled together on *Endeavour*.

She pushed her red hair out of her eyes. "We should have clear skies until darkfall, then rain in the early night. That's the normal pattern and we have no indication it'll be any different this time."

Tony nodded. "Well, my recommendation is, all of us work on unloading shuttle three until we've got our weapons out. I know it's a procedure violation to unload equipment that won't be protected from the elements, but you've heard the predicted weather. We'll have time to get a canopy up after we're loaded. Any other thoughts from the floor?"

"Two." Chris Aspfo, our carbon chemist. "Get the satellites to photo this area on every pass, maximum resolution. Second, get the flitters unpacked as well, and fly patrols. If there are dangerous creatures out there, we want to know what we're dealing with."

There were murmurs of assent. "Shall we vote on it then?" Tony asked.

We voted on each suggestion separately. They all passed by healthy margins, though they meant a lot of extra work for everyone. Survival came first. We spent the next fifty hours in two backbreaking shifts to get all the gear out of shuttle three, and then everyone strapped on a side arm. The heavier weapons were cached in the flexplex we used as our colony office.

The shadows were long by then—37 Gem took forever to set—but the sky was beautiful in the west. When we were done I helped Horst and Claire move their belongings into my flexplex. I had grown used to my privacy and wasn't entirely happy with the move, but I found the company comforting. After that I took them down to the big cargo canopy we called the Barn and gave our five Shires and the other animals their one-per-day checkup. It was a real judgement call to decide which animals to bring from Earth, and of those which to release into the environment. We had some time to make up our minds with the smaller ones, like mice and birds, who were still in cold sleep in the shuttles. The larger animals like pigs and cows had been in the main cold sleep vaults on *Endeavour*, and so we had to make the choice to introduce them before we reentered. In the event, we'd brought them all. It was really no decision at all, although the mission plan called for us to make one. That was really just a political sop to the groups back on Earth who'd been worried that large scale introductions might destroy the native biome on our new planet. They had the luxury of caring about such abstractions, but we colonists didn't.

We were here to live, not preserve an alien bioheritage, and the odds against us were steep enough as it was.

I was used to doing the work on my own, but it was good to have others know the basics of my job. Dixie had thrown a shoe and I showed Horst and Claire how to cast a new one from plasteel resin. It had the consistency of warm Jell-O, but it set up steel-hard in minutes. The important thing is not to get any on yourself, because it won't come off without taking your skin with it.

They got the technique down promptly, but there was a trade-off there too. We were being less efficient with three specialists doing a job that one could handle. After that we went back to the greenhouse lab and started working on our respective projects. My task was more protein disassembly with the native flora. I needed to prove two things in order to know that there might, at least in theory, be local foods we could eat. The first was that life here contained at least the ten essential amino acids that humans require but that we can't synthesize for ourselves, and preferably the complete set of twenty specified by our genetic code. The second was to prove that none of the other amino acids present was actually toxic in quantity. Later on I'd worry about vitamins A through E in all their various forms, but I was less hopeful that we'd manage to find those. Amino acids are formed by natural processes everywhere from deep space to deep oceans. Vitamins are formed by biological processes alone, if you don't count human chemistry, and the chance of 37 Gem-IV sponsoring life that had the same biological processes as life on Earth was essentially zero. Witness whatever it used to encode genetic information instead of DNA. Different chemicals doing the same job.

Syrene called us away to be there as Tony presided over a brief memorial service for Vlad and Mona. It felt strange to move from the routine of colony life to the raw emotions of a funeral, with the knowledge in the back of my brain that I'd return to work when it was over as if nothing had happened. We were going to bury them in a little plot by the bluff and we held the service there, though Genia still had their bodies in the infirmary. After that Horst and Claire and I found it hard to concentrate when we got back to the lab. I suggested that we all go down to the field and do some clearing and plowing with the last of the sunlight. Hard physical work has a way of clearing the head that more cerebral engagements don't. They agreed and we trooped down. It was unusual for the three of us to work together on the field, if only because I generally preferred to work alone and Claire had to concentrate on getting her seeds built. We took two teams and two plows, determined to get the job done so we could plant when the sun came back. Every time I hauled another rock to the growing pile at the edge of the furrows I found myself scanning the line of tangled shrubbery that lined the riverbank. I couldn't shake the feeling that something was watching us, waiting its opportunity. 37 Gem-IV was a big planet, and an old one. There could be anything out there. I couldn't get my mind off those big tracks. It was a predator, whatever it was; anyone who knew anything about animals could tell you that, and it was a large one. My side arm was a reassuring weight against my hip.

\* \* \*

We finished the shift without incident and led the teams back up to the barn. It was well and truly dark by the time we were done, and the air was getting cool. We trooped back to our flexplex with nothing more in mind than a meal and sleep.

Genia intercepted us as we came through the Town Square. "Can I grab you for a second, Mitchel?"

"Sure." Claire and Horst started to come but Claire stopped them. "Just Mitchel, it's a medical thing."

They exchanged glances, already the buddy system rule wasn't holding up. "It's okay." I told them. "Warm me up a meal."

They went off and Genia took me into her infirmary. "Where's Tony?" I asked.

"He's organizing the cargo storage. There's not a lot of point in making him stay in here all day."

I nodded. *Stay with your buddy* might work on a school field trip, but it wasn't particularly practical in our circumstances. The rule wasn't going to last long.

She was opening up the foam blocks she'd made into an improvised morgue slab. "I'd like your

opinion on the cause of death here." Mona was there, naked and stiff, her belly and limbs distended, her skin ghastly pale on her front, bruised liver red underneath her where her blood had pooled. Flexible hoses running with chilled water kept the temperatures low enough to prevent decomposition, but the sight wasn't pleasing, nor was the smell, although it was thankfully faint.

"I'm a vet . . ." I protested.

"You're also the only other trained doctor here. I'm not a pathologist myself, but I really need to see if you find what I find. I want to be sure before I say anything."

"What have you got?"

"I don't want to prejudice your opinion."

I nodded, moving closer, mentally moving myself back to anatomy classes where I'd dissected all manner of living things. The difference was that they had been animals, and this was a human, and had been a friend. I swallowed hard and got on with it, speaking clearly to describe my findings.

"Okay, she seems largely intact, no obvious wounds or trauma on first inspection." I moved up to her head and went on. "There's mud on her face, some in her nostrils." I noticed something, looked closer, looked up at Genia. "Did you do any dissection?"

She shook her head. "No."

"Well, this is significant then. There's a sharp-edged wound running from over her ear to the back of her neck." I looked closer. "Not a lot of bleeding. I'd guess it was done after she was dead."

Genia nodded. "Likely."

I looked further, something funny about her face beneath the dried-on mud . . . it was swollen and blotchy, just one big bruise. I looked further. Mona was still wearing her locket with Perrin Classten's picture in it. Perrin had been her lifemate, and one of the ones who never woke up from cold sleep. At the side of her neck there were bruises, and a clear impression of the locket's chain. I pulled an eyelid up. Her eyes were solid red with burnt blood vessels. I felt horror at the sight, though I'd been expecting it. With that evidence I could interpret the markings on her neck as strangulation marks. I stood up. "She was choked to death."

Genia nodded again. "That's my opinion too."

I put down the ophthalmoscope shakily. "Do I need to look further?"

"I'll save you the trouble." She gestured to her microscope. "Here's the slide of her vaginal swab."

I looked, saw spermatozoa. Human spermatozoa. I felt the blood draining from my face. "She was raped. It was one of us, and she was raped and killed."

Genia nodded. "Also, while her clothes were badly ripped up, the crotch of her pants was cut, not torn."

I stared at the wall where Genia had a laminated poster of a human body, half showing the muscle structure, the other half showing the skeleton. "Cheryl too . . ."

"That would be my bet."

I looked back at Genia. "So my guess is, whoever did this ambushed her from behind. The river is far enough away that no one would hear her except by accident, if she even has a chance to scream before he gets his hands on her throat. He chokes her and rapes her, either before or after she's dead." I couldn't believe what I was saying, it seemed unreal, distant somehow, as if I was reading a crime novel in which I had somehow become a character. "And the river is a great place to get rid of the evidence. Except Vlad surprises him at some point." I looked to the other improvised slab. "Did he have any wounds other than the skull fracture?"

"Not that I found."

"So he probably didn't catch him in the act, maybe just afterward. Maybe the killer convinces Vlad that Genia's had an accident, then hits him with a rock when he leans down to help her."

"So why not put the bodies in the river?"

"Lack of time? Unlikely. Too rattled? Possible. Maybe he was interrupted again." I remembered the way I'd felt when I went into a bank with my submachine gun hidden under my jacket, adrenaline pumping. I'd convinced myself that everything was under control, and the first two times I turned out to be right. I knew where the cameras were looking and stayed out of their way. If I touched something, I took it with me. I knew my route in and my route out, had my stash prepared, had an alibi and never needed it. I told myself I was good, but the third time a customer made a move and I turned and fired. Suddenly everyone was screaming and running and my carefully prepared plan fell apart. I made about a dozen critical mistakes in the next three minutes and every single one of them turned up as evidence against me. Yah, I knew what it was to have a crime go sour in the middle. Whoever our killer was had just learned the same lesson. Somehow the experience didn't stop me from robbing another bank, even though I knew the alert was out and they were looking for me. Some people learn slow. The second time they caught me red-handed. I could have shot my way out of that one too, and probably would have died in the attempt. What stopped me wasn't fear though, it was an inability to pull the trigger. The vision of my bullets slamming into a completely innocent clerk paralyzed me. I should never have gone out, should have just stayed hidden until the police shifted their attention elsewhere, although come to think of it, my life's trajectory would still have taken me to 37 Geminorum.

"We're living with a psychopath." Genia's voice was musing.

I nodded. I didn't like the knowledge that I'd ended someone's life, though you might not think that matters to someone willing to open fire in a crowded building. I had been a stupid punk, but I wasn't a psychopath. We all had records in the colony program, but they were supposed to winnow the actively dangerous from those who had simply messed up very badly. I twisted my finger up to the sky. Evidently they'd messed up as badly as we had, but there wasn't much I could say about that.

What would our killer learn from his experience? So far, only that he could get away with it. If we didn't stop him, there'd be more bodies. There was more at stake here than the already weighty issue of murder. On a personal level I wouldn't be eager to trade places with Mona or Cheryl for the good of the colony, but the stark biological fact was, the way to our colony's future was through the wombs of our women. As a group we could afford to lose men much more than women, and a sexual predator wouldn't stop at the two he'd already killed. We were all on long-term contraceptives, and would be for the foreseeable future, but the ultimate goal was to create a thriving community that would carry on and ultimately populate this world. There would be little point to building anything if humanity on 37 Gem-IV was doomed to extinction in our own lifetimes.

Little point to living, in fact.

"Are you okay Mitchel?" Genia was looking down at me, worry on her face.

"Yah, it's just . . ." Just a lot to take in all at once. Words didn't cover it.

"I know. I've been agonizing over how to handle this since I figured it out."

"Who else knows about this?"

"Only Tony."

"Okay." I stood up, professional again. "Let's keep it that way for now. The last thing we want is for the killer to know we're on to him until we can prove who it is."

She nodded. "How are we going to do that?"

"I don't know." I pondered. "Look over the crime scene, see what we can learn."

We dressed warmly and hunted up some flashlights. I looked up forensic procedures on the colony's universal library while she filled the flashlight's fuel cells. I had high hopes; there is an amazing amount you can learn from footprints, from the arrangement of the bodies, from bent underbrush. Footprints especially were key, I thought. Even supposedly identical new shoes have unique markings on the soles, and wear only increases their distinctiveness. Identifying the killer could be as simple as making a cast of



his footprints and then matching them against everyone in the colony. With that in mind I went down to the barn and got some plasteel resin to take casts with. We went down the bluff beneath a sky frosted with a warped zodiac. Fifty-six light-years is enough to make a big difference to the arrangement of the celestial sphere, not enough to completely erase the familiar constellations.

We followed the path past our little cleared and plowed field and took the fork down to the river where the pump hose went in. It took a while to locate the crime scene, which was some fifty meters off the track, but we found everyone's footprints and followed the path. When we got there my heart fell. The clues we needed might be there all right, but most of the colony had come down to the site after the news. There were hundreds of footprints, the undergrowth was completely trampled. There was an impression in the soft mud where Mona's body had been, but it too was full of footprints. I could only tell where Vlad had been by the tramlings that led to the spot.

"Quite a mess." Genia mirrored my thoughts.

"Yah, I don't know if we'll learn anything here."

"We might as well look around since we've come."

I nodded. At least the relative locations of the bodies might tell us something. I walked to where Mona was found and looked back up to the other site where Vlad had been, then climbed up there and looked back down to the river. I swung my flashlight around, taking in the area. It was dense with the twisting shrubs, but there was a relatively clear path leading to the beaten trail that ran from the riverbank and the pump hose back up past the field to the bluff. It was ten meters from there to the muddy bank where Mona had been found, the shortest path to the river.

"Hey, look at this." Genia had been poking around in the shrubs behind me and was holding up a fist-sized rock. "I think we have our murder weapon."

"Excellent." I went over and looked, saw the blood and hair caked on it.

We looked around the crime scene again, and no doubt a trained forensic investigator would have come away with a wealth of information. I felt I'd come away with a bunch of picture puzzle pieces all from different puzzles. How could we attach a face to all this? I didn't know.

"How long were they dead when you got them?" I asked Genia, mostly because it was all I could think of to ask.

"They were still warm, which means nothing since the ambient temperature wasn't far off a hundred then. Rigor mortis hadn't set in though, not at all. I'd say, no more than half an hour."

I nodded and looked around some more. Eventually the chill got to us and we clambered back up the bluff and shut down the infirmary. I went back to my flexplex. Horst and Claire were already asleep, and I settled down and shut off the lights, but my brain wouldn't stop working. Eventually I gave up and clicked on my universal library to do some reading on the nature of the crime.

Sexual serial killers have always been with us, I learned. There is a human tendency, I suppose, to romanticize the past as a better, simpler time. And yet, tales of vampires and demons who would take villagers in the night and slaughter them in unspeakable rites are ancient, and universal. In modern retrospect we can see in those stories an attempt to explain a horrible reality that went beyond the ability of the witnesses to understand, just as the black death and cholera were explained as a miasma that traveled on the night air. A body is found, raped and horribly mutilated, and then another, and another. It must be a vampire. What else but some innately evil creature would do such a thing? Nobody wants to believe it might be the gentle and popular schoolmaster. But sometimes, even before forensic investigation became a scientific discipline, the schoolmaster is caught. Then the stories are of transformations, werewolves who walk among us by day and feast on our flesh by night. Again, the world is full of such tales. Even confronted with a perfectly ordinary culprit, people instinctively reject the notion that a person they have known and liked could do such things. To ascribe supernatural causation to the dark side of human nature is to avoid the admission that, perhaps, you too have the capacity to be that insane.

I know better than that. I opened up with a submachine gun in a crowded bank. I killed without even

thinking about it, my mind was on a different plane altogether for those mad minutes. That I was later devastated by what I had done didn't change the reality that, in the moment, I had killed someone. The dead can't be brought back to life, and the seeds of insanity are in all of us.

And yet, there is still a difference, an important difference, between killing in rage or panic and killing for sexual pleasure. Rage and panic are, after all, relatively rare emotional states for most of us. I put myself in a position where bad outcomes were highly probable, but they weren't inevitable. Sexual desire, on the other hand, is a constant, and if your fantasies revolve around the violent death of your partner, the collision between desire and reality is inevitable. Serial killers don't kill because they have to, they kill because they like it. A lot.

I read more, and started making notes. They are invariably psychopaths, usually portrayed as more intelligent than they really are; it's not really that hard to kill someone. They are often charming and manipulative, plausible liars, slick operators, able to gain the confidence of both their victims and the authorities. They show surface success, but their lives are usually devoid of real accomplishment, if only because they spend so much time in their fantasy worlds. They will often insert themselves into their own investigation, and they'll often taunt the police with notes or clues. Frequently they revisit the scene of the crime to vicariously relive the event, and many of them keep souvenirs, jewelry items, articles of clothing, even body parts. One I read of collected toes, another made a necklace out of his victim's teeth. Usually there is a traumatic event, what investigators call a precipitating stressor, which triggers the crime. We'd all had more than enough stress and loss since coming out of cold sleep. Ninety percent of them are male and ten percent female. We could be sure of our target's gender at least—we had his sperm.

I started reading about crime scene analysis and the split between signature and modus operandi. MO was simply the way the crime got committed, the procedure the criminal went through to get what he wanted. Signature was about what he got out of the crime. Say you have three burglaries. In one the back door is jimmied and jewelry is stolen. In the second the back door is jimmied and family photographs are missing. In the third a rear window is broken and cash is gone. Which of these three go together, which is the odd man out? If you answered one and two you're wrong, despite the identical method of entry. One and three go together, because in both cases the burglar is just looking for valuables. The second crime is more serious, even though the value of stolen goods is lower. The criminal is after something personal, and the odds are high he'll be back.

I switched off the light again, but again I couldn't sleep. After tossing and turning for what seemed like hours I got back up and got dressed. Outside there were lights on under one of the cargo canopies, where Cal's team was back to working on the pumps. The solar foil provided power to crack water for hydrogen, which we stored in the tanks on the shuttles. The hydrogen ran fuel cells in the night to give us heat and light. We couldn't crack water in the dark, but we needed to keep the pumps going at a minimum level as the temperature fell. The water hose had a heater core, but if the water didn't keep moving around it, the lines would freeze up and split. I hiked back down the bluff with my flashlight. Overhead the wind had changed and the constellations were gone as cloud cover built up. The onset of darkness always brought rain as the cool, dry, night air moved in and forced the humid air that hung in the river valley to rise until its moisture condensed into towering thunderheads.

The crime scene hadn't changed, but my way of looking at it had. I went to the pump first, a two-foot cylinder on the bank humming quietly to itself. It was the focus, the starting point for this sordid little play. It was unlikely the criminal had carried the bodies any distance in the daylight, so the victims must have come on their own. So what motivated Mona? She was a mechtech, but the fuel cells were her baby, not the pumps. Still, she was qualified, and no one was more overworked than Cal. So someone says, "Come and look at the river pump, there's a problem." That someone says it because his motivation is to get Mona alone, and there's no more isolated point in our little world than the riverbed. Anything beyond that is wild country. Something caught my eye in the mud, a water sample bottle. I picked it up and looked at it.

Then what? Mona comes, the last decision she'll ever make. There's no reason she shouldn't; in our

tiny little community we all have faith in each other. And then she's at the pump, nothing wrong with it after all. Is she tricked into taking that short walk off the trail into the shrubs, or is she forced? She must have been tricked. It wouldn't be impossible to force her, but why? The criminal had her trust, and manipulation is his game. I dug a scrap of paper out of my pocket, carefully wrapped the water sample bottle in it, and tucked it away. Hopefully that would prevent any fingerprints from being rubbed off. If I'd been thinking I would have brought some plastic bags to keep the evidence fresh, but I'm a rank beginner at this. I hoped I'd never become an expert.

So the perpetrator pretends to hear something, or see something, and she goes with him. I got up and walked the fifty meters through the alien shrubs to the rocks where we'd found Vlad's body and then down to the bank where we'd found Mona. And then when they're far enough away that he feels comfortable, not so far that she'll question where they're going, he just puts his hands on her throat from behind and the pretense is over. She tries to pry them off of course. I thought about that and made a note. We needed to check everyone for injuries to their hands. She gets free for a second, he catches her and her clothing is torn, and at some point, when she's unconscious or already dead, he cuts her pants open and rapes her. That takes some time, and then what?

Something was wrong. He wouldn't rape her in the mud, he'd wind up covered in it, and he's smart enough not to generate such obvious evidence. And it's a bit of a scramble down the bank to the river. No, she wasn't killed where we found her, she was killed up where we found Vlad. I went back up the bank to that point. Suddenly I understood—the little clearing was perfect, well hidden, the undergrowth thick and soft, no discomfort for his knees while he's raping her.

And then what? Then he hauls her body down the bank, and now that I looked I could see the drag marks on the edge of the rock, or maybe they'd been caused when her body was hauled back up. I made another note to put forward a rule at the next colony meeting that crime scenes would be left undisturbed until they could be examined. So, not proven, but assume it's true. He drags her down there and puts her in the river and the evidence just floats away. Vanished the way Cheryl had.

Except Mona never made it to the river. I went back down to the bank and now the reason was clear. The pump was downstream. Before she floats off to oblivion she's going to float right past it, and at that very moment Vlad arrives at the river to take water samples. I put my hand in my pocket to the little water sample bottle and made another note to fingerprint it and confirm that it was Vlad who'd left it there.

So Vlad doesn't know what's going on—the fact that he was going about his business with the sample bottle proves that, but our perpetrator hears him shut the pump down, and he doesn't know that Vlad hasn't heard something, Mona's managed to make some noise before she dies. He gets scared and starts acting on impulse, and this is where the crime starts to unravel. I remembered my own experience in the bank, twelve years ago now. The urge is to get the situation back under control, by whatever means are necessary. Instinct starts to override thought.

So Vlad is big enough to put up serious resistance, and our guy doesn't want to deal with that. So another trick—he calls out for help. Vlad comes running. I climbed back up to the clearing. The perpetrator points out Mona's body, tells Vlad she's collapsed. Vlad turns to look, and bang, a rock is grabbed up and slammed down. The crime is over. I looked around with the flashlight for a bit and found a hollow space in the ground, just the right size for the rock Genia had found. Bingo! Not exactly a Sherlock Holmes piece of deduction, but the first piece of evidence I'd theorized first and found later.

And why then didn't he put both bodies in the river? Because someone *else* is coming, Jessica and Porter. Neither of them had any reason to be down by the river at all, that's a question I'll have to come back to. Their reasons don't matter so much as the killer's thought processes as they arrived. He can't handle more than one at a time with no weapon better than a rock. So then what? He runs, not directly back to the trail but through the bushes, paralleling the path until he gets up out of the shrubs into the clearer area where the plowed field is. Genia had said the bodies had been there no more than an hour. I was willing to bet they were there less than five minutes.

Except why would he run and not simply hide and wait in silence? Because they're coming toward him, moving off the trail towards the same clearing he's in for the same reason—it's easily accessible, and they need privacy. Were they paired? The claim that they'd heard something was to cover up their rendezvous. So he has to run and then, only after they've turned off the trail into the shrubs, might Porter and Jessica hear something as he runs away. They reach the clearing and find the bodies, but they don't know that the culprit has just left. I went to the edge of the clearing away from the river and looked carefully until I finally found some bent and broken branches. Adrenaline shot through me. I was definitely on the trail now, literally and figuratively. I moved carefully, shining my light everywhere. Sometimes there's no sign at all, but always in a few meters I find something, branches bent, the lichenlike ground cover compressed. It takes a long time, and I think while I search.

He's running through the underbrush, trying to be quiet, and he's planning as he goes. Does he know the bodies have already been found, or is he figuring out how to get back to the dump site and get them into the river? No, Jessica and Porter might have heard the sound of him moving through the brush and come to investigate. If he'd thought he could get away with it, he would have stopped moving, waited silently for them to leave, and then come back later. He was scared, and he thought they were on to him. It must have generated a decent amount of noise hauling Mona down that bank. So when they start moving toward him he knows he's busted. As he's running he's thinking about his alibi, how he's going to spin the evidence. That's something to look for. We knew the time of death with high precision now, so we can interview everyone in the colony about what they were doing at that instant. The problem is, lots of us are working on our own, spread out all over the place, and everyone is going on their own circadian rhythm. Half the colony won't have an alibi.

I can cross that bridge when I come to it. The faint trail comes out at the bottom of the field, right where the track runs past and down to the river and the pump. And there, perfectly framed in my flashlight, in a low spot where the ground cover ends and the field begins, was an unmistakable footprint. There are many footprints nearby where the track was beaten down, but this one absolutely must be the perpetrator's, it's the only one coming out of the bush line. I looked closer and saw how the ball of the foot was well defined, how the heel was less so, how the ridges of the tread pattern were pushed backwards. He was running. Exultation swelled in my chest; all I had to do was make a resin cast, and we had him.

Of course I'd left the plasteel back in my flexplex. I thought about it for a moment, then grabbed a bunch of branches off some shrubs and put them in a little pile on the trail to mark the place. That done I trudged back to get the resin. I was halfway up the bluff when lightning flashed. The thunder was right on top of it, and instants later the rain came, pelting down in droplets big enough to hurt. In seconds I was soaked, but I didn't care. I was running then, stumbling on stones, sprinting to our flexplex. I grabbed the resin and sprinted back, nearly breaking my neck on the newly slick trail down the bluff. The round-trip was maybe fifteen minutes while the lightning lit up the sky with surreal intensity and the thunder echoed over the landscape. Right up until I got there I hoped I might salvage the evidence, but my heart sank. The low spot was now a puddle, and a steady stream was running through it and then down the trail toward the pump. The vital print was under two inches of water, already eroded and distorted. I tried to take a cast anyway, but plasteel is hydrophobic before it sets and the water prevented it from taking a pattern. My shoulders sagged, and I turned around to trudge back up the bluff one last time. Horst and Claire were both still fast asleep when I got back to the flexplex. I stripped and fell into my bunk, still soaked to the skin and not caring. The last thing I remembered was the rain drumming on the structure's outer skin, and then I was dead to the world.

"Mitchel!" Claire was shaking me. I came to groggily and went through the motions of breakfast. We've been eating sealed meals for a year now. We had a dozen varieties each of breakfast, lunch and supper and I was heartily sick of all of them. Horst and Claire looked at me questioningly, but said nothing. They knew I'd been working with Genia on the autopsy, they probably knew I'd been running on minimum sleep. I wanted to tell them what I'd found, but I couldn't. I looked at Horst. He was reliable, hardworking, good-humored. I couldn't picture him doing what had been done to Mona, nor killing Vlad

in cold blood. The three of us working on the agriculture project had become close, even before I'd moved in with them. Surely I could trust them.

Psychopaths are charming and manipulative, I had to remember that. I couldn't picture any of the colony doing it, and I thought I knew them all quite well, but someone had. I just had to find out who, and until I did, I couldn't share what I knew with anyone but Genia. She and I, through her autopsy and my confirmation of her findings, were the de facto investigators on the case. It put distance between me and my new housemates, and I didn't like it.

And in the meantime, I had to put in at least a token amount of work in the greenhouse and on the field. We trooped in under the artificial lighting and I sat down at my workstation, staring blankly at the amino acid analysis I had run last. I couldn't bring myself to focus. The rain had stopped, and it was chilly. Syrene and her group were hauling the flitters in their packing into the newly erected hangar canopy, working under four big floodlights. Through the plastic walls I could see their blurry outlines, as though I was looking at another world. We had four of the flitters, big colorful butterflies, flimsy looking but tough and very fuel-efficient. Each was capable of carrying two people at up to eighty miles an hour. I looked away from the distraction and pounded my fist on the desk. I'd been so pleased with my detective work the previous night, and the single damning piece of evidence I'd turned up had been rendered useless right in front of me. It wasn't anyone's fault, least of all my own. The rain rains. That didn't make me feel any better.

It did, however, remind me of the other piece of evidence I'd found; Vlad's water test bottle. I took it out of my pocket. It wasn't likely to be the key to anything, but I'd have to check it. I looked up forensics on the universal library to find out the best way to lift fingerprints. There were a variety of extremely sophisticated techniques that would get a fingerprint off almost any surface, but all of them required equipment we didn't have. The best I could do was to use powdered talc.

And of course I'd have to get Genia to take a set of prints off Vlad to verify they were his. I pushed myself away from my desk and stood up. Horst was tending the hydroponics tanks, Claire was busy running another gene scan on the sequencer, her display blurry with lines and lines of GCAT. It was a familiar routine I wished I was still part of, instead of going to get fingerprints from a corpse.

I slapped my forehead. Fingerprints! Gene scan! I'd been wasting my time blundering around in the dark and the rain when the answer was sitting right in front of me. Everyone has their own DNA, forty-six chromosomes in twenty-three pairs in every cell of their body, in a pattern unique in the universe save only for an identical twin. Sperm are a little different, because they only carry half of each chromosome pair, expecting to mate up with the other half in the egg to form the complete genome of a new offspring, exactly half of either parent. But for every sperm the genetic pie is sliced in half on a different line, get enough of them together and they form the same genetic fingerprint as any other cell in the donor's body.

Why hadn't I thought of that when I was running around trying to make a crude duplicate of a footprint? Because I had gotten used to working with amino acids and couldn't work with the genetic code of my alien plants. Because I wasn't a trained forensic investigator. Because I was tired and stressed and most of all, because I was, despite all my efforts to the contrary, plainly stupid from time to time. "Claire," I asked. "Can you do a gene scan on a person?"

"Sure, if you need me to." Her eyes showed concern. She knew where I was going, in outline if not in detail.

"Could you get a gene scan of everyone in the colony?"

"It depends what you want to know about them. Some factors are easy to link to their genes, some are quite complex."

"I just need a unique genetic fingerprint for everyone here."

"Yah, I can do that with a few restriction enzymes. It won't give you the actual genome, but everyone's will be different."

"That's all I need."

"You have some evidence from the autopsy then?"

I nodded. She turned back to her console. "I'll get set up to run it." Her voice was grim.

I found Genia and told her what I'd found last night, which, even if it gave no new evidence, at least supported the theory that we were dealing with serial rape-murder, and told her that Claire could do a gene scan. She felt as brain-frozen as I did over not thinking of DNA fingerprinting either. I carefully looked in the other direction while she took another swab from Mona's body. It's not that I'm squeamish, but I chose vet medicine over human medicine for a reason.

She took the swab over to Claire while I found Tony. He was over with Syrene, helping with the flitters.

I took him to one side. Everyone else studiously avoided noticing that I'd done it, which only made it obvious that they had. The tension in our little group was high.

"I need you to call a town meeting. Right now."

His face showed concern. "Why?"

"Genia's found something, the town needs to know about it." It was half-evasive, avoiding my own participation in the investigation, and avoiding the details of what we'd figured out. I was becoming increasingly isolated by secrecy, and I couldn't even tell what I should or should not be telling people.

It wasn't enough to satisfy Tony. "Look," he said, his voice carefully reasonable. "If I'm going to disrupt everyone's work, I have to have a good reason."

I thought about it for a moment. "Mona and Vlad were definitely murdered. Mona was raped as well. Claire is going to do a gene scan on the whole colony."

Tony's face showed deep concern. "Are you sure about this? Sure enough to stop work?"

I looked at him in disbelief. "We have a serial killer on our hands here. Yes, I'm sure." For a moment I debated telling him of my findings, but they had been completely superseded by the potential of a gene scan so there was no point. "Yes, I think it's worth pulling everyone in."

My voice had an edge to it and he picked up on it. "Yes, yes of course. There's just a lot to balance here, you understand. Everyone's overloaded as it is, and I have to look at the big picture."

I nodded. "Thirty minutes in the cargo canopy, okay?"

"The hangar canopy is warmer, and it has lights."

"Even better." I left him there, calling everyone on their coms, and went back to the greenhouse. Claire and Genia were there, with Horst looking over their shoulders, running the swab sample through polymerase chain reaction amplification. The criminal's DNA was a gooey white blob in the bottom of the test tube. I watched as she put it in the sequencer, and five minutes later long strings of genetic code started flowing over the screen.

Claire smiled. "I wasn't sure if we'd get it or not. What we'll have when we're done here is a combination of Mona's DNA and the killer's. Then I'm going to run another one with just Mona's and we'll subtract it out. There'll still be some cross contamination, but since there are only seventeen possible suspects, the chance of any ambiguity in the result is basically zero.

"Excellent." I put my hand on her shoulder. "Can this run by itself while we have the town meeting?"

"Do I need to be there?"

"We should all be there."

"Okay." We went out, left the sequencer humming quietly to itself.

Tony came by as we went out. "Will hair clippings do to get DNA, Claire? They seem easiest, we don't want anyone having an excuse to object."

She nodded. "They'll be perfect."

"Okay, I'll go get some scissors, and some plastic bags."

We went to the hangar canopy and waited, watching Syrene's group putting together the flitters while the other colonists trickled in from whatever jobs we'd interrupted them in the middle of. Quite a few came by themselves. Tony's buddy system was a good idea, but it simply wasn't practical on a full-time basis when everyone had so much to get done. Their faces were questioning and the tension was palpable, but nobody actually asked what the assembly was all about.

When everyone was present the flitter gang downed tools and found somewhere to sit. Tony went to the front of the group. "As you know, Genia has been doing the autopsy on Vlad and Mona. Now Mitchel has something to tell you all about it."

Me? I had thought Tony would handle the whole thing, as he usually did. Tony retreated to the edge of the circle and I stepped forward, not entirely comfortably. "Genia asked me to confirm her autopsy results, and I've done that. We've found that they were both killed, murdered I mean, and Mona was raped. We suspect, though we have no proof, that the same thing happened to Cheryl."

"What's your evidence?" Calibre Cadogan's deep Welsh brogue.

"She died by strangulation, with genital trauma and sperm in her vagina."

"That doesn't prove rape."

"Was anyone paired with Mona?" I held my arms wide, inviting counterproof. We all knew she'd stayed single, her locket with Perrin's picture was evidence enough of that.

Tony stepped forward and raised a hand before anyone could answer. "The physical evidence isn't important. We have the killer's DNA from Mona's body. We're going to take a hair sample from everyone here and Claire is going to run a gene scan on all of us."

As he said it I was suddenly aware that everyone was still carrying a side arm. When the killer realized he was cornered he might well decide to start shooting. I took a step backwards, let my hand drop casually to my side. Tony looked around the circle, meeting everyone's eyes. "How long will it take, Claire?"

"It takes about five hours for a run, and I can run twenty in parallel at once."

"Good. We've got seventeen men, so one batch will do it."

"No, I'm testing the women too," Claire said. People looked at her. "This isn't a men against women thing, this is all of us against a psychopath. Two batches."

There were dissenting murmurs around the room at that, but nobody objected out loud. It would take twice as long for no apparent reason, but she was right. The tension in our normally congenial group was palpable, eyes staring accusingly, or sliding away to stare into the distance. If we got split along gender lines, the rifts might never heal.

Tony beckoned Claire and Genia. "We're going to do this in full view of everyone, then we're going to wait here for the results," he said. He had a cloth sample bag full of small plastic bags and a pair of scissors, a marker pen and a clipboard with all our names on it. He gave the clipboard to Genia and the marker pen to Claire. We all watched as he solemnly reached up, clipped a lock of his own wavy, dark brown hair, sealed it in a bag and wrote his name on it. He gave the scissors to Claire, while Genia marked his name off on the clipboard. The three of them came to each of us in turn, took a hair sample, sealed it, labeled it and put it back into Tony's bag. Finally they were done.

Claire took Genia out into the darkness with her to help with the scans. I sat beside Horst in silence, feeling isolated from the community by virtue of the investigation and ejected from the investigation by virtue of my gender. Nobody was particularly comfortable, and I remained acutely aware that everyone was armed. I thought Tony might have made everyone give up their weapons, now that we knew we weren't facing some alien predator but a purely human one, but he didn't. I didn't suggest it; I was uncomfortable enough being thrust into the position of policing my peers, I wasn't about to start issuing orders too, even indirectly. The group mood was hostile, and that hostility was going to land somewhere.

I didn't want it to be on me.

It was a long and unpleasant wait. Occasionally hushed conversations started here and there, but for the most part we were silent. The men were looking at each other, sizing each other up in case it came to a fight, and the women were clustering together, their body language tight and defensive. We had grown to trust each other implicitly, knew each other intimately, and now that trust had been violated. Unless we could purge our community of the poison that had infected it, the colony would fall apart.

And what was the killer thinking? He had to know he'd be caught. He was planning something. My eyes kept going to people's side arms. I considered speaking to Tony about it, but didn't because it would look conspiratorial. The killer couldn't shoot everyone before we could get him. He had to know that, so his plan had to be something else.

At around the three-hour mark Cal stood up and said, "I think everyone should put their side arms away, before we get the results back."

I breathed out in relief; I hadn't been the only one thinking of the danger they now represented to us. Tony agreed with him, and Syrene got one of the rigid boxes the flitter motors had come in and we all filed past and put our weapons in it. Syrene and Jessica sat on the box. Nobody objected to it, and the reality behind the action was clear, just as it was behind allowing Claire and Genia to leave to do the gene scan while the rest of us waited. Women could be trusted on this issue and men couldn't. The gender split was happening, had already happened. Tony arranged bathroom breaks in groups of no less than eight.

The waiting game continued. Outside the wind rose, howling mournfully. At least it was night, and we weren't losing as much productivity as we would have if the sun had been high. Finally the canopy doors opened, admitting a blast of cold air and Genia.

"The first batch is clear." She didn't sound triumphant. "No match."

"Who did you do?" Tony asked for all of us.

"All the men, and Taria, Syrene and Jessica." Murmurs sped around the room.

"All the men?" There was challenge in Tony's voice.

"Yes, all the men." She held up her hands to ward off questions. "I know, I know, we're doing the rest now, and checking our results. Right now there's no match, not even close."

"Why do the women at all?" asked Taria.

"Because we need to, right?" Genia's voice was sharp. "Because we need to resolve this, and that's how it's going to get resolved, by testing everyone, and retesting if we have to. Someone has cheated, somehow, but we're going to find out how, and then we're going to find out who."

Another five hours of waiting. Some people slept slouched against crates, others read or wrote. A few conversations rose, went on for a while and fell again. I did none of those things, my mind was too busy. What had gone wrong? I had watched every person in the colony give a hair sample right in front of me. Gene scan results were impossible to fake, so the only other possibility was that Genia and Claire were lying. Except that if Genia had wanted to cover up the killer's identity, she wouldn't have asked me to confirm her autopsy. If Claire wanted to do it, she just had to declare a match with someone else. Anyway it was inconceivable that either of them would tamper with the results when she might be the next victim.

Time dragged. Eventually Genia came back. Everyone looked at her expectantly. She waited for a long minute before speaking, thinking about what she was going to say. "We have a problem. We've done everyone's scan including the killer's. We have everyone's profile including the killer's. None of them match. None are even close. The killer's scan is absolutely unique." She paused, not wanting to say what she was about to say. "It seems there's someone else on the planet with us."

There was a long, stunned silence, until Jayce exploded, "That's impossible!"

She nodded. "I know it's impossible. Nevertheless, it's true. Claire is checking the equipment right now, but that's a long outside shot. It's been working perfectly with the plants, and it just gave us forty



completely clean scans. We subtracted Mona's scan from the swab scan that combined her and the killer to get the killer's scan, then subtracted that one from the swab scan to get back Mona's, which came out precisely correct. We know the sequencer is working properly. I'll say it again, there are no matches. The gene scan we got from the killer is not from anyone here."

"Vlad?" asked Jayce.

Genia shook her head. "We checked Vlad's as well, in the second batch."

Voices rose to cacophony, loud after the long, dragging silence. There was relief that it wasn't one of our own, consternation at the result, fear of what this new, unknown factor might mean for all of us. Tony's voice cut through it all.

"Listen up! Listen!" He waited for everyone to fall quiet. "We've heard the evidence. I find it compelling, although I admit I don't yet understand how it can be true. What we're facing now is a serious problem." He turned to Genia. "I think we'd all like you and Claire to run another set of scans, immediately." She nodded, weary but resigned, and he went on. "In the meantime, I want all of you to think about our time on *Endeavour*. There's somebody else on the planet. He wasn't born here, he shipped with us, he came with us, and he grounded with us. Now he's out there, somewhere, and he's preying on us."

"Tony." Jessica's voice was reasoning. "Nobody stows away on a colony ship. Nobody could, even if they wanted to, it's a thousand-year voyage with the ship in vacuum for most of it. If you don't have a cold-sleep vault, you aren't going."

Tony shrugged. "You explain the scan results then." Jessica had nothing to say to that and he went on. "How it happened is less important than the basic fact it *has* happened. We've lost a lot of time here, but we've learned something important, and that is, the killer isn't one of us. I want everyone to be extra careful, especially now that it's night." He paused for emphasis. "It's going to get very cold out there where he is, and he's going to come looking for warmth. You can count on it."

"Side arms?" asked Jayce.

Tony gave him a look. He'd adopted more authority in the crisis and already he didn't like being second-guessed. "Yes, side arms," he said.

We all collected our weapons and trooped out into the cold darkness. There was frost on the ground and the howling wind carried the occasional snowflake. Most people went back to their flexplexes, tired, visibly upset and not a little fearful. I went to the greenhouse with Genia. Claire was there, prepping samples in the centrifuge.

"How could someone stow away on *Endeavour*?" I asked as we came in the door. "It's just not feasible."

Genia shrugged. "Think of a way."

"It *could* be done I suppose." I pondered a moment. "It wouldn't be easy."

"How?"

"If you were one of the cold-sleep techs you could be the last one out. When everyone is already out cold, no pun intended, you kill one of us, dump the body out the air lock and get in their chamber yourself."

Claire looked up from her work. "You'd be found out on arrival."

"Hey, nobody said it had to be a practical plan," I protested.

She held a test tube up to the light and shook it. "We're dealing with something that has to be at least theoretically practical."

"So you come up with one," I challenged.

She put the test tube into the rack and labeled it. "Maybe rig an extra sleep chamber in a maintenance space, hidden. *Endeavour* is huge."

I shook my head. "That would have to be done in construction."

"So, maybe our person had help."

"Why would someone help him? More to the point, why would anyone want a one-way ticket to nowhere if they had any option at all."

She shrugged. "I can't answer that."

"Maybe it was one of us." Genia handed me a box full of bagged hair samples. "Here, count these, make sure I haven't made a mistake."

"We just proved that it wasn't." I started going through the bags.

"I don't mean one of us in the community." Genia leaned back against one of the filtration tubs. "I mean one of the people we thought had died. What if someone, a colonist, woke up and hid, let the rest of us think they were one of the ones who died."

"We didn't find any empty sleep chambers," Claire said.

"Sure we did. Ours. Did anyone actually count them?" Genia was on to something and she knew it.

I shook my head. "I doubt it. We were all too busy dealing with the loss of ninety percent of the colony."

"It makes sense, Mitchel." Her words were coming fast. "Why look for some lunatic cold-sleep technician? The program people are all vetted and cleared within an inch of their lives before they're even allowed to look at a ship. We colonists, on the other hand, are already all convicted murderers. You're looking at the wrong population."

"Violent criminals who've been screened and cleared within an inch of our lives, and judged psychologically safe for the mission," I countered.

"Didn't you tell me a while ago that psychopaths are charming and manipulative? We're also all selected for high intelligence. Are you telling me a smart psychopath couldn't fool those *zlotniks* on the Colonization Council?" Genia twisted her finger at the sky.

"Yes . . ."

"So this guy wakes up with us, hides before anyone sees him, lives on *Endeavour* for a year while we survey the planet, then sneaks on a shuttle, comes down with us, finds himself a little hidey-hole somewhere, fills it with supplies and lives there, waiting for his moment to strike."

I shook my head. "I don't buy it."

"*Endeavour* is a big ship with a lot of places nobody visits unless something goes wrong. The shuttles are big too, and we've got more food and supplies than we know what to do with. We'd never notice what he took."

I shook my head. "I don't know. What's the motive?"

She shrugged. "It's the least far-fetched scenario. I can't tell you a motive; what's the motive behind serial rape and murder? I'm not fit to judge the drives of a psychopath. Thankfully."

She had me there. Claire clicked keys on the sequencer and symbols spilled across her screen. "Everything checks out. Again. The machinery is working perfectly."

Genia sighed. "Do we really have to do all those profiles again?"

Claire nodded. "Yes. We do. These are bizarre findings. We have to remove any possible trace of doubt." I looked out into the darkness feeling tired. The snowflakes were starting to come more frequently, swirling beneath the lights over the cargo canopy doors. We'd been up twenty hours and it would be ten more before we were done. At least they let me stay and help. The possibility of a maniac lurking in the endless darkness outside had healed the gender rift. The women were glad I was there.

Ten hours later we got the same result we'd had before. Thirty-seven unique DNA patterns from every living colonist, two more from Vlad and Mona, and one isolated from the sperm swab. None of them were even close to matching. Tired and defeated, we shut down the lab. Claire and I walked Genia

back to her flexplex, eyes straining in the dark against shadows imagined into danger. It had gotten noticeably colder and there was a thin rime of snow on the ground. We bid her good night and trudged back to our own quarters. Horst was already asleep, his door clicked closed. For a moment we hesitated in the small central vestibule, reluctant to part.

I gave her hand a reassuring squeeze. "I'll be right here, and Horst." You'll be safe.

She gave me a quick smile back. "I just want you to know, Mitch, I never thought it was you."

She hugged me then, tight, and it was a long time before she let me go. I lowered my hands to her waist and we hesitated again, but it was late and we were both exhausted. She turned to her door and I watched her click it closed behind her. Then I stumbled into my space and fell into bed. The wind howled against the insulshell skin. It was going to be a long, cold night.

It was colder still when I awoke, twelve hours later by the glow of my watch in the darkness. I dressed in layers, pulled on boots and thick mitts and trudged out to the barn. Outside, snow crunched underfoot as I made my way to the barn. 37 Geminorum-IV had no moon, but the constellations were hard and bright overhead, reflecting off the white landscape and giving enough light to see by. There was no sign of the killer. I didn't expect that there would be, but still I kept my hand on my side arm as I went, and shined my flash into the barn's dark corners as I entered.

It was warmer inside. Daff and Dixie and the other big Shire horses were calm in their stables, and Merlin and Minerva, our two surviving cats, were huddling up on one of the high ledges where the warmer air collected. I broke a thin layer of ice out of the oxen's water trough and pulled down a big pack of feed concentrate to fill up their hoppers, then worked in turn through the goats, the sheep, the llamas, the chinchillas and rabbits, and the rest of our extensive menagerie. I spent a little longer with the Shires, grooming them a little and slipping them each a sugar cube in turn. I stopped by Daff last. I had raised her from a foal back on Earth and we have a special bond. I volunteered for the colony program because I could see no point to a life spent in prison. I was smart enough to pass their tests, but inside I was still the same stupid, fronting tough kid who held up banks more because it helped my image than because it helped my finances. But the Colony Council was smarter than we usually gave them credit for, and they introduced me to riding, which changed my life. Riding was freedom in a way I had never experienced it before. At first the work required to care for the horses was simply the price I had to pay to ride them, but soon, and as the program leaders no doubt calculated, inevitably, I developed an attachment to them that brought me out of my narrow, defensive mind-set. When the time came to choose my program track I took veterinary medicine. It was a decision I had never regretted.

After looking after the animals I went over to the greenhouses, a welcome oasis of light and heat in the long, dark night. Horst and Claire were there already, working on the plants, and Cal was doing something with the power lines and complaining about our reserves. The accumulators on the shuttles had ample hydrogen storage capacity to run the fuel cells through the night when the solar foil was useless, but various inefficiencies meant they were little over half full. If the full complement of five hundred and twenty colonists had come down, we would be finding it a cold and dark night. As it was, we would be fine so long as we were very careful in our power use.

I looked at the little collection of hair samples by the sequencer. Claire wasn't working on them, she was back to trying to adapt strawberries to the extended diurnal cycle and the bitter cold that came with the long night. Horst was helping Cal route a second power bus that would allow us to put an extension on the greenhouse when the sun was up again. I felt I should be doing something to track down the murderer, but what? He was out there, somewhere, but hunting him down in the darkness was out of the question, even if we knew where to look. Logically, I should relinquish my unsought role as investigator and go back to determining the food value of the local plants. If I could prove they were both safe to eat and provided all the necessary nutrients, then we could start using them for animal fodder. That was a concern, because most of our animals had survived, so we had over a hundred all told in the barn. Our food reserves for them ran just three years.

And what was our killer doing for food? He could have stolen a lot from the landers, they were some

distance away from the townsite and there had never been a reason to guard them. What was he doing for heat? He would have no access to power . . .

"What would it take to survive out there?" I asked the question not quite realizing I was speaking out loud.

"Out there?" Horst swept an arm to encompass the darkness. "It would take a miracle."

"Water, shelter, heat and food," answered Claire, more practically.

Cal nodded. "He would have to have a fire going. He might have stolen food and equipment, but I'll guarantee he's not tapped into our power lines. I'm up to the landers and back every day, and I watch the consumption levels like a hawk."

I nodded. "But he is surviving."

Cal shook his head. "For all you know he might be a frozen corpse right now. It takes experience to survive outside in weather like this."

"He survived the last night," I countered.

"Maybe he hid in one of the shuttles. Maybe he's there now."

"Possibly." I let the conversation lapse there, but the more I put myself in the killer's shoes the more problems there seemed to be. We were a small community, but very well equipped, the more so because we had supplies for a group ten times our size. We had the animals to help us, the solar foil, prefab pop-structures, raw materials from polycarbonate to duralum and all the tools we could possibly need, and it was still an incredible amount of work to establish ourselves and survive. What would it be like for a single person?

I pondered the point. Bare existence would be the best he could hope for. We had all done the emergency survival course in colonist training, but the first lesson they'd taught us was, don't get lost in the first place. Water, shelter, heat and food. The river was the simple answer to the water question, and we knew the water was drinkable. He could have built himself a crude shelter from the native vegetation, and burning it would provide heat as well. Food was a more difficult issue, he couldn't know what was safe to eat and what wasn't. Even I didn't know that, and I'd spent weeks in a lab full of sophisticated equipment designed to answer exactly that question. On Earth castaways had starved surrounded by edible plants, simply because they couldn't tell which ones to choose, and others had poisoned themselves for the same reason.

Here on 37 Gem-IV the only possible answer was the food we'd brought with us. He must have been pillaging the shuttles, banking on our not noticing the absence of what he'd taken. Genia had pointed out that he could have set himself up with our supplies, but when I thought about the logistics of it, I could see he had to be using them still. Without the animals or a ground carrier everything he took he'd have to carry with him. The landers were far enough away from the Town that he could simply watch and wait for a time when there was no one around. He'd be making another trip every week or so, at least.

So the answer to catching him was putting security on the shuttles. It would take a while, but eventually starvation would force him to come to us. We knew he was unarmed; the trouble we'd had digging out the side arms ourselves was testimony to that. I needed to get Tony and organize a watch, maybe even get Ian Kellar, our electronics wizard, to rig up some kind of monitoring system. Then it was only a matter of time. We could ill afford to divert the effort from more important work, but we had to do it.

I looked out at the darkness, feeling overwhelmed. The ancestral tree of humanity has its roots in the heat of Africa. None of our ancestors ever had to hibernate to survive harsh winters, but our bodies still respond to cold and darkness. We eat more and sleep more, our metabolism slows, and with it our cognitive functions. I sat and ruminated, punching keys more or less at random and letting the same data pour over my screen again and again. Something about the scenario didn't add up, but I couldn't put my finger on it. Halfway through the shift Claire brought Horst and I some meals, and I ate mechanically, not really tasting my food. That wasn't a big loss given that we have only thirty-six basic meal pack menus

and I had already had more than enough of all of them. Several hours later Horst brought another meal, and I realized that I had wasted the entire shift thinking about the killer. I might as well be actively investigating the crime for all the useful botanical analysis I was accomplishing. We shut down the lab and went out into the stillness of the frigid night. I dropped by the infirmary on my way past, but Genia wasn't there, so I did my rounds at the barn and then went back to our flexplex. Despite my mental exhaustion, sleep was a long time in coming.

The next day the temperature was down to forty below zero, but the wind had dropped to nothing. There was a half-inch layer of new snow, glowing under the starlight with unearthly beauty. I checked the Barn and turned the Shires out into the temporary paddock for a little exercise. The three hundred and fifty hours of enforced idleness was hard on them and they were glad to get out. I put the llamas out too, though the other animals were as content to stay in the relative warmth of the barn as I was to leave them there.

Something caught the corner of my eye on the snow. A set of wide-spaced pawprints where one of the cats had been running, a large slash where it had skidded and launched itself in a new direction, a flurry of disturbance, and then measured steps to the tiny door cut in the side of the barn wall where they let themselves in and out. I looked closer and saw smaller pawprints, larger than a mouse, smaller than a rat. We'd brought lots of rodents from Earth, a few in cold sleep, most as frozen embryos in nitrogen freezers aboard the shuttles. We hadn't even unpacked the gestation machinery that would bring them to life. Whatever had caused the tracks had to be native fauna. I looked closer, but the tracks were too blurred to discern much more than the size of the animal and the fact that it was four-legged.

Fascinating! 37 Gem-IV had little insectlike creatures with four legs, two wings and an exoskeleton; but nobody had yet encountered any larger animals, though there were tracks enough to testify to their presence. I went into the barn and climbed up to the cat's perch. Merlin hopped gracefully out of my way while Minerva cocked her head at me quizzically. They had, in true cat style, eaten all of the creature but the head, presented at the entrance to their area like the skull of a cannibal islander's victim, posted as a warning to intruders. I picked it up and looked at it. It had a thick coat of fine fur, swept into a crest along the top of the skull, with a thick, shiny black band around the front of it, and below that a forward-thrust mouth. I could see no sign of eyes, ears or a nose, until I realized that the black band was the eyes, or eye. It used a single cylindrical lens rather than the two spherical ones we mammals use. Behind it would be a ribbon of retina, giving it a continuous field of view of close to two hundred and seventy degrees, although without the depth perception that two separate but overlapping images allow us. I was willing to bet the creature bobbed its head continuously, like a pigeon, integrating successive images over time instead of over space in order to build up a three-dimensional picture of the world.

No wonder we'd seen so little of the native fauna. With vision like that they'd be very hard to sneak up on. I found a piece of paper in my pocket and slid the specimen onto it, folding it carefully and putting it away. This was an important find, and it occurred to me that I'd get to name it. I looked Minerva over while I was there. She seemed fine. I didn't know if she'd eaten the creature or if Merlin had, but I'd watch their health carefully over the next while. If they didn't suffer any adverse effects, it would be a good indication that the local fauna was safe for mammals to eat. That was a job intended for our rats, when we managed to get the gestational machinery set up, but every data point was important. She jumped down indignantly after I'd done looking her over, and I found a treasure, another rodentoid body, this one with partially chewed hindquarters but otherwise intact. I carefully wrapped it too, then climbed back down and impatiently hurried through the rest of my barn chores. I headed back to the greenhouse to start dissecting my trophies to see what else I could learn about the creature. As I closed the barn doors my eye went again to the tracks that had alerted me to the cat's prize.

The thought came to me unbidden, against my desire to think it. The killer would leave tracks too. In the new-fallen snow any movement he made would be obvious. We did not have to guard the shuttles and wait for him. He had to live close, we already knew that. All we had to do was walk in increasing circles outside the camp and sooner or later, inevitably, we would come upon his trail. Catching him then

would be simple. I gritted my teeth. What I wanted to do was go back to the lab with my specimen and dissect it. What I wanted to do was spend time with Claire in the warmth of the greenhouse, enjoying each other's company as we pursued our separate lines of research. What I didn't want to do was wander around in the frigid darkness looking for a psychopath, but that was what was going to happen. I headed back to the Town Square. I wasn't going to do this alone. I had my side arm and willingness to use it, but hunting a murderer by myself would be simply stupid.

My first thought was to take Genia, but when I stuck my head into the infirmary she wasn't there. I went back to the greenhouse, hoping to find Cal Cadogan or Horst. I found Claire instead, unpacking equipment in the storage canopy that served as our machine shop and tool locker. I would rather have Cal's muscles with me in case it came to a physical fight, but Claire was an excellent shot, which was more likely to turn out to be important. We packed some food, printed out a satellite image of the area we'd be covering and set off for the landers. On our way past the flexplexes I stuck my head in Tony's door to let him know where we were going. I had a momentary thought to recruit him for the adventure too, but he was working on something at his desk and barely acknowledged us. Fair enough, we were all overworked. Finding the killer was a top priority, but it couldn't be our only priority or the colony would collapse.

The four landers were spread out in a rough square a third of a mile on a side. Lander One was closest, a half-hour hike from the Town. We planned to box around them in a circuit that would take us a mile upstream, then down to the river and along for a couple of miles downstream, then back up the bluff and up to the landing site. We'd positioned the Town because we needed to access both the landers and the river, and the killer would have the same needs. After Cheryl had vanished we had instituted a rule prohibiting people from exploring alone or in the dark, so any tracks that ran anywhere but straight out from the Town or straight in to it had to be our target. We set out grimly, side arms in hand. We had flashlights but didn't really need them, the snow was glowing with its own radiance in the starlight. I actually expected to find tracks quite quickly. The references told me that serial killers tended to extreme arrogance, and it was hard to see how they could be otherwise. This one was used to getting away with things, with fooling people. He'd been stealing from us for a long time now, and he'd believe he could do it with impunity. He was stealthy, but he wasn't a ghost, and we would find him.

As it turned out I was wrong. There were tracks, but they were all on the well-worn trail between the Town and the landers. We circled close around the landers, then angled down to the river. Above the bluff we saw animal tracks, including a few from the large-clawed beast that had been our principal concern when we first arrived on planet, but no human prints. I smirked. Humans have always feared the great predators, wolves, tigers, and bears, constrictor snakes and sharks, but by far the greatest killers of humans are other humans. We weren't even established on this new world and that reality was proving true again.

The going got more difficult after we scrambled down the bluff, and I had to unzip my jacket. I'd gained muscle in 37 Gem-IV's higher gravity—we all had—and I was burning enough calories to cause overheating. If you have good cold-weather gear, then the problem is not staying warm but matching your level of insulation to your thermal output. The vegetation grew thicker as we came down to the riverbank, and we had to weave in and around it as we worked our way back to the pump station. That was the resting point we'd given ourselves, halfway through our trek. It would give us a chance to check the machinery as well. The heater core in the water lines would stop them from freezing up, but we needed to check the pump itself to make sure it wasn't suffering unduly in the cold. The snow in sheltered areas came up to our ankles, and fresh animal tracks stood out clearly. Even older ones were visible, though their outlines were blurred by snow blown by the earlier winds. There was no chance we'd miss any footprints if we came across them. We stuck as close to the riverbank as possible, reasoning that the killer would have to have access to water, but we found nothing. As we got closer to the pump I began to think we should have started off downstream. If he was using the river to dispose of bodies. He was probably using it to dispose of trash as well, and he wouldn't want to be giving his presence away by having seal meal wrappers floating past the pump station. I was tired and hungry and mentally ready to

take our planned break when we found the body. It was a naked woman, facedown and half-covered in frozen snow, with her legs splayed obscenely.

I went to her, instinctively checking for signs of life, although it was more than obvious she was dead, frozen solid. Cold horror ran through my veins as I lifted her face. It was Genia. Her hands were tied behind her back with thin cord, tight enough that her hands were swollen and purple. Her clothing had been cut off her in strips, and the knife that had done the cutting had left long, deep slashes in the flesh beneath. There were other wounds on her body, little cuts on her feet, on her breasts and buttocks, a long slice from her forehead over the top of her skull to the back of her neck. I hoped desperately that she'd been dead before any of that was done, but there was clotted blood on the wounds. She'd suffered through it all and been killed at the end. There was no question about the cause of death, her face showed the characteristic microhemorrhaging of strangulation.

I turned away, unable to look. My gaze met Claire's. Her side arm was drawn and her jaw was clenched in anger. There had been some conversations about what to do with the killer when we caught him. Tony had advocated holding a formal trial, to establish our system of justice early. Jayce had passionately advocated the medieval practice of stoning as more appropriate. I had avoided the discussion myself, and I hadn't heard Claire express her opinion either. Looking at her now it was clear what she'd do if she could get her hands on the perpetrator. I looked away again, feeling my own anger well up. Stoning would be too good for him.

We were just a few yards from the pump, in exactly the place we'd found Mona and Vlad. The killer was taunting us, proving he could repeat the same crime right under our noses. It was ample evidence of his arrogance, and what was frustrating was that he'd gotten away with it. I set my jaw and promised myself that he wouldn't get away with it again. There were footprints, half-obsured by blowing snow but clear enough to follow. Two sets entered the little clearing, only one set left, by the same route I'd tracked before. I drew my own side arm and nodded to Claire. We followed them, and again they paralleled the path running from the plowed field to the pump, then joined it and got lost in the beaten path up to the bluff and the Town. He was clever, no question. He knew the danger the snow presented and was using our own paths to move around, counting on the fact that we only ventured out when we had to in the night, and that at a distance in the dark one snowsuited figure would look just like another.

We paralleled the path on the way back, Claire on the upstream side, and I on the downstream. He had to leave it sometime before he got back up to the town. Except he didn't, there were no tracks anywhere. We met again at the base of the bluff. I looked up the steep, rocky trail.

"So can he fly?" Claire was as frustrated as I was.

I holstered my side arm and sat down on a rock, exhaustion coming over me in a wave. "There are two possibilities. One is he has a boat, a raft or something, and he's coming in and out on the river, living somewhere on the other side. He'd feel safe there, the river is a natural barrier."

Claire shook her head. "So why would he come up this way, why not just get back on his raft and vanish?"

"Maybe to lay a false trail and make us overlook the river as a potential hiding place. Or there's the second possibility. He's living right in Town with us."

"He wouldn't dare." Her face showed a fear that belied the disbelief in her voice.

I shrugged. "There's a lot of empty space, we've got flexplexes we aren't using and cargo canopies we haven't been inside since we set them up."

"What does he do, stay inside and plot about his next victim all day?"

"He might at that. Genia was the one handling the investigation, more or less, until she got me involved. If he was close enough to overhear our discussions, he'd know that. He'd know she was a threat to him, and someone like that, his psychology wouldn't respond well to a threat coming from a woman. He struck back."

Claire shuddered and I put my arm around her. We hiked back up the hill and told Tony what we'd

found. He organized a group to go and bring back the body. Without Genia, I would be the one to do the autopsy. Claire took me into the greenhouse and we sat, physically and mentally drained. The omnipresent darkness seemed to press against the transparent walls, as though it would swallow us in an instant if we let our guard down. The killer was somewhere out there laughing. Cal Cadogan got another group together and they systematically searched every structure we had up. Jayce took six up to the shuttles to do the same thing in their cavernous holds.

Two hours later neither group had found anything. There was another town meeting in the hangar canopy. This one was angry, with accusations flying back and forth. It was all Tony could do to keep order, and he bore the brunt of everyone's outrage. The partner system he had implemented for safety wasn't working, we all needed to be at different places at different times. Genia had been his partner, and now she was dead. Jayce and Piotr Myul nearly got into a fistfight over some trivial issue. Our little community was starting to fall apart.

I slipped out and went back to the infirmary to carry out the second autopsy of my life. I carefully noted her wounds, verified that she, too, had been raped, and took another vaginal swab so that Claire could later confirm that the DNA was the same as the sample taken from Mona, not that I expected anything else. The idea floated through my mind that somehow the DNA had been faked, but that was impossible.

Why had she gone down to the pump in the dark? The answer was stark: she'd had no reason, except that she'd been forced there. Combined with the evidence of the tracks the pattern was clear. The killer was evolving, no longer waiting for his victims to come to him. He was coming right into the heart of our community to tear lives out of it. Reflexively I looked to the door, as though he might come in with my thoughts. I had no doubt the searches had been thorough, and there just wasn't that much space to hide in a flexplex if someone came looking for you. At least part of the time he had to be away from the Town, although he was comfortable enough to come in among us. That brought me back to the question of how he was managing to survive out there. The temperature fell steadily through the long night. Last time it had gotten to sixty below zero before the sun came up again. We had power and shelter and food. What did he have?

There was no good answer. I finished my work and shut down the lab. The greenhouse was empty, so I trudged back to my flexplex through the cold. We were more than halfway through the night, thank all that was thankable. Overhead the constellations glittered like diamonds clearer than I had ever seen them on Earth, with all the moisture now frozen out of the air. 37 Gem-IV was a hard world for humans, but if we could survive ourselves, we could survive it. I kicked the snow off my boots in the flexplex's little vestibule. I had planned just to fall asleep in my space, but at my own door I paused, and then knocked instead on Claire's.

She was awake and in bed, and her eyes told me she was glad of my company. I sat by her for a while as we talked. Her eyes misted over when the conversation came to Genia, and I held her, not even trying to talk around the constriction in my throat. Eventually we felt better. After a time I kissed her, feeling the heat of her body against my skin. We slept in each other's arms.

I got up the next day feeling wonderful, the cold, the dark and the psychopath all forgotten as I looked at Claire, still peacefully asleep, her hair curling around a delicate ear. I ran my hand down her side, down over her waist and up the curve of her hip, leaning close to kiss her gently on the cheek. She stirred and her eyes opened, and she looked up at me, smiling. The previous night I had felt a twang of loss as I realized I was sharing a bed with someone other than Suzanne, but this morning that feeling was gone, replaced by a sense of closeness that had been missing from my life for far too long.

We spent a languid hour, waking up and talking, exploring each other's bodies with a leisure that hadn't been there in the eager haste of our first lovemaking. Eventually we got up and got dressed, revitalized. Outside, floodlights spilled across the snow, washing out the stars overhead. Four figures in cold-weather gear tramped around the perimeter of the Town, the permanent guard force that was the primary result of last night's meeting. We grabbed some food from the storage canopy, and then went



into the greenhouse. Claire was going to run the DNA sample from Genia just to confirm the killer's identity, and I was going to take the opportunity to dissect the rodentoids that the cats had killed. I should have been finishing my autopsy of Genia, but I wasn't going to let Claire out of my sight until the killer was flushed out. When she'd finished her gene scan she could come over to the infirmary and help me out.

There was a printed schedule waiting for us on the greenhouse door, listing the times we'd be on security patrol ourselves and signed by Tony, along with a page detailing the patrols' equipment and responsibilities. Claire and I weren't on the same shift, but I resolved to switch with someone so we would be. I sighed heavily. The human body responds to danger with an immediate fight or flight reaction. When neither fight nor flight is an appropriate response, stress builds up. When the danger is omnipresent the stress goes on and on, a continuous nagging worry in the back of your mind that you can never escape. I wanted to get the entire episode over with, not only to stop the killings but to save myself from the stress of having to worry about them.

I sat down with my rodentoids and the microscope while Claire went to work with the sequencer. I could hear her muttering to herself as she worked.

"Mitchel, can you give me a hand with this thing?"

"What's wrong?"

"The processing system won't come on."

I went over and checked all the obvious things that she'd already checked. There was power, all the ancillaries were plugged in, it was set up properly. Horst came over from his workstation and helped us.

"Were there any problems before?" I asked Claire.

"It was working perfectly yesterday."

We fiddled with it some more but could find nothing wrong. Eventually we started taking the sequencer apart a piece at a time, verifying all the connections. It sequenced DNA by running a sample through a carefully choreographed chemical dance, starting with a swab on a test slide that was sampled, amplified, unraveled, restricted, matched, blotted and so on. The mechanics were in perfect working order, there was power to the computer and her screen came up to show the system passing all its self-diagnostics, but for some reason nothing moved when she gave it the command to sequence.

An hour later we were still frustrated, having completely checked and reinstalled the system from the ground up. I was convinced the problem had to be a loose connection; what else could it be? But I was having a lot of difficulty proving my theory. For want of anything else to do I started following the signal path physically all the way from the computer through the hardware interfaces, checking each subsystem in turn. Electronics is far from my area of expertise, but I'd learned in the last year aboard *Endeavour*, when the demand for veterinary services was zero and the need for someone to take up the slack for techs who hadn't survived cold sleep was far too high.

It took two more hours to find the problem, and when I did I found it only by accident, the third time through tracing signals through the system. There was a thin scratch on the underside of the sequencer interface board, cutting through several layers of circuit trace. It was no more than half an inch long, but it rendered the interface board useless, and with it the sequencer. The colony mission planners were smart people; our computer gear was standardized so we could swap parts between different workstations at will. Hardly any of it was customized, but by necessity the sequencer interface board was. We would have to do a replacement from stores, which could be a big headache. I showed the board to my companions, glad at least to have the problem identified, and called up the colony stores inventory on my own workstation. We had two spares, thankfully already unloaded and not buried on one of the shuttles, less of a headache than I thought. I got my cold-weather gear on and trudged over to the storage canopies to start searching code numbers. Eventually I found the relevant box, full of various spares for the sequencer. There were two empty niches where the replacement interface boards should have been.

I cursed. It wasn't the first time the Colonization Council had either failed to pack or miscataloged

some critical piece of equipment. I checked the box again, verifying the storage code numbers. They were correct, and the contents list included not only the interface boards but a lot of other spares for the gene sequencer. Just to be sure I popped the seals on the adjacent boxes, which were also coded and listed for sequencer spares. Everything was there, nothing out of place, everything packed securely and clearly labeled. I looked through the first box again, but there was no chance I'd missed anything. The interface boards weren't there. I went back and looked at the foam niches where the boards were supposed to be. There were faint impressions in the foam. *Something* had been stored there, so it wasn't simply that the boards had never been loaded in the first place. I sat back and thought about it, trying to remember if the environmental seals had been intact on the box when I'd opened it. I hadn't noticed, because it hadn't occurred to me that I might need to know. Still, I didn't need evidence from the seals—the impressions in the foam were enough. The boards had been packed, had arrived on 37 Gem-IV and then someone had taken them.

That person might be Claire, and it might be that she had experienced previous problems with the sequencer and had to replace the boards already. I clung to that thought, though in the back of my brain I knew it was a faint hope. I would be one of the first to know if something had gone wrong with the machinery prior to this, and if she'd experienced problems with the interface before and solved the problem with a replacement, that would have been the first thing she tried this time, and I wouldn't have had to spend hours tracing the fault through the system. I went back to the greenhouse and asked her about it.

She shook her head. "No, I've never had a problem with the sequencer at all before now."

"Is there a chance you could have taken the boards while picking up some other spares?"

"I've never had to get any spares out of storage. Just consumables, like glassware and blotting plates."

There was concern in her voice, she was picking up the implications just as I was and she didn't like them. I looked again at the groove. What could have caused it? There was nothing in the case that would have rubbed against that part of the board with the minimal vibration the mechanics produced while it was operating. I looked closer, saw multiple cut lines. The groove was in fact several, as if someone had made repeated strokes with a razor blade to dig into the board's surface. It looked almost deliberate, although I didn't want to think that it could be. I looked again to verify my findings. There was no room for any other conclusion. The groove was deliberate, and its only possible purpose was to very subtly but very permanently render the sequencer useless. A single cut might have been an accident, but there were multiple incisions. Why? Because if only the circuit traces on the surface were cut, we could repair them, but traces damaged in the core of the board couldn't be reached. I showed the damage to Claire and watched her face while she came to the same conclusion I did. Then we both showed it to Horst.

"We've been sabotaged," he said.

"Why would someone do this?" Claire asked the question for all of us.

Horst spread his hands, stating the obvious. "To render the sequencer useless."

"But why?" Her voice was plaintive. It was her work that had been destroyed. "What would any of us gain from this? We all need this thing to work, we need to get our crops modified if we're going to survive on this world."

"It has to be our killer." My jaw was set.

"This is a completely different crime," Horst pointed out.

"He's right." Claire looked at the door, uncomfortable with the thought that the psychopath had been at her workstation.

"A different sort of crime." I spoke slowly, reasoning ahead of my words. "But we only have one person cutting a hole in our lifeboat here, and that's the killer."

"What's his motive?" Claire asked the obvious question.

"I don't know," I admitted. "But he wanted the sequencer out of action. If he'd damaged the computer, we could have swapped out components from another system. If he damaged the mechanicals, Cal could fix them. The interface board is the choke point, he had only to damage this one and take the spares."

"But why?" Horst threw up his hands in frustration. "We've already proved he's someone outside the colony. We're not going to get a different set of DNA from Genia, and we're not going to need DNA to prove that he's the culprit."

I spread my hands. "Maybe we would get different DNA from Genia. Maybe there's a second killer."

Claire shuddered. "Don't even say that."

"We all have blood on our hands here, Claire. It could be anyone." Horst's voice was flat.

I looked again at the subtle sabotage on the board. He had meant for it to be overlooked. Why? Because he didn't want us to know it was deliberate sabotage. He wanted the sequencer out of action, and the failure to find the replacements blamed on the Colonization Council. And why would he destroy the gene sequencer? He feared it, that had to be the reason. The source of that fear was another question. It would do nothing to identify him, nothing to aid in his capture. He alone on the planet could commit sex crimes without worrying about genetic evidence, because he was completely outside our tiny society. His worries had to be stealth and concealment, but not hiding evidence.

Or was that true? As Horst had pointed out, we all had blood on our hands. Serial killers were charming and manipulative. Could two of them have slipped through the Colonization Council's evaluations and now be in our midst? Or was it something more personal, a long-held grudge against Genia that someone had taken the opportunity to act on, duplicating the original killer's style in order to pin the blame on him. That person would have motive enough to prevent us from getting DNA evidence that would demonstrate that the first killer was not the same as the second. Two killers seemed a far-fetched hypothesis, but we had the evidence of the tracks from Genia's murder site, and the killer knew our systems and organization well enough to subtly but effectively sabotage the gene sequencer, and to locate and remove the spares without being noticed. So there was one killer inside our community who feared DNA identification and another who was, by unassailable DNA evidence, outside of it.

Except that, if our second killer's motive was some grudge against Genia, then it wasn't really rape and murder. There would be no genetic evidence because there would be no actual rape, only the simulation of it. I looked out into the darkness. There was a good answer to that, at least. We needed the gene sequencer to modify our crops, and in the long term our survival rested on that. The killer had the spares, and in the fullness of time they would turn up so the colony could continue. How he expected to get away with that was an open question; there was zero probability that the rest of us wouldn't immediately reopen the case.

That was an important piece of information. The killer, one of them anyway, was running scared and exercising poor judgement as a result. That was another known characteristic of serial killers; as the pressure came on they tended to come apart. Pushed far enough they could turn into spree killers, murderers who left a trail of bodies in their wake as they tried desperately to avoid capture. That was a result our tiny community could ill afford. I remembered again that we were all armed. Handled poorly, this whole thing could turn into a bloodbath, and our doctor was already dead.

Horst and Claire had moved on to talk about how the killer was picking victims, but I wasn't really listening. The sabotage of the DNA sequencer was the key to the puzzle, I knew. I just couldn't figure out which way to turn it. An outside serial rape-murderer wouldn't need to sabotage it. An inside revenge killer simulating the outside killer's pattern wouldn't need to sabotage it either. So who would?

"Claire," I asked, "do you still have the gene scans you took from everyone online?"

"Of course."

"Could you check?"

She checked, and she had them all on file, and what's more she had used some of our limited supply of paper to print out hard copies, and still had them. So whoever it was hadn't thought to destroy the evidence we already had. That meant there was more genetic evidence out there. So what was it? And how could we use it without the gene sequencer? I looked at the little box full of hair samples. We still had that too. So what were we looking for that we didn't have yet?

Two murders and a sabotage. One killer or two, and was there another person involved? No, three murders, first Mona and Vlad, then Genia, but two crime scenes. No, *four* murders and *three* crime scenes. We just didn't know where the crime scene for Cheryl Teirson's disappearance was. Or had she really been taken by one of the big-clawed predators we'd never seen? My thoughts wheeled around. How was I going to unravel what was real from what was possible?

Genetic evidence. Maybe there was something I'd missed on Genia's body. I excused myself and went over to the infirmary, braving the bitter cold with just my jacket and boots because the distance was short. For a moment I had a macabre vision that I would find her body gone, but it was still here, her skin waxy where she'd been frostbitten before she died. I looked over her wounds again and took pictures, feeling a strange detachment as I examined a corpse that had been a friend. When I got to her scalp wound I paused, something tugging at my memory. Mona had been cut over her ear and around to the nape of her neck, but though she'd been raped and strangled, she'd had no other blade injuries. Genia did, but they were all small stab wounds except for the long slice through her scalp. The wound was a gaping slit perhaps a quarter inch wide. It had been narrower when we'd found her, but skin contracted after death, so the width of the wound proved nothing. I looked over the edges of the wound with a magnifier, and after several minutes I found what I was looking for. The two edges of the incision didn't match, there was a strip of flesh missing.

Genetic evidence. I had a revelation then. The scenario goes like this. A serial sex killer slips into the colony program with the rest of us whose violence had more correctable roots. Maybe he stays latent through the whole training regime, maybe he continues to kill and just gets away with it. Then he's on the ship, and maybe, probably, his lover was one of the ninety percent who died in cold sleep. That's the precipitating stressor. First he hides on *Endeavour*, isolating himself from us, watching us, vicariously living out the horrific fantasy he plans to enact on the community once we're on the ground. He stows on board one of the shuttles and sets himself up with stolen gear somewhere in the river valley. Cheryl is the first victim, the murder goes like clockwork, and he makes her body vanish in the river. Mona is the second, but Vlad interrupts him before he's finished. What Vlad interrupts is the incision around her ear, which is why it's unfinished. Serial killers collect trophies from their victims, and this one collects hair. He's caught in the act of scalping her. I remembered Cheryl Teirson's long black tresses. If we ever found her body, I'd bet a ticket back to Earth that she was scalped as well.

And Genia, she's investigating him, she's getting evidence that points to him. She's a threat, and she's a woman, and he responds the only way he knows how. He doesn't throw her in the river because this time he knows we aren't going to blame her disappearance on the native fauna. Instead he leaves her on display, raped and degraded, a defiant gesture thrown at the rest of us, a warning to stop searching him out, not that it's going to work, but he isn't acting rationally now, isn't thinking things all the way through. So he *can't* scalp her because he doesn't want the rest of us knowing that much about him, he doesn't want us to know what to look for. But neither can he resist taking a thin strip as a souvenir, and the rest of the cuts are just window dressing to conceal the one that matters.

Find the evidence, find the killer. I laughed at myself, because it sounded so easy. The harder problem was—find the killer, find the evidence. How he was managing to survive on his own out there, and how he was getting into our community were the real key questions. And it still didn't explain why he'd sabotaged the gene sequencer. We wouldn't need DNA to know that some outsider we found in a hut by the river was the perpetrator. I mused on that, and then it hit me.

We weren't looking for an outsider at all, he was an insider, and a clever one. The killer's trophies would be the final evidence, if I could find them. He'd want them close, because they were the reason he

did the crime, his *signature* as the references called it. He'd be reliving the moments vicariously, over and over. I shuddered thinking about that. He'd *need* his trophies nearby, close enough to get at easily, but he'd have them somewhere they couldn't be pinned on him if anyone found them. There were thousands of such places in the Town alone, in a wall section, in a supply box, anywhere. It was just a matter of searching them out, which was possible, and then linking them to him, which might be impossible unless we were smart about it.

And then I had a better idea. He'd fooled us, but now I knew where to find the evidence that would catch him. I went to the flexplex that had been Cheryl's, untouched since she'd vanished. A few minutes later I was back in the greenhouse with a hair sample. I gave it to Claire.

"I need to know whose hair this is."

She spread her hands. "The sequencer isn't working, and isn't going to be working. Horst is going to try to . . ."

I held up a hand, stopping her in midsentence. "We can do it by eye, under a microscope."

She nodded, picking up on my urgency. We sorted through the box. There were only six samples that were even close to the black, wavy sample I'd found. I mounted a few strands of each on slides and Claire inspected them. I didn't trust myself to do the job, I already had a strong conviction about the results we were going to find.

She looked up from the eyepieces. "It's this one. Tony's."

I bent over and looked for myself. The match was immediately obvious. I stood up again. "He's the killer."

"Tony?" Claire was surprised, even though she must have figured out what I was doing. "How . . . ?"

"I went through Cheryl's space in her flexplex and got this hair from her comb."

She looked at me uncomprehending.

"Don't you see! It's Cheryl's hair! Psychopaths, they take things from their victims, little trophies, so they can relive the experience over and over. Clothing, jewelry, sometimes body parts. For Tony it's hair."

"That's incredible!" Her tone was disbelieving.

"Remember he asked if a hair sample was good for the gene scan? He was figuring out how he was going to beat it as soon as he knew what we were going to do. He was lucky enough to have a hair sample close enough to his own color that he could get away with it—Cheryl's. Once you agreed that hair was a good sample source, he went and set up another bag with a snip of Cheryl's hair. He kept control of all the samples as you went around and collected them, it would have been easy to make the switch before he handed them to you and Genia. You expected thirty-seven hair samples, all labeled, and that's what you got."

She pursed her lips. "So while we're looking for some mysterious outsider, he took Genia right from under us." Her voice grew tight, holding back rage. "My God, Mitchel . . ." The words trailed off, and her eyes were hard and cold. I had always wondered how Claire could have ever committed a crime serious enough to rate a life sentence, but I could see in that look that she was quite capable of killing.

I nodded. "And every decision he's made as our de facto leader has been to divert our attention and energy away from him."

Her hand moved to her holster. It occurred to me that we had no precedent for trial and punishment established in our fledgling society. The world we had come from was quite sophisticated in dealing with those who broke the law. I could see that justice on 37 Gem-IV was going to be a lot more primitive.

And he was still the de facto leader. I called him on the com, trying to keep my voice level.

"Tony here."

"It's Mitchel. We need a town meeting, immediately."

"Can it wait?"

"It's about our killer." I paused; in my haste I hadn't thought of a plausible reason to get everyone into one place. "I think I've figured out how this guy is getting in and out of here without anyone seeing him."

"How?"

I pulled an answer out of the air. "One of us is helping him." I was spinning the lies off the tip of my tongue, and I was going to get caught.

"Do you know who?"

"Not yet." That sounded lame. "I think I know how we can find out."

"What are you planning?" His voice was relaxed, but he was probing, oh so casually, and I was out of plausible answers.

"I'd rather present my evidence in front of everyone. It's important." He couldn't argue with that. He was, after all, only first among equals. He had gained authority in the hunt for the phantom killer, but he had no actual right to demand information from me, nor could he actually refuse to call the meeting without giving himself away.

He paused, no doubt searching for a way around the equation. "Are you sure about that?"

"Convinced."

There was silence on the other end of the line, but ultimately, what could he say? "An hour from now, in the hangar canopy." His voice was still calm and casual. Did I detect a hint of an edge in it?

Claire and I called Horst from the other end of the greenhouse and made a plan. It was simple enough. We'd get everyone in the hangar, tell them that one of us was helping the outsider, and present some plausible reason that was true. We'd say the helper was a woman, which should get Tony's guard down, and then ask everyone to hand over their side arms. We wouldn't collect his first, but we'd collect it early, leaving lots of people still armed in case he tried anything, including Horst, Claire and myself. Once we had Tony's weapon secure, we'd call him forward and present our evidence to the group. What happened then was an open question, but it would be a community decision. I envisioned a trial of some kind, but the important thing was, he wouldn't be allowed to get control of the situation. We would have an end to the killings, and we could get on with conquering this hostile world and building our own future.

An hour later the whole colony was gathered in the hangar canopy. Their faces were wan and tired, the long darkness taking its toll on all of us. Our plan worked perfectly, no one questioned our explanation, and when it came time to hand in the side arms no one protested as Claire came around and Horst moved them all into a spare cargo container. Most especially Tony didn't protest. I watched him carefully as handed over his weapon. He seemed relaxed and casual, and for a moment I doubted my own conclusions. His questioning on the com had put me on the spot, and I had half expected him to refuse when we tried to disarm him. Claire took a couple more weapons from the people beside him and then moved off to one side.

I stood in the center of the circle and took a deep breath. "Tony, I'd like you to step forward please."

He did, still relaxed and confident. "What about your weapon, Mitch? And theirs?" He nodded to the half of the circle Claire hadn't disarmed.

"We're going to hang on to them . . ." I started, but I didn't get a chance to finish. Suddenly there was a weapon in his hand.

"Hands up, get your hands up." He backed away, the unarmed people around him making room. He'd brazened it out as far as he could, but he'd come prepared with a backup side arm. He'd seen the trap closing on him, and now he was going to fight.

"What are you doing, Tony?" It was Chris Aspho, not understanding.

Tony laughed. "As I'm sure Mitchel here was about to tell you, I'm the one responsible for your little nightmares." He was smiling, actually proud of himself. "I killed Cheryl and Vlad and Mona and Genia, and I'll kill you too, if you don't do what you're told." He waved the weapon. "Everyone down on your

knees." I saw his eyes, hard and bright, flicking around the room. He was going to kill us all, he'd already made that decision, which was why he wasn't hiding anything any longer. People were kneeling down. The next command would be to lie down, and if we did that we were all dead, me and Claire first. I took a step forward, still standing.

He swung the muzzle of his weapon, looking at me like death. "I won't ask twice, Mitchel." His voice was cold, but he didn't pull the trigger because he couldn't. Everyone had stopped when I stepped forward and half the colony was still standing. If he shot me, they'd shoot him, and it would be all over. Impasse. We all had our hands up, but half of us were still armed. He couldn't hold us off forever, and he couldn't run. I saw his face get calculating, and his eyes hardened. He was going through the exact same thought chain I just had, and he was going to take his chances and shoot because it was his only hope.

I spoke before he could pull the trigger. "What do you think will happen if you start firing? You can't shoot all of us before someone shoots you."

"What do you suggest then, veterinarian?" His voice was sneering.

"Just turn around and walk away."

"You'll just shoot me in the back."

I shook my head. "We aren't like you, Tony."

"I'll need provisions and equipment."

I met his gaze. "That's not going to happen either. You can have your life."

I watched as the same equations raced through his head again, but I'd changed the numbers by giving him the chance to get out the door. If he ran for it, he'd have what he stood in and no more. We outnumbered him, but there weren't enough of us to mount a permanent guard. He could sneak back, steal food and supplies. More important, he could rape and kill again. That was what drove him. Every other decision came down to that.

I saw him reach a decision and he turned and made a break for the hangar entrance. He made three strides before Calibre Cadogan's fist got in the way and he went down. His weapon went flying into the dirt and suddenly there was a mob, the whole colony was on him, screaming and kicking. Primitive justice.

"Stop!" I yelled it but no one stopped. I yanked my side arm from its holster and fired. The shot split the night and I yelled, "Stop!" again. This time they stopped.

"What the hell are you doing, Mitch?" Jayce looked up at me from the center of the mob, his arm around Tony's throat. "He's getting just what he deserves."

"Yah." I was breathing hard, feeling an adrenaline rush I hadn't felt since my last bank robbery. "He's getting what he deserves, but the rest of us deserve a world with a little justice in it."

"Are you out of your mind?"

"Think about it, Jayce."

For a long moment the tableau held, and I looked at a sea of faces contorted with rage, taking out endless nights of fear on one man. Tony looked up pathetically, his own features a mask of fear, already bruised and swollen.

"He's right, boyo." Cal leaned over slowly and helped both Jayce and Tony upright. "What we do here is going to set the tone here for a long time to come." He looked around, meeting everyone's eyes with his own intense gaze. "We're all here because we made some pretty big mistakes with the law. Let's not make another one." He nodded to me. "Mitchel, I think you should organize the trial." I nodded back, not trusting myself to speak around the lump in my throat.

Without warning Cal's fist slammed into Tony's face and he went down, his nose broken and streaming blood. The group reacted but Cal met their gaze again before the mob could move in. "I think it's appropriate that the prisoner stay on the ground," he said. Tony looked up, holding his nose and rocking, his eyes wide and childlike. There was something deep there, revealed in his pain and

vulnerability, and I had to wonder what horrors he had gone through that had turned him into what he was.

The last blow wasn't quite the right thing to do but nobody objected. The message was clear, the time for charming and manipulative was over. Our colony stores didn't include anything like handcuffs. We trussed him in strapping tape and Cal stood over him. I got the trial organized simply because it was my idea. We held it right there, there was no reason not to. Syrene acted as his defense and Jayce as the prosecution. They wanted me to be judge, but I pointed out that I was also a witness, so Jessica took that role.

It was a short trial. Jayce asked Claire how certain she was of her techniques, what the chances of a genetic mismatch were. There was no room at all for error there; she had the genetic profile of every person on the planet and his was the only match. He asked me about my procedures, how Genia and I had got the semen sample from Mona's body. Then Syrene asked questions, and to her credit she asked hard ones. Wasn't it possible that Mona had sex with Tony prior to the murder? Did we have proof that they hadn't? We had no genetic evidence from Genia, and we couldn't prove it was Tony who sabotaged the sequencer.

The trial could have fallen apart there, and I hadn't considered the implications for the colony if it did. It was Tony who convicted himself, ultimately. He tried to follow up on the line that Syrene had opened, saying that he'd had an affair with Mona, that he loved her, that he couldn't possibly do that to anyone. The words were heartfelt, but he had the eyes of a cornered animal. He was back to charming and manipulative, though his own actions, his own words while he'd held us all at gunpoint put the lie to that line. I testified to Mona's genital trauma, and Jayce pointed out we hadn't found two sets of DNA in her, only one. She had been raped after she died, and Tony was the only possible culprit. I explained the cut I had found on Mona's scalp, and the strip taken from Genia. The final clincher was my testimony about Cheryl's hair, and Claire's that she had matched it with the sample that should have been Tony's. He had an explanation for that too, a tortured and convoluted one that nobody believed, but he held on to it to the end, spinning lies that he couldn't have believed that we would believe. He just did it because he was a psychopath, and lying was what he did. Jessica called a recess and the trial moved to the greenhouse so we could take another hair sample from Tony and demonstrate it wasn't the same as the one he was supposed to have given to match with the DNA taken from Mona.

The rest of the colony served as the jury, and when we'd demonstrated the hair mismatch they all went around behind one of the cargo canopies to discuss the case. It took them only as long as it took to walk there and back and their verdict was unanimous. Guilty as charged.

"So what do we do with him?" I put the question to the group at large. A more advanced legal system might have excused the prisoner from hearing his fate under discussion. As it was he got to listen in.

"Kill him." Jayce's voice was hard.

"Listen, I . . ." Tony's voice was desperate, but it stopped when Cal's eyes met his and his scarred knuckles curled into a fist.

"Do we want the death penalty here?" I asked.

"If we don't kill him, what do we do with him? We can't guard him for any length of time."

"We all have guilty pasts." I spread my arms. "The Colonization Council gave us another chance."

"But Earth is gone." Jayce's voice was choked with emotion. "Earth is five hundred trillion miles away and a thousand years ago. We're here, and this . . ." He groped for words. ". . . this rabid dog has nearly destroyed us all."

As he spoke I suddenly realized that he must have been paired with one of the victims. Not Mona, not Genia, it must have been Cheryl. There was more here than fear, more than a desire for justice or even revenge. There was an ocean's deep pain of loss. I knew it myself, I still felt it when I thought of Suzanne, less now that Claire was in my life. I looked across at her. Her face was serious as she watched



the drama play itself out.

"None of us would be here if Earth had a death penalty."

"What do *you* want to do with him then?" Jayce challenged.

I paused. I hadn't thought it out that far. "Exile. We'll fly him downriver, far, far away, find an island, if we can. We'll give him supplies and gear, drop him there and leave him."

Jayce was unimpressed. "Why waste the time and resources? He's guilty, he's admitted it, we've all seen the evidence."

"He's guilty." I turned to Tony, letting my own anger swell up. "We all know he's guilty. I've seen what he did to Genia. She was my friend. I know him, know what he is better than any of you. He doesn't deserve any lenience, and no, he doesn't deserve to live." I paused, breathing deep. "This isn't about him, this is about our society. Someday we'll have someone who we decide is guilty who really isn't. Then we'll have a chance to correct our mistake."

"He'll die out there anyway," Chris Aspho spoke up. "He won't survive the night."

"Maybe, maybe not. We're giving him the chance. It's the best we can do. I don't care so much what happens to him, but we're setting the ground rules here. Our children are going to live in the world we create." I looked across the hangar to Claire, saw her smile. We would be having children ourselves one day.

I won the argument, not so much because the others thought I was right as because I was the one who had tracked Tony down in the first place. Jessica pulled down the images from *Endeavour's* last photo pass and we found a good-sized island where the river formed a delta as it met the planet's vast southern ocean. It was flat enough in places to get the flitters down, and at five hundred miles downstream, just within range. It would have been wiser to wait for the sun to come up, but nobody wanted to keep him around. Syrene and Chris volunteered to fly in the dark with full-spectrum goggles on, and we set up the flitter's flight computers with the coordinates. We stripped Tony and gave him a search that was probably more thorough than it needed to be, then dressed him under guard, trussed him again with strapping tape, and tossed him into the tiny cargo compartment of Flitter Two. Flitter One carried a grab bag of tools and supplies, enough that he could survive, if he was industrious and lucky, and if he could find something to eat. We'd watch the island with *Endeavour's* cameras, and if he was still alive in a year we'd know we could eat at least some of the local flora. It would save us having to defrost the rats.

I started sweating the moment they were airborne, and though I was supposed to be working in the greenhouse I kept popping over to Jessica's workstation by the uplink dish to check their location and progress. It was hard to see how Tony could get loose and commandeer Flitter Two, harder still to imagine what he might do if he did, but that didn't prevent the worry. Seven hours later I breathed out as Syrene reported Tony down on the island and both flitters airborne again. They left him trussed and stuck a hunting knife in the ground nearby. He could crawl over and get himself loose, but not fast enough to interfere with their takeoff. It was only then I realized I'd been awake for nearly thirty hours. I sat down beside the uplink console and was asleep before I knew it, still wearing my cold-weather gear.

I was dreaming that I was flying a flitter myself when I woke to the drone of engines. I went outside into weather that must have been sixty below. I just had time to look up when a dark shape swept across the sky, followed by another. Other colonists were coming out, heading for the patch of snow that was our airstrip to welcome the flitters home. I stood at the front of the group, a decision neither I nor anyone else made consciously. Tony, charming and manipulative, had made himself our leader. Now he was gone and because I had been the one to depose him, I had taken his place as first among equals. Perhaps if Cal Cadogan hadn't backed me up when the others would have beaten him to death, or if I hadn't convinced Jayce it was better to exile him than execute him, it would have happened differently. The king is dead, long live the king.

Claire came up beside me and I put my arm around her as Syrene banked around into the wind to

land. She snuggled close and I saw a faint brightening in the eastern sky behind the incoming flitter, where 37 Geminorum was slowly coming over the horizon. For the first time since I'd come out of cold sleep I saw a real future on this world. It took the dawn a long time to arrive on 37 Gem-IV, but it did come.

"You know," I said to Claire, as Syrene buzzed to a stop and Chris's flitter swung overhead to start its landing run. "We really need to name this place."

She smiled up at me. "I'm sure we'll think of something."

## **THE SCIENCE IN THE STORY: "BOTANY BAY"**

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***Paul Chafe***

### **37 Geminorum and life on other planets**

37 Geminorum is about 56 light-years distant, and a virtual twin of our sun. It is slightly older, at 5.5 billion vs 4.6 billion years and ten percent heavier with about the same diameter. This gives it a surface temperature of around 6250 degrees and makes it about 25% more luminous than the sun. 37 Gem has been short-listed as a high-probability candidate for having a life-bearing world. If all goes well, NASA's Terrestrial Planet Finder will take a look at 37 Gem in 2012 in order to see if it can pick up signs of water and oxygen. Water, so far as we know, is essential to life, and free oxygen, which left to itself quickly leaves the atmosphere by combining with other elements, is a strong indicator that there is something at work replenishing it. On our planet that something is the photosynthetic process of green plants. Detecting H<sub>2</sub>O and O<sub>2</sub> on an Earth-sized planet in a stable orbit around a sunlike star would be a strong indication that we are not alone in the universe, granted we may be sharing it with nothing more sophisticated than blue-green algae.

Of course this assumes that life on other planets is at least vaguely like life on Earth. In fact there may be life with exotic metabolic processes radically different from life on Earth (and in fact, on Earth, only photosynthetic plants actually produce oxygen, the rest of us consume it), but without more information we can only guess at what forms it might take. Moreover, there are strong reasons to suppose that life, wherever we find it, will have certain things in common with life on Earth.

Life lives in the universe, and though the few brief ticks that measure the life of any earthly creature seem completely out of sync with the ponderous cycles of stars and galaxies, we now know the two are intimately related. The conditions of the Big Bang led to the creation of hydrogen and helium gas in the early universe. As the universe expanded these gases coalesced into huge clouds, which then collapsed under their own gravity to form stars and galaxies. These first stars may have had gas giant planets, but rocky, Earth-like planets were impossible because the heavy elements of which they (and we) are made had not yet been formed. Some of these elements are forged in the fusion processes of massive stars, and the rest in the extreme conditions of supernova explosions, which thereby serve to seed interstellar hydrogen clouds with the basic materials for life. Supernovas play another role in setting the conditions for life by compressing and heating the interstellar medium with their intense shock waves to trigger star formation.

There is more to life than simple elements, of course. On Earth life is built of amino acids, which form the letters of the protein alphabet coded into our DNA. Though amino acids could (and probably did) form on the early Earth from ammonia, methane, water and hydrogen, there has been a nagging unanswered question. Like gloves, amino acids display chirality, or handedness—they come in mirror image forms. Most chemical reactions ignore handedness but life depends on it, because proteins have to fold into complex shapes to do their jobs. As long as all amino acids of a given type have the same chirality the protein will fold the same way each time, but if both left- and right-handed versions are present, the process becomes akin to driving to a friend's house by flipping a coin at each intersection. Even a tiny protein would have billions of different ways to fold, almost all of them wrong. Living things (with trivial exceptions) synthesize only the left-handed form of amino acids, but how life got started at all on a planet where natural processes formed both types equally is another question. However, amino acids are now also known to form in space, along with many other biologically important molecules. The European Space Agency's Infrared Space Observatory has found them in huge quantities in vast molecular gas clouds seeded by supernovae, and especially in energy-rich areas of star formation. Interestingly, the amino acids found in asteroids are also left-handed, suggesting that some interstellar process is at work to sort the amino acid basket. One potential candidate is circularly polarized ultraviolet light. Like amino acids, circularly polarized light comes in either left or right orientations, and will preferentially break up molecules of the opposite hand. Researchers using the Anglo-Australian Telescope have found star-forming regions bathed in circularly polarized light, and we may owe our existence to the sun itself being formed in such a region. By the time you read this the ESA's Rosetta probe will be on its way to rendezvous with comet Churyumov-Gerasimenko. Its lander will carry the Cometary Sampling and Composition experiment (COSAC), which will be able to detect and analyze any amino acids present. If it finds them, and if they too turn out to be left-handed, it will be strong support for the theory that the chemistry of life on Earth, and by extension on other worlds, first started in interstellar gas clouds long before the solar system was born.

Space does not only provide the building blocks for life, it may also provide the driving forces for evolution. Mass extinctions occur regularly through our planet's history, and each one wipes the evolutionary slate clean to allow life to develop in new directions. The theory that an asteroid impact in the Yucatán peninsula wiped out the dinosaurs and set the stage for mammalian dominance is now widely, although not universally, accepted. The impact laid down an iridium-rich layer of clay around the world, and five other mass extinction events are also associated with iridium deposits. A graph of mass extinctions appears to show a periodicity of about 26 million years. One theorized source for this periodicity is a distant companion star to our sun with a highly eccentric orbit. Every 26 million years the star spins through the Oort cloud, the cometary halo at the edge of the solar system, disrupting the orbits

of the comets and sending them plunging earthward in a shower. Searches for this star have so far found nothing, and some researchers have proposed that the driving force behind the impacts is the Sun's gravitationally driven oscillation through the galactic plane.

All this means that evolution on other worlds will probably use the same chemistry set that it does here, solving the same basic problems of replication and propagation, and under the same physical rules. How the basic materials are assembled to solve those problems is something else again. On Earth we use just twenty out of many hundreds of possible amino acids. In addition, DNA, which combines a pyrimidine or purine base with a sugar backbone is just one of a whole family of molecules that could carry genetic information in the same type of highly stable helical structure. We can expect life on other worlds to resemble life here, but only very broadly. There will be replicators built around a DNA- or RNA-like molecule. There will be cells because a cell is the minimum complete survival unit built around a genome. The first cells will be photosynthetic because that will be their best source of energy, and later other cells will learn to eat them. There will be organisms built of cells, taking advantage of the cellular specializations that group living allows. We probably shouldn't expect much more than that. For two thirds of the 3.5 billion years that life has existed on Earth there was nothing more interesting to look at than algae and bacteria. Life has only been out of the oceans for 10% of that period. As the sun consumes its hydrogen it grows slowly larger and hotter, and in another 3.5 billion years it will have expanded enough to fry all life on Earth, if some other fate hasn't befallen us first. Looking at this statistic, we have around a fifty-fifty chance of observing interesting life on a promising planet.

It would be wonderful to discover a world that harbored not only bacteria, moss and jellyfish, but intelligent life with an advanced civilization. This is much less likely. Some evolutionary solutions, like fins, wings, legs, ears, eyes and sexual reproduction, have evolved independently many times. Some, like cephalopod tentacles and civilization-building brains, have evolved only once, despite their seemingly obvious usefulness. We can expect life on other worlds to be built of amino acids, although probably a different set than the ones we use. We can expect it to carry its genetic information in structures akin to DNA, and in many cases to reshuffle those structures every generation through sex. We can expect it to have recognizable senses, familiar modes of locomotion, to either eat or photosynthesize. We probably shouldn't expect it to have tentacles or advanced technology. The universe is so large there almost certainly *are* other civilizations out there, even civilizations of intelligent octopi, but precisely because it is so large, they will be very hard to find. Even so we will learn a lot in the search, and what else is life for?

## **Genetic Engineering**

In the story the colonists adapt terrestrial plants to life in the difficult environment of 37 Geminorum-IV. In the last twenty years genetic engineering has moved from science fiction to everyday fact of life. If you haven't eaten genetically modified foods by now, you're one of a tiny and very careful minority. Over 100 million acres are now planted with genetically modified crops, mostly in the United States. Species from corn to soybeans have had their genome altered, and the realities of the food-processing industry mean that components of these foods can show up where you least expect them. Predictably this practice has generated considerable debate on both sides. The companies who control the technology claim that the practice increases crop yields and nutritive value, reduces costs and presents no measurable risk to either consumers or the environment. Opponents argue that transgenic crops can pass along their modifications to wild species through cross-pollination and other transfer methodologies, and that there is insufficient proof that genetically modified crops are safe for human consumption.

At a basic level, genetic engineering is nothing that humans haven't done for thousands of years through selective breeding. Dog breeds vary so widely from each other and from the wolves they're descended from that they seem like different species. Corn is so different from its ancestor, the wild grass teosinte, that it took genetic analysis to establish the link with any certainty at all. Traditional breeding uses naturally occurring genetic variation and mutation to produce desired characteristics in a genome, a long and laborious process. Genetic engineering shortcuts the process by introducing a specific, desired trait into a species from an unrelated one, producing results in one generation instead of dozens or hundreds. As such it has tremendous promise. Bacteria modified to produce human insulin were the first commercial genetically engineered organisms, and most insulin since 1982 has been produced this way. Bacteria-produced insulin is both cheaper than that derived from animals and, because it is identical to the insulin produced in the human body, doesn't cause the allergic reactions that the animal product can.

No one would argue that this is a bad thing, but it is just the tip of the iceberg. Entrepreneurs have long wanted to produce spider silk commercially, because it's ten times stronger and tougher, weight for weight, than steel. Unlike silkworms, spiders are difficult to farm, and the complex protein structure of spider silk has defied efforts at artificial synthesis. However, the silk glands of spiders are similar in structure to mammalian milk glands, and by introducing the gene for spider silk proteins, a Canadian company has created a strain of goats that give spider silk protein in their milk. Similar experiments have produced fish that glow in the dark. Spider silk may be a useful industrial material, but the glowing fish, which was developed by accident, is being marketed purely as a pet. We now have the literal ability to play God, to create life, within broad limits, in whatever form we choose. How we should, or if we should, use that power is an open question.

The accident that created the Glofish highlights one of the primary concerns about genetic engineering; it is an inexact science. Researchers do not precisely splice genes into genomes like a director cutting a movie. The process is closer to painting with a shotgun. The desired genes, along with some that just hitch a ride, are inserted in more or less the correct location, with some risk of damaging the target. The bioballistic technique, used with plant cells, makes this analogy literally correct. The desired genes are coated onto tiny slivers of tungsten and then fired into the cell's nucleus, where the genes will be taken into the plant's genome. Other techniques use bacterial plasmids or viral vectors to bring the genes to the cell. The problem here is the bacterial hitchhiker genes that transfer bacterial characteristics (including perhaps antibiotic resistance) to new organisms. Combining this with bacteria's ability to promiscuously transfer genes among themselves, and even into other species of bacteria, might allow these genes to escape into wild species, with unpredictable consequences. Gene transfer from genetically modified crops to other plants is also possible, raising the specter of superweeds with programmed-in genetic resistances to control agents.

Looming larger than the scientific issues are the social issues. Genetic engineering is an expensive, research-intensive business carried out by large and powerful companies whose interests are not always aligned with the public's. It is possible to genetically engineer crops that resist insects and crowd out weeds on their own. Agribusiness giant Monsanto has instead chosen to create strains that withstand heavy applications of their own weedkillers, thereby increasing demand for their products, in addition to charging farmers for the privilege of planting Monsanto seeds. The adverse environmental side effects of pesticide runoff are well-known, and there is concern about the damage done to benign species like butterflies, as well as a recognition that increased use of pesticides leads inevitably to pesticide resistance in pests. Finally the health effects of the genetic modifications on humans are not known.

Beyond custom-designed plants, animals and drug-producing bacteria is the ability to modify our own genetic code. Experiments are under way to cure monogenic (i.e., caused by one defective gene) diseases like muscular dystrophy, hemophilia and cystic fibrosis through gene therapy, the direct modification of a patient's genome. The promise, at least, is of a complete cure in a single treatment, with the corrected gene inserted into the patient's cells and reproducing itself stably. For serious diseases the benefits are clear, but the potential does not end there. Gene therapies are already being developed that will function on fetuses in the womb—the only place to solve some genetic problems. We will eventually

have genetic therapies that do not just cure or prevent a disease but make an unborn child grow smarter and stronger. Current gene therapies affect only somatic cells—the modifications they make are not passed on to a recipient's children—but research into techniques to modify the germ line itself is under way. When these potentials become reality, who will benefit from them, and who will bear the responsibility if they go wrong?

In the final analysis, it is clear the genetic modification of species is here to stay. We have, for the first time, the power to direct our own evolutionary future. It is up to us, as a society, to use that power wisely.

## Solar Foil

The colonists on 37 Gem-IV have set up several hectares of solar foil, flexible rolls of black plastic that turn sunlight into power. They use the collected energy to crack water into hydrogen, and store the hydrogen in their landers to run the fuel cells that power their equipment. Solar foil is cheap, tough, clean and efficient, an ideal way to generate power. Is it possible?

The sun puts about 600 watts of power onto the average square meter of our planet every day, for free and with no pollution. We can convert that power directly to electricity with a silicon solar cell through the process that won Einstein his Nobel prize, the photoelectric effect. It works because a photon of sufficient energy can hit an atom and knock an electron loose, creating what's known as an electron/hole pair. The hole is the empty space left behind where the electron used to be, and another electron can then fall into that hole, allowing the hole to, in effect, move around. The electron, naturally, tends to fall back into its hole, but if we can get the electron to take a roundabout route through a wire, we have an electrical current that we can do useful work with. Electrons have a negative charge and holes have a positive charge, so if we can create a charge gradient, the holes and electrons will separate themselves automatically.

As it turns out silicon is a good material to use for this, with electrons that are relatively easy to knock free. Pure silicon has four electrons available for this trick, but we can give it either extra electrons by doping it with phosphorous with five electrons (call this N-type silicon), or extra holes by doping with boron, with just three (call this P-type). Putting these two oppositely doped materials in contact creates a PN junction, the basis of the semiconductor diode and the solid-state transistors that are the workhorses of the information age. At the junction, some of the extra electrons on one side fall into the holes on the other side, which creates exactly the charge gradient we need. In a solar cell an electron/hole pair is created in the junction by an incoming photon, and the gradient sweeps the electron away from the junction and into the N side, while the hole gets swept into the P side. Run a wire from the N side to the P side to allow them to get back together again, add sunlight and you have electrical power.

Silicon solar cells originated in the 1950s as a power source for spacecraft. The first cells were only 4% efficient and hellishly expensive, but today a typical commercial cell is around 10% efficient and the best semiconductor cells (using gallium arsenide) are 35% efficient and cheap enough to power pocket calculators and remote highway signs. It would be nice if we could power our homes with solar cell shingles, but modern silicon solar cells remain too expensive to use in anything but niche applications, even if the number of niches has increased steadily over the years. A solar array costs about \$7,000 per kilowatt of installed capacity. Contrast this with \$500 per kilowatt for a typical gas-fired power plant and it's usually a better deal just to hook up to the grid if you can, even given that sunlight is free.

Silicon cells are a semiconductor product, and we're used to seeing the cost of semiconductor products fall steadily as their capability goes up rapidly. Over the years we have been able to keep

reducing the size of the circuits, which means we can put more chips on the same size wafer, and those smaller chips run faster and use less power, all other things being equal. Silicon solar cells don't benefit from this equation, because they are fundamentally about being big, we need a lot of square meters of silicon to capture usable amounts of power. Making the cells more efficient has strict limits, and there isn't that much room for improvement. Process improvements don't offer much help either. Semiconductor wafers are doped by successively depositing, baking and etching layers of material on an ultrapure silicon substrate. These procedures have to be done in superclean, controlled environments, using vacuum chambers, precision ovens, ion sputterers and other expensive equipment. The size of the chambers and the time the wafers have to be baked puts strict limits on production rates. The finished cells are fragile, and so must be hand-assembled into solar panels, again slowing production and adding cost. Solar cells are useful, but they aren't solar foil, not yet.

The solution is to find a whole new way of doing business. Conductive plastics have been around for nearly thirty years, and it is possible to make N- and P-type polymer semiconductors. By combining these in the same way as a conventional solar cell we have a solar cell that can be made with cheap materials in a bulk-layering process at room temperature and pressure, not very different from the processes used to produce aluminized plastic sheets. In theory these solar cells can be made on a roll meters wide and hundreds, or even thousands of meters long. Cheap and damage tolerant, this kind of solar foil could easily be installed on rooftops as a standard option when new houses are built, or retrofitted to existing homes just as easily. The economic benefits of clean and cheap power produced right at the point of consumption are obvious, and researchers have been working in a number of directions to perfect this technology. Currently the catch is efficiency. Plastic semiconductors are less effective at producing electron/hole pairs than silicon and separate them less effectively when they are produced. As a result, plastic solar cells have been limited to efficiencies of a few percent, low enough that their cheaper production cost doesn't compensate enough to make them commercially viable as a primary power source.

That may change in the near future. Researchers at UC Berkeley have developed a novel method of producing plastic solar cells that promise much higher efficiencies. They combine P3HT, a semiconductor polymer, with carefully sized microclusters of cadmium selenide. The clusters are shaped into nanorods, seven nanometers in diameter and sixty long. The diameter is chosen to maximize the production of electron/hole pairs by visible light, and the length allows the nanorods to function as highly conductive wires, overcoming the poor conductivity that reduces the efficiency of most plastic cells. The interface between plastic and the nanorods forms the PN junction, with holes being transferred to the plastic and electrons being carried down the core of the nanorod to the aluminum back-electrode. Simply blending the microrods with the plastic results in a conversion efficiency of under 2%, but aligning the rods vertically and adjusting their spacing into a regular honeycomb structure both maximizes the number of incident photons that can create an electron/hole pair, and maximizes the conduction of electrons down the rods to the back electrode. Using this technique, efficiencies of 10% or more are possible. Commercializing the nanoassembly techniques needed to create the honeycomb is the subject of ongoing research.

The economic and social benefits of bringing solar cell costs down to or below conventional grid power costs need no elaboration here. It has been two hundred and fifty years since the start of the industrial revolution, but our civilization is still primarily powered by fossil fuels, particularly coal. While the economic benefits of industrialization are indisputable, so are the costs to ourselves and the environment. All our power sources (except nuclear) are rooted in sunlight, directly or indirectly. It makes sense to harvest it as close to the source as possible.

## Interstellar travel

In order to find life in other star systems we have to get there. There are two ways to do this. One is to travel not through but *around* space using a mechanism like wormholes or hyperdrive, getting from A to B without going through any of the points in between. Such wrinkles in the space-time continuum aren't absolutely forbidden by our understanding of the way the universe works, but if, and how, we can actually use them for transportation is anyone's guess. Nevertheless most science fiction stories that involve planets outside the solar system use some variation on this approach. The space drive is simply assumed to work, along with blasters, teleporters, tractor beams and whatever other hardware the author needs to put in his world. We don't need to know exactly *how* these things work, any more than we need to understand the thermodynamics of a twin spool gas turbine in order to get from London to New York on a commercial jet. This approach is an absolute necessity if you want to write about an interstellar civilization without dealing with issues like relativistic time dilation. (See Joe Haldeman's *Forever War* for a book that *does* deal with time dilation in detail.)

The second way to get to the stars is with some advanced but recognizable technology like laser-driven solar sails or fusion drives. Interstellar empires are out, but there are still lots of interesting stories here, with the advantage that, unlike the hyperdrive, we can at least envision the nuts and bolts that go into such a system, whether we can build them today or not.

The *Endeavour* that brought the colonists to 37 Gem is a modified Bussard ramjet. In 1960 R. W. Bussard first envisioned a starship that would harvest interstellar hydrogen for fuel with a big magnetic field and burn it in a fusion drive, continuously accelerating. Taking relativity into account, Bussard's original design was capable of getting within a tiny fraction of the speed of light, crossing the observable universe in 20 years ship time (12 billion years Earth time). There are some problems with the concept, however, including the relative sparsity of hydrogen in the area around our solar system and the problem of running a fusion drive with fuel moving through it at relativistic speeds. Like any ramjet, the Bussard drive has a minimum operational speed, about 5% of  $c$ , so *Endeavour* uses onboard fuel to get herself up to this speed. After that she throttles back the engines. For most of the voyage she uses a magnetic field twice the size of Earth's to harvest fuel to refill her tanks, burning just enough to maintain ramscoop velocity as she travels. This avoids or reduces some of the major design difficulties with the Bussard ramjet, at the cost of moving much slower. This isn't such a bad thing, as we also reduce the need for shielding from the flux of interstellar material falling in at near lightspeed. We still have to worry about hard cosmic rays, but the huge magnetic fields can help with that.

For hardware we'll need some really big magnets for the drive itself, which will contain the fusion plasma, and some high-powered lasers to heat it. We'll have huge fuel tanks to power the ship until it's going fast enough for the ramscoop effect to kick in, and then some truly mind-boggling magnets to create the scoop field. Unfortunately, even small interstellar distances are immense, and the travel times range from prohibitive (say 40 years to Alpha Centauri at 10% lightspeed) to ridiculous (a millennium to 37 Geminorum at 5% lightspeed). Still, we can envision some more technologies to help us out here, including cold sleep, generation ships and undying sentient computers. Relativistic time dilation is small at these speeds, so is unfortunately not much help.

*Endeavour* carries four unpowered reentry shuttles, each twice the size of a 747 and massing a thousand tons each, preloaded with colony supplies. The main ship is just banks of cold sleep chambers, and we'll assume it takes half a ton of life support per colonist, and another half ton of support gear, so the passenger compartment comes in at five hundred and twenty tons. Add a generous two thousand tons more for the drive and shielding and round up for sensors and control systems and we have a total ship mass of seven thousand tons, about as much as a modern destroyer.

Accelerating a seven-thousand-ton ship to 5% of the speed of light takes a lot of energy. Using Newton rather than Einstein to keep the math simple (and accepting a .2% error), the energy required is



equal to half the mass, times the velocity squared. Five percent of lightspeed is 15000 kilometers per second, and the energy required is  $7.88 \times 10^{22}$  joules. That's nearly 20 *billion* megatonnes, to put that in units more commonly used to measure fusion yields, but we'll actually need more power than that, since we won't convert energy to velocity with 100% efficiency. If (admittedly a big if) we can get an exhaust velocity of 5% of lightspeed out of our drive then we require about a hundred thousand tons of hydrogen fuel to get a final velocity of 5% of lightspeed for our ship. Total ship mass is then a hundred and twelve thousand tons, with five thousand tons added for tankage at a mass ratio of 20. This is as big as an aircraft carrier—large, but not impossibly so. We will need cheap ground-to-orbit transport to get it up there, but given the ability to build a .5c fusion drive, we will *have* cheap ground-to-orbit transport. Our drive needs to work with normal light hydrogen, because deuterium costs \$1,500 a kilogram and tritium, which has to be made in nuclear reactors or particle accelerators, is \$50,000 a kilogram, too expensive even if we can reduce its cost by a factor of 50. If (another big if) we can contrive to generate the temperatures and pressures required to make light hydrogen fusion effective, we also get an aneutronic fusion reaction, which means our colonists won't be baked in neutron radiation by the time they get there. These technologies are far in advance of anything we can build today, but unlike warp drives they don't require rewriting the physics books.

Since even at 5% of lightspeed a journey to 37 Gem would take a thousand years, some kind of cold-sleep hibernation technology is essential. Human cryonics is not an especially advanced science right now, and those who have themselves frozen rather than buried or cremated are unlikely ever to be revived (partly because current laws require that they be dead prior to freezing, but even if they weren't, the tremendous damage inflicted on human tissues in the freezing process means they'll be thawed out as cellular mush). However, cryopreservation does exist in nature. Alaskan wood frogs survive the winters by freezing solid, protecting their cells from ice crystals with glycogen and a series of clever adaptations. Sperm, ova and embryos can be frozen indefinitely with liquid nitrogen in a simple cryoprotective solution, and so can small pieces of tissue like blood vessels given more advanced treatment. Living systems *can* survive the process—but unfortunately it doesn't scale up well.

There are four problems that must be overcome before cold sleep is viable for humans. The first is getting the cryoprotectants, which tend to be very toxic in concentration, to every cell in the body without killing the body in the process. This prevents the cell membranes from bursting because of ice expansion. The second is preventing gross physical damage (like brain fracture) from occurring as the tissues contract and become brittle as the temperature falls. The third and fourth problems are the reverse of the first two, thawing the subject safely, and getting all the cryoprotectants back out of the subject. Humans are now routinely cooled to 18 degrees Celsius for open-heart surgery, and animal experiments have gone down as low as 3 Celsius. At these temperatures perfusion with cryoprotectants won't kill you. One large problem is that perfusion has to occur through the bloodstream, and poorly vascularized tissues like bone and cartilage will have trouble here. The next step is to get from just above zero to liquid nitrogen temperatures without damage. The key is careful control of the freezing profile, holding off freezing as long as possible, then triggering it all at once (a process known as seeding), and preventing the differential contraction of tissues that leads to cracking.

A person frozen in this state could well be considered to be alive in suspended animation. The problem then becomes thawing them out, a much trickier problem. It has to be done all at once, because tissues that thaw before the circulatory system is operating will die waiting for oxygen. Radio wave reheating, basically a sophisticated microwave oven, might do the job, but it needs to be done with precision so that parts of the patient aren't cooked in the process. Once brought back to a temperature above freezing the subject needs to be deperfused to flush the cryoprotectants back out of the system, then finally warmed back up to body temperature, hopefully none the worse for the wear.

Because of the tremendous travel times involved, solving the problems of cold-sleep hibernation is essential if we want to get to the stars (or to the future, for those of us left here on Earth). However, they are not insurmountable in the long run. There are many therapies today, including transplants, artificial organ replacements, heart and brain surgeries and microsurgical reattachment of severed limbs, which

were pure science fiction fifty years ago. The stars can be ours, if we want them.

## BEYOND PLUTO

*A story of big ideas; a story of first contact and second contact; a story of birth and rebirth; a story only a plasma physicist could write . . .*

***Gregory Benford***

### **The Far Dark**

Tricia knew she was born to do this. From the beginning of this long mission, she had found her hours on watch the most exciting she had ever known. Even after well over a year on this mission, her pulse raced when she went on duty.

She peered at the landscape relentlessly. Stark shadows cut across the dirty gray plain and the Sun was a sharp, glaring point. Under Charon's gloomy crescent the thin methane atmosphere scattered little light. Shading across the bleak cold, towering ice was darkly twisted, their tortured sculptures worked by eons on a somber, sleeping plain. The moon loomed huge and shadowy above a sharp horizon.

It held a certain austere beauty, but the mere landscape told nothing of its incredible cold. They had been drawn here by the unexplained, growing warmth of this place—yet warmth was the wrong word. That grim, dismal view was only eighty degrees above absolute zero. A single moment's exposure would not merely freeze her; it would snap her bones from thermal stresses.

Yet here, life stirred. Incredibly.

*Life on Pluto. Amazing enough by itself. But the startling fact, hard even now to believe, was that this was not all. Not just the simple legged forms that crawled and walked these bitter, barren hills. There were others who descended from the sky, those from even farther out, beyond Pluto—the Darksiders.*

Nobody, not even the most extreme exobiologists, had guessed.

Tricia resisted a morbid feeling: that the fragments of crumpled metal mingled with those ice-chunks were actually scraps of . . . well, flesh.

By now she knew better. Not flesh, but once living—if machines could do that. But emotion is slow to overtake reason.

She inched the crawler she commanded forward. Working in a comfy work pod, directing the crawler with telepresence gloves, she had to be careful not to alarm her prey. Ahead, the gunmetal-blue, oblong Darksider didn't seem to notice. Maybe it was recovering from its landing? Or playing possum? *Remember, you're the new kid out here. You might look like an intriguing new kind of lunch.*

She moved her hands in their command gloves, made the crawler grind forward another meter, crunching ice. Her tracked and low crawler was in shadow, approaching at an angle to the Darksider. In the incredible cold here, slow was always a good idea. Parts froze up without notice. Circuitry went dead and even an emergency warm-up couldn't revive them. Life here had an ominous, ponderous feel that got on her nerves.

Another sluggish move, then a wait. The Darksider didn't seem to mind.

Scavenging for Darksider remains had turned out to be easier than skystone hunting. The rain of incoming meteors had that rather poetic name, in the whispery acoustic language of the native Plutonians. The zand, she had named them, a combination of zany and grand—they were both. They spoke in long, wispy chords that skated great distances through the thin nitrogen-methane air. Chilled words, peeling out with a rolling rhythm that reminded her of whale song. But unlike the whales, this time she caught what the zand were saying.

That she knew this was yet another wonder, but one human-made. The translating programs—and what miracles those were, born of the advanced SETI programmers!—had picked out an obvious combination word, more expressive than English's *meteors*. And indeed, the rocks that came gliding in from the utter darkness beyond Pluto did not flare in the chilly "air" here. They just slammed into the ice, carrying their fresh information—from where?

"Got the target?" Franklin said over comm.

"Dead on. Big one, looks like parabolic antennas sticking out of the carapace."

"Let me know, huh?" His tone was edgy. "I'm on this watch too, y'know? It's not nice to just say nothing, leave me hanging here."

"I'll try being nicer if you'll try being smarter."

"Hey, just because I screwed up capturing that pair of Darksiders—"

"Okay, okay." She should be keeping the peace, but he was indeed irksome. "I'm just watching it for now."

"Oh. I'll get on the spectral scan."

"I thought you were napping."

In his familiar miffed tone he shot back, "I'm checking your every step."

"Don't need a babysitter, y'know," she said. "Catch up on your sleep."

"That an order, Captain?" Franklin said stiffly, with a subtone of derision to boot.

"Sure. Nod off all you want."

Actually, he was right. They had all been working so hard, for so long, that four days ago Earthside told her to institute mandatory days off. Nobody was going to honor that, she could tell right now. They all loved this vast, strange problem set before them. The mystery kept them going.

*Hey, concentrate.*

One more meter . . . Out of shadow now. *Closer . . .*

Her boards reported weak microwave emissions from the prey, but it remained stark and silent on the snow. But no, *not* a corpse, she reminded herself. The latest arrival from somewhere beyond Pluto. Her hands moved in air like a pianist's.

*Move. Close with it.*

The crawler probe clanked forward and stuck out spindly grapples. Grasped. *Gotcha.*

She reeled in her catch like a fish. Back to the waiting lift vehicle. While the probe and its burden

were still lifting off for the mother ship, *Proserpina*, the DIS computer ship-mind whirred through a preliminary analysis. Tricia watched the silvery ship rising to join its mother, and felt sharp anticipation.

The skystone was a nasty machine. Those fierce-looking claws . . . tantalum carbide, hard and tough even in supercold. The structural shell . . . aluminum/titanium alloy. (*Magnification, please.*) Those looked like mechanical relays of some sort, and they were made of—solid mercury? Sure; at these temperatures, why not?

But what was the purpose of those patterns of rare earths? And those curves, seen in projection, looked almost like a conventionalized helix—*Oh*.

Tricia spoke into her recorder.

"Hypothesis: these devices, whatever they are, contain a genetic model. Yeah! And it's carried in a double helix, like DNA! A model of—of what? Of the 'ideal' zand, from a Darksider's point of view?" Her mind raced. "We already know that these infalls came periodically, when Pluto arcs out along its steeply elliptical orbit. On each such raid the Darksiders—a name for the unknown, that's all—scan the zands, say. And those that don't measure up they squish."

Could this be? Guided evolution, faster than Pluto's low-energy biosphere could have achieved by itself—

Damn. She still didn't like it. "Guided" evolution reminded her of Earth's political strongmen during the previous century, with their cynical talk of "guided democracy." But such power now lay in human hands, and eventually would be used—wisely, she hoped.

Not too strange, then, to think of something utterly strange carrying out a genetic program in this deep freeze?

The probe clunked into its housing; she heard it ring. A conveyor rattled, taking its burden down to *Proserpina*'s low-temperature laboratory. Time to get to work.

Tricia paused for a moment, considering what would be appropriate audio background while she worked. Something Romantic, but reflective, she decided; Schumann's *Konzerstück*.

Supported by mellow French horns, the piano chords rolled out while DIS, now in direct physical contact with the specimen, shifted into high speed. She fancied she could hear it hum.

Views of their catch filled screens around her. Well, well—this beast hadn't been bent from sheet metal in a machine shop, that was sure. Coldformed, one molecular layer at a time—grown as crystals were. From the Oort Clouders' massive perspective, she guessed, a delicate job of microengineering.

And the chilling thought came: from that same perspective, the injection of those microtools into the zand culture would be no more a "raid" than the injection of antibiotics into a human bloodstream.

The thing was not dead, she had to remind herself, only deactivated. With care, and with DIS's help, she could probably feed a trickle of tailored DC into its superconducting circuitry and bring it back to life. Make it *move*, clash those jagged claws, jump up and down. ("Boogie," she almost heard Grandma say.) Possibly attract its makers' attention that way?

No. If one of her own hemoglobin molecules tried to get her attention, would she notice? *That* was the relative scale between herself and the somber dwellers in the Oort Cloud, in the far dark beyond the warm worlds.

Where the sun's gravitational grip slackened, countless icy islands swung in orbits that took many centuries to complete a single curve around the dim home star. That archipelago stretched halfway to the next gleaming stars, and seemed to be the origin of the Darksiders. As infinities went, it would do quite nicely.

\* \* \*

They had come seeking the root of a mystery, never anticipating that the answer would be so vast and startling. At the end of the TwenCen, Pluto's atmosphere had seemed to start cooling off, as the planet arced outward on its slanting ellipse. Atmospheric specialists predicted it would freeze out

somewhere before 2020. NASA had sent a speedy mission to catch the collapse.

Only it didn't come. Instead, even as the first probe sped outward, the thin film of chilly nitrogen and methane cloaking Pluto began to warm. And to alter. Other compounds began spiking their spectral signatures up on the most sensitive Earthbound detectors: water vapor, carbon dioxide, even nitrogen wedded to oxygens.

And a further, ominous puzzle: the Solar System's bow shock was moving. This was the working front where the Sun's wind of particles met the interstellar plasma, much like the curve made by a ship powering across a lake, seen from above. Before, the nearest this bow shock had gotten to the sun was about 100 AU, a full hundred times farther than the Earth-Sun distance. But now that fluttery front lay only a few AU beyond Pluto.

And now Pluto held life. Not just chilly slime molds, but small crawly creatures. And these in turn were being altered by the skystones.

No accident, all this, certainly—but what was the underlying cause?

What they hadn't expected to find was an artificial biosphere, sorting itself out on Pluto. And driven by energies somehow imported from the Darkside region, where the bow shock roiled and frothed in plasma arcs bigger than planets.

Even before they got a grip on the puzzles of Pluto, word came that a more advanced ship was plowing its way out from the inner Solar System, insolently named *High Flyer*. And closing in fast, on a red-hot plume. As if they didn't have enough to deal with already.

\* \* \*

Her work pod filled with an orchestral fanfare, those magical rising arpeggios from the piano's sonorous lower octaves—and then the timer chimed. The music stopped dead. She jerked at the sudden silence. And imagined DIS's reproving thoughts.

With a sigh, Tricia turned the music back on, but low. She owed it to Earthside, after the grief she'd given them, at least to keep punctually to their radio schedules.

A fundamental rule of missions: There was always *some* damn thing. She told DIS to start trying revival methods on the captured machine. It could run their previous methods, see if anything clicked. Judging from their painful experience trying to resurrect these strange machines, probably nothing would work.

She switched on audio and visual and tried to relax in her pod chair. Deep breath—

"Axelrod—Dr. Jensen—anybody else back there—this is Astronaut Tricia West, aboard *Proserpina* in Pluto orbit." It still gave her a charge to be able to say that. (And Grandma would have warned her not to get so swell-headed.) They would edit and polish for the whole brimming Earthside audience, of course, as now required by full-disclosure laws. She hoped no laser link pirates had caught her latest reports. They swooped into the beam and carried off choice nuggets, decrypted them and bootlegged them in time to compete with the cleaned version. Embarrassments galore, unless she kept close to the vest. But who could, all the time?

In the background Schumann sang, and DIS clucked and ruminated, while she talked.

"I have one of the Darksiders—can't help thinking of them that way—on board in the cold lab. DIS is working on it. No, I didn't commit the horror-movie blunder and let an unfriendly Thing loose inside my spaceship. These are very obviously mechanical devices—whether simple instruments or semiautonomous robots I don't yet know."

She couldn't resist a twinge of unease. She had acted as captain, overruling Franklin's quite plausible objections. She wanted to *know*—and it was their lives on the line out here, right? *Easy, girl—keep your tones proper and level*. Or should she record these little reports and have DIS take out the stress-diagnostic frequencies? She should consider that.

"Toward making contact with the Darksiders, whatever they are—zilch. The local Pluto life-forms,

the zands, I'd love to take the time to study them. But this is a sideshow, Franklin and I—and the rest of the crew—think. You're just going to have to rely on our judgment."

She took a deep breath; somehow talking into silence, knowing that her message would take hours to get to its listeners, made her uneasy. Reminding her of how far away they were from help? With one exception, yes.

"And, speaking of the zands—I've had some second thoughts on what to do about their situation. This Darksider strategy! Hiding from sight and occasionally sneaking a meteorite in amongst the zands might be as bad for them as to have Lady Bountiful descend from the clouds in full view. It could make them completely passive."

Amateur psychoanalysis, sure, but it made sense even for aliens. Skystones will fall when needed, right? Lightgiver will provide; *they* need do nothing.

"There's quite enough external control over their fate as it is, with even their genes—if I can use that word imprecisely—messed with by outsiders. I'd like to see the zands stand up on their own feet, even though feet are something they haven't got."

*Hopeless anthropomorphism*; she could all but hear Dr. Jensen snap out the words.

*Avoid argument, kid*, Tricia told herself; *you're really in charge out here, calling all the shots. Captain! But get some advice first.*

"So—I'm having DIS plot me a new course toward *High Flyer*. I want to link up with them. I know, I know—this ship wasn't made to go out into the comet-rich inner disk. But we've picked up a lot of easy water here, heating the ice. We're fully fueled. No problems! But I only want to go on a little—just to work with *High Flyer*, is all."

*There, it's said*. Not crazy, no. Hell, Earthside sends a totally new kind of ship out to explore further, and wants *me* to meekly head on home?

Good thing she could talk Franklin into going back to sleep. Otherwise, he and the rest of her crew would stick their oars in, too. *And it's my decision, damn it!* Mine alone. Captain.

Her logic was clear, right? It was almost 20,000 AUs out to the main Cloud sphere itself, and their pokey nuke drive could only make it far enough to nip at the heels of *High Flyer*. She made herself take a long breath. *But we could stay in the game*. "Now, if I only had a fusion bucket—well, I can dream, can't I—"

Clanging. Loud rasping alarms.

Tricia leaped from the immersion pod, heading for the pilot's chair. A whole row of instrument lights winked red. The hull was overheating.

But how? Panic flailed her. Heating from atmospheric friction? Maybe—were they falling out of orbit into atmosphere?

But, no—the holoscreen image of the planet and its satellite showed *Proserpina* precisely on its looping curve, where it should be. What could be heating the hull?—and blasting salvos of static into her music deck. Reflexively she shut it off.

Radio and microwave readouts jumped to the top of their scale. Sheets of electricity, swathing *Proserpina's* hull—and rebroadcasting like crazy.

Could any get in here? Flashes of light current? And how much microwave dosage was she getting?

Best get into her insul-suit—and fast. She shucked her coverall and squirmed into antiradiation garb that looked like a silvery wet suit. It clung coldly to her bare skin. Franklin came through a hatch, doing the same.

Banging. Thumps. Metal on metal.

From inside.

Oh, *damn!* Tricia raced hand over hand, down a tube, around a corner. She could hear crew

banging around in the corridors above. She slipped, hit the wall, rebounded from a bulkhead, swiveled—and stopped before the view port for the cold lab. Cracks marred its frosty interior.

The alien body inside had revived. Its tin-gray parts moved with jerky purpose. It jumped and jittered. A claw swung at the view port again—and stopped. Tricia flinched away.

It—or the intelligence controlling it—must have realized what would happen if it broke out. Emerging into ship temperature, the rules of superconduction would be suspended. Ordinary electrical resistance would prevail. Heat would build up as its currents suddenly met resistance. *Zap*. Death by Ohm's law.

She watched the thing jitter around uncertainly. No way a beast as big as an Oort Clouder had to be could react that fast. The "Darksider" body must have reacted reflexively to the input surge DIS had tried. It had come to life and automatically fought to escape. Then it must have sensed that the environment beyond that view port would be dangerously hot, and stopped its effort to break out.

Now it stood motionless on the cold lab's examination table amidst the restraining straps' tangled ruin. Tricia fancied that it glared.

Without being asked to, DIS had switched from lab analysis to dealing with the immediate emergency. *Good ol' DIS*. The heating of the hull, its sensor monitors informed Tricia, affected the surface skin only. Those secondary, lightning-bright lower-frequency discharges were annoying—obviously she wasn't going to finish her message to Earthside just yet—but otherwise no more than a nuisance.

She relied on her training. Getting her immediate adrenaline-pumping alarm to fade, her racing heart and gulping breath settled back to normal—with meditation skills, that took two minutes. Then came a wave of fierce joy.

She couldn't reach out to the vast, aloof denizens of the Oort Cloud. But quite evidently one of them had come exploring on its own account, and touched her instead. Rippling currents along their hull, prodding its emissary Darksider 'bot.

She had a momentary vision—an intuition, but from where?—of a spongy, swarming thing like a cloud. Yet also a thing of currents and whirling motion, a thinking tornado. And a thin extruded tendril of it—hesitant, flexing, touching. A giant's rub.

## Long Wavelengths

The Solar System was a spheroid cloud of debris, Ellen reflected. She looked at the big flatscreen display of an iceteroid they were passing, gleaming dully in the dim radiance of the ever-more-distant sun.

The whole vast volume behind their ship, the *High Flyer*, was filigreed with bands and shells of flying shrapnel. Big ice fragments that at any moment could smash together, or just clip each other, getting pumped into long ellipses, deep wobbly orbits. And this negligible-looking little blob of primordial gray ice and dust right here could, like the rest of the solar system's slow leftovers, now and then make a sharp hook by skimming near another piece of scrap, and in a few years slam into a blundering planet.

She shivered, not from the cold outside. Her pod was toasty-warm, comfy. But the strangeness that lay before them was approaching, and she had no idea of even what it might be.

"Anything new from *Proserpina*?" Piotr hollered from the control room. He could have spoken over comm, but he just leaned back in his chair and called down the gangway. They spent enough time logged into electronics systems as it was. And a husband and wife like to keep in touch in the most basic ways, too.

"Not a peep. They're not due to report for nearly an hour." Nervously she checked the all-sky scan anyway. Yes—far back there, the nuclear rocket plume's virulent blue-white dot, chugging along.

"I'm getting a lot that odd noise again," Piotr called. "Coming up in the ultralow frequencies."

"I thought you said it was just more turbulence from the bow shock."

"Earthside advises me not. Say is too low, very low frequency, for these high power levels."

"Then it goes in the mystery bin."

"I already sent to the SETI compiler. Maybe someday it will tell us something, huh?" He leaned back in his flex-seat and grinned, so that she could see him down the gangway. "Before we retire, maybe even."

This was a standing joke between them. They would never retire unless the world ran out of mysteries, and out here that was quite unlikely. She grinned back. "Wrong. I have a big file processing right now. SETI Institute finally coughed up."

"I don't believe!"

"Come look." About time to peek at the processing anyway. Her curiosity was as voracious as his.

By the time Ellen's hard-driving expedition into the far outer Solar System had arrived, the first, *Proserpina*, had requested and gotten the full SETI codes used to interpret and build up a dictionary from an advanced, but unknown intelligence. They had needed it to talk with the zand, the crawlies of Pluto.

The software had followed on detailed theories of how language built up from basic mental architecture. For decades the cunning linguists had used the primates as a model, but in the last decade they had extended it to the dolphins and whales. It had turned out that whale song was elaborate, beautiful—and simple. The first whale song deciphered had the structural complexity of grand opera, but the message (like most opera plots, and that was no coincidence) was: *I'm horny I'm horny I'm horny*. Later code work unfolded the intricate whale ways of broadcasting *I'm this way!* And *Food here*. And *Danger!* There were other tribal messages, too, but none that could not be expressed in a sentence. Nature did not always produce sophisticated dialogue.

But why should that experience apply to the extreme low frequencies the old *Voyager* probes had first noted, and *Proserpina* had captured for detailed analysis? A big question.

Now there was a new angle to the process. The incoming digital streams broke into constellations that resembled words in their numerical architecture.

"And they are! So the Earthside tech types say." Ellen finished her explanation to a blinking Piotr. "Our words. English!"

"Is impossible."

She grinned and put on her mock-gruff Russian accent. "Is not."

"Must be error."

"Unless whoever's sending this has heard us first, and they're replying."

"At ten kilohertz? Nobody uses frequencies like that!"

"Oh?" She had a sudden idea.

"*Da!* Even early radio, Marconi, he used hundreds of kilohertz—"

"Wait, yes, you're right." She scribbled on her slate.

He frowned and scratched his short, salt-and-pepper beard. "Right how?"

"Ummm . . . Marconi used those frequencies because he was using really big antennas."

"*Da*—made of chicken wire, they were, strung between houses, like early Russian pioneers in radio—"

"Who discovered it all first, along with the telephone and laughing gas—yeah, I've heard. Point is, my



earnest darling, Marconi's antennas had to be at least a fraction of the size of the wavelengths he used, or else they couldn't radiate very much—or receive much, either."

"That was best he could do."

"Yes—and this is the best they can do."

"Who?"

"Whoever sent these signals at frequencies of ten kilohertz. Maybe they picked up our transmissions—God help us, maybe all our radio and TV for the last century—but can't reply at those frequencies. Because at radio wavelengths, we're talking antennas maybe a meter in size. Instead, they go for ten kilohertz—because that's a wavelength they can manage."

Piotr blinked. "No—a joke, right?"

"Nope—divide the speed of light by the frequency to get the wavelength, and therefore the antenna size. The thing that sent us these messages—the ones SETI is grinding away at right now—they're at least thirty kilometers across."

## Instigator

Though the galaxy appears to be a swirling pinwheel of light, most of it is nothing. Emptiness. Utter black oblivion.

Or so it seems to small mortal eyes. The forms of life that arise on planets, encased in flesh or carapace, in fur or fin, see the universe through a narrow slit of the spectrum, light's brimming wealth. Evolution prunes and whittles its subjects so they take advantage of the greatest flux their parent stars can offer. Seldom does planetary life evolve to sample the lazy, meter-long wavelengths of the radio, or the pungent snap of X-rays.

So they do not witness the chaotic tumble of great plasma clouds between the stars. They see nothing hanging between the hard points of incandescent light, and so falsely assume that what they call "space" is—just that.

Yet stars, those brimming balls of radiance, continually spew forth matter, which fills the void. The starwind streams out, expelled by snarling magnetic storms.

A human hand dipped into this gale from a spacecraft would snatch up only a few tens of molecules. By the time the thinning gale reaches the rim of the solar system, the density drops to a thousandth of that handful. Then this billowing wraith wind thins further—and meets the colder, denser fog that hangs between the stars.

There, between sunspace and interstellar space, while the comets wait to begin their weary inward journeys, something happens in that realm that is no mere meaningless dance of matter and energy. Though invisible to human eyes, the banks of clotted plasma moving there are complex and forbidding. And alive.

Seen in an immense radio lens, the vast reaches would seem to have knots and puckerings, swirls and crevasses. Here the particles thicken, there they disperse into gossamer nothingness. And moving amid this shifting structure are thicker clots still. Some huge eye, sensing radio waves a kilometer long, would see them as incandescently rich. Their skins would shine where magnetic constrictions pinch and comb their intricate internal streamings. Filaments like glistening hair would wave and shimmer in the slow sway of ancient, energetic ions.

An even larger eye could hear the booming calls and muted, tinkling cadences of their conversations.

Their talk had begun before the birth of the arrogant star that blared away its substance nearby.

These Beings are unseeable by anything that evolved on simple, raw planets. They live through the adroit weaving of electrical currents. They feed on the electric potentials that trickle through the comet clouds. Their interiors are highly ionized plasmas, smoldering and hissing with soft energies. Moving at tens of kilometers per second, these inner cores sweep up magnetic fields and harness the induced electrical fields.

Even the best astronomy of small, planet-bound, chemically driven intelligences could only glimpse the momentary flaring of these plasma veins. The larger arteries and organs of the Beings would be beyond all but truly immense radio eyes—certainly far larger than anything contemplated by humans, even after the rocket-powered breakout into their own solar system. Each of the Beings stretches across a light-day of thick plasma and molecules.

If the entire solar system, including dim Pluto, were reduced to the size of a human fingertip, the bulk of the Oort Cloud of iceballs would lie ten yards away from that finger. Yet these spaces still could encompass only a few hundreds of the Beings, and had for billions of years.

Bodies so vast must run by delegation. A pulsing stomach busy digesting induced currents cannot know immediately that a distant molecular arm hungers for this spark of life. The intelligences, which evolved to govern this huge bulk, then resemble parliaments rather than dictatorships.

Yet even assemblies have names. And must at times speak with one voice.

The habit of these particular Beings had long been to assign names by the principal traits each displayed—age-old, but not immutable. Still, to other intelligences these traits themselves were mysterious, fundamentally unfathomable. To represent them by the signs and conventions of mortal discourse would be to falsify.

Outlining the unknown begins with a gesture toward the known. To convey even a sliver of the flavor, though, demands simplification. One must remember that the gift and curse of language is to render complexity into clarity, as much as is possible. This can make profundity appear commonplace. Yet it must be.

Forceful broke a long, tense silence. <Let us end this pernicious search *now*.>

<Absolutely,> Serene echoed. This was no surprise. She had opposed the Lower System investigation from the start.

From Ring, Forceful's grim spouse, came ringing agreement. A quick chorus of assent forked forth from Mirk and Chill, their sons, who liked the far, cold reaches of the Vastness beyond all stars. Soon, despite the time-delay that waves took to span these reaches, came assents from their sons' mates, Sunless and Dusk. These were echoing calls, hollow-sounding and rich in bass ion harmonics.

<Someone is trying to force a cusp point, a crisis—and before we can recover from the bad news,> Recorder mused.

Forceful and Ring, their sons, and their sons' mates made up a block of six. Thus far they had been able to outweigh with firm argument the Eight others, who still wanted to press on. That faction desired to plunge in past the outermost planet's eccentric orbit and into the hot lower depths.

Only once before had any Being ventured into those treacherous regions. And now the balance had been thrown even further the way of the Eight, by disaster.

Rumors had whispered in from distant Beings—distant even by their own vast standards for measuring space—from the stars themselves. Strange tales, indeed. Stories that the surfaces of many little rocky worlds tucked in close to stars had lately been rotting into life. Here *lately* meant on the proper scale of high intelligences—the time needed by a star to trace out its orbit around the center of the galaxy itself. A respectable time.

The words from the stars spoke of a low, obscene, hot life. Not powered by the clean

transformations of electromotive force, but by the clumsy building up and tearing down of molecules.

These rot-born beasts were *swamps*. They seethed with the messy contaminants that made up the cometary iceballs. Their spectral signals the Beings had deduced from their explorations of the icy motes that would, on occasion, loop in and out of planetary systems, swinging into lethal zones where heat clawed at them.

<They are cropping up everywhere in the galaxy,> Instigator had told his fellow workers. That was some time before, when he had first reported on the genetic experiment he himself had started on this local system's outermost world, nearly a galactic cycle ago. <They are quick! And quite successful!>

Forceful shot back, <You are making copies, are you not?>

Instigator sent fluttering coils of turbulence at this insult. <I use the ample data that flowed down in the star-messages.>

<Mere imitation,> Forceful dismissed.

<None of us has ever made a solid being!> Instigator shouted.

<None ever wanted to,> Sunless and Dusk sent in their hollow tones.

Even in this argument, they and Mirk and Chill followed the ancient convention, that subordinate generations spoke as one. If they disagreed among themselves, they remained silent—which was often a blessing, their elders strongly believed.

<This achievement I am doing for us all,> Instigator sent.

Forceful rejected this in plumes of incandescent effrontery. <You are doing it from vain pride.>

Ominously, Instigator coiled portions of itself into dark striations. <I do not tolerate insults well, as many here know.>

<You have had quite a bit of practice at that,> Recorder noted. <I feel some of us have been intolerant of . . . eccentricity.> The pause before the last symbol-term was significant, placing Recorder midway between the factions.

<I have had quite a bit of provocation!> Instigator shot back.

<You arc over to a conclusion-state without just cause,> Forceful said.

<I got the basic plans and methods from a long star-message. Profound truths! They are of the very greatest wavelengths and require much study to comprehend.> Instigator purred off portions of itself to show disarming openness. <The passages were laden with import and a call to alertness.>

Forceful sent coils of skepticism. <Not all such messages live up to their grandiose billing.>

<But they can,> Recorder observed. <In this case—but mind, with no promise of future agreement—I side with Instigator. We must prepare prudently.>

<How?> A chorus of Ring, Forceful, Mirk and Chill, Sunless and Dusk—all sent the same doubtful interrogation.

Recorder showed startled puzzlement. <By allowing Instigator to act according to his character. We must all go to the Cascade soon, to feed. Let us do so in a proper spirit. We must allow some freedom to each other.>

<You are being too soft!> Forceful sent with quick, angry striations. <Your hunger for the Cascade speeds you to hasty decision.>

Recorder sent rumbling bass notes of discordance. <Careful what you say. I, the eldest local, feel that we can afford to continue experimenting with the solid mechanisms.>

<It is full of risk!> Forceful countered.

Recorder sent firmly, <The risks of contact with such unbearable cold is, in the end, that of the rash, the occasionally foolish—that is, of Instigator and its many parts. Let Instigator digest the risks.>

<As I do,> Instigator sent.

<We need Crafter!> Dusk sent. <One who knows how to work with tiny things.>

<I speak with Crafter often,> Instigator said. <It is working on these problems.>

<Crafter should speak to us,> Ring said with an indignant aura. <Directly.>

<Crafter likes solitude,> Instigator sent mildly. <To craft.>

<Very well.> Recorder paused to let their momentary angers dissipate along the intricate magnetic field lines. <Let us go to the Cascade in a goodly spirit.>

Derisive laughter came, but in such long wavelengths that the Being—or Beings—who sent it could not be resolved, even using the antennas of the largest of them, Recorder. Vexing, but Recorder had suffered such insouciance before.

## The Solar Ramparts

Tricia gazed at the pale crescent of Pluto falling behind. Its moon, Charon, looked oversized, fat. It was, at about half Pluto's diameter. Thirty years ago, the astronomers said, it was just an iceball. Now it brimmed with a filigree of warming nitrogen and water, as Pluto did. Pale gas rimmed both crescents.

The source of the energy that drove this change lay farther out. And Franklin had found out how. It came in subtly, as electrical currents in a thin plasma column, pointing straight away from the sun.

The nuclear drive rumbled hard at her back, rattling the decks. *Proserpina* was now riding along that column's outer sheath. The plasma physicists Earthside thought they could learn a lot about how the whole mechanism worked by looking at the boundary conditions, for some reason.

Not her field, but it made sense—something was confining the current flow, shaping it neatly on the Pluto-Charon tide-locked waltz. What lay at the other end of this machine nobody had even guessed, so far. Something big and strange, for sure.

"Picking up a lot of turbulence," Franklin said from the side couch.

"Plasma waves?"

"Yeah, a lot like the stuff coming from the bow shock zone up ahead, I'd say."

"Low frequency? Like *Voyager*?" About plasma physics she knew at least enough to ask questions, but not much more.

"Sure is. Pressure waves, running down this sheath, keeping the currents nicely aligned."

"A kind of pipe?"

"Yep. Energy flow pipe, with Pluto and Charon the two ends of the circuit." Franklin was intrigued, fingers working in his command gloves. He waved in the space before him and pretty colored displays outlined the flow patterns. Currents arcing in from infinity, nosediving, finally captured by the crusts of the two worlds. The heating effect flared visibly as a dull orange glow in the icy crusts. Filigrees ran under the blue ice sheets, melting the thinnest layers into gossamer vapors. Clouds fumed into the gathering atmospheres.

"Damned odd," was all Tricia could think to say.

"Not an accident, no way," Franklin whispered, eyes intent on the constant play of pattern.

"What kind of thing can set up magnetic pipes bigger than planets?"

Franklin shrugged. "I dunno. Earthside is still talking about all this as a whole new kind of biosphere—"

"I'll say!"

"—but natural. The astrophysicists are playing games with the bow shock region, tying its moving into all this commotion on Pluto."

She snorted. "That just moves the problem back a step. What made the bow shock boundary move in from 100 AU?"

"You don't get the game." Franklin grinned. "Moving the cause into their ballpark means they get to make the pitches. Get the hurry-up funding. Make headlines."

"So young, and already so cynical."

"You expect scientists to be loftily above it all?"

She nodded grudgingly. "Okay, now you're starting to sound reasonable. Time to up my medication."

\* \* \*

It took six days to overtake *High Flyer*. Escape velocity from Pluto was 1.1 kilometers/second, only a tenth of what it took to escape Earth's grasp. Orbital speeds were low out here, too, Pluto's a paltry 500 meters/second, not a whole lot faster than a jet plane could move. Out there in the Oort Cloud, speeds got even slower. Tricia had a momentary comic picture of herself running to catch up with a planet . . .

And there it was, rushing into the far dark.

*High Flyer* was a huge thing, like a skyscraper with a big bright rocket flare stuck on one end. Most of it was gray bottles of water blocking the hind drive from the living quarters.

In space, geometry is the only guide to size, and even geometry needs a measuring stick. Here the only guide to her eyes was the air lock, a mere small cap near the top third of the craft.

This was a *big* nuke. And the first fusion rocket of major scale, built both for speed and distance. No mere pod sitting atop a big fuel tank, which in turn fed into the reactor. Of course, the parts had to line up that way, no matter how ornate the subsections got, because the water in the tank shielded the crew from the reactor and the plasma plume in the magnetic nozzle. To even see the plume, and diagnose it, they had a rearview mirror floating out fifty meters to the side. The whole stack was in zero g, except the top thick disk, which the crew seldom left. Forty meters in diameter, looking like a dirty angel food cake, it spun lazily around to provide a full Earth g at the outside. There the walls were a meter thick and filled with water for radiation shielding. So were the bow walls, shaped into a coolie hat with forward viewing sensors. Nobody could eyeball the outside except through the electronic feeds.

The whole ship was well over a hundred meters long and rode a blue-white flare that stretched back ten kilometers before fraying into steamy streamers. Plasma fumed and blared along the exhaust length, ions and electrons finding each other at last and reuniting into atoms, spitting out the actinic glare. The blue pencil pointed dead astern, so that at the right angle the whole scene was an exclamation point, with the sun as the dot. *Proserpina* hauled up within a kilometer, and they fretted over the details of making the transfer. In the end, Tricia won out. She, Franklin and two other crew would go across in the shuttle. Part of her wanted to play status games and make them come to her, but her own curiosity won out. She wanted to see what this monster of a ship looked like, and it would indeed be good to get out of the house for a while.

Not that she looked forward to a tech-talk fest. Whenever ship crews got together there was a lot of talking shop, but out here she could use some simple human contact. Being captain of five other crew always kept you at a distance. And the hyperlink to Earth was not an adequate substitute for real talk, either. Last week she got a memo that said, "Cascade this to your people and see what the push-back is." It put her off reading her e-mail for days.

They wedded to the air lock gingerly. The lock was big and bulky, like everything here, with fancy safety bells and whistles. *Mass to spare*, she thought sourly.

They cycled through, in formation. For Earthside audiences *High Flyer* was recording every greeting, handshake, joke and guffaw. They got through it, agreed to turn the cameras off, and Tricia had

a moment to assess this Ellen Barth, senior woman among astronauts, legendary for a crusty exterior that concealed a sharp intelligence. The face was lined, mouth cocked at an appraising angle, eyes quick.

Her husband, Piotr, was quiet and gruff, big and muscular among the slim astronauts, eyes flicking from one face to another as the conversation moved. Equally famous. Tricia wondered how they were in bed together . . .

Everybody knew each other's profiles, had read their books (some ghost authored, some even eloquent), and they passed through the usual compliments. Tricia knew she would take an industrial-strength makeover to be presentable, but the *High Flyer* men all told her how great she looked. One, Hiroshi Okada, had gleaming eyes and a mirthful grin. She liked him at once, and not just because his compliments didn't seem a tad forced at all.

In cultural profile *High Flyer's* crew was like hers. By no accident, most spacers were from North America or Asia. Those were the cultures, mid-twenty-first century, where young people still asked *When can I do X?* The Europeans usually said, with dread, *How do we stop people from doing X?* And *X* could be just about anything technological. Genetically modified food, screening for future disease risk, opening up the asteroids for mining of scarce metals, living longer through genetic tailoring, beaming microwave power from space, living halftime in virtual villages, sending a beacon signal to the stars. You name it, the Euros thought that Jeremiah was a serious, deep thinker, and in fact a cool guy. Whereas Pollyanna was just a silly twit, with no knowledge of history. So the Euros didn't go into space—you could die!—and were busy shoring up their aging societies with plentiful taxes and fearful politics.

They seated themselves around the ship's pedestal mess table, a polycarbon white circle. An awkward moment. Everybody beamed, glad to see fresh faces, but nobody spoke. Then Piotr produced, improbably, two bottles of champagne to mark the moment. That loosened everybody before lips touched liquid.

Sure enough, the first socializing was about the latest Earthside news, most of it just the usual wrangling and angling that passed for politics. That done, like dogs sniffing noses, they relaxed.

Tricia let the chatter run for about half an hour before saying, "What do you make of our . . . hosts?"

Piotr's face was veiled as he said, "You think the big things make the small things?"

"Somebody did," Tricia said. "We're not looking at natural evolution here, for sure."

Ellen's mouth tilted skeptically. "These zands of yours, how can something bigger than a barn make them?"

"Not a clue," Tricia said. "But they didn't evolve on Pluto. That's not a biosphere back there, not a truly integrated system. It's a base camp, getting by on energy rations."

"And run by electrical power that comes from 'way beyond," Franklin added.

Ellen's wary gaze did not alter. "No chance Pluto's been running that way for a long time?"

Franklin shook his head. "It looks . . . well, recent, contrived."

"By something *really* strange," Tricia said.

Piotr said, "So we invoke that rule, the knife something—"

"Ockham's razor," Tricia said. "We've got two strange things; maybe one causes the other."

"Three strange things," Ellen said flatly. "You got the transmission Earthside sent forty-two hours ago? They've decoded that low-frequency stuff that keeps washing over us."

Tricia raised eyebrows and nodded reluctantly. "I can't follow it all, but . . . okay, one more mystery."

"Getting to be a lot out here," Piotr observed.

Hiroshi nodded. "I've been running codes, along with the Earthside spectral analysis. They're—the big things—sending stuff in English, that's certain."

Ellen said, "They call themselves the Beings."

"Also the Diaphanous," Hiroshi added precisely.

Tricia hadn't heard that one. "Imagine—what a vocabulary."

"I had to look it up," Piotr admitted. "And I'm human."

Ellen smiled at him. "Most of the time."

"They must've been listening to us—to all Earthside—a long time," Hiroshi said carefully. "It is the only way to explain how it can—"

"How they can," Franklin interjected.

"Right." Hiroshi nodded vigorously. "How they can know so much of our language. English, anyway, though there were pieces in German—*Ich muss diese Frage verstehen*, as I remember."

"Maybe they have only one language?" Tricia thought out loud. "So they eavesdrop on some Earthside broadcasts and include it all, thinking it's just some English they don't understand?"

"Um." Hiroshi thought. "German's close enough to English, one of the two roots of it . . . maybe they can see that? Incorporate the German?"

Piotr blinked. "What a mind."

"Minds," Franklin corrected him. "Earthside has clear conversations in every batch. Interplay. Talk. We're overhearing them."

"But . . . they're sending to us in English, too." Piotr frowned.

"Earthside has cracked their code," Franklin said. "We can eavesdrop on them too, now."

"I am still amazed that anyone could figure out what so strange a thing was saying," Piotr said disarmingly. He gazed at Franklin. "Can explain?"

This brought them a beaming smile. Tricia knew well by now that Franklin was a frustrated professor, and would no doubt be a real one someday. For now he was stuck being a mere astronaut. "The key is the chromatic scale. You know, the way notes are arranged on the piano. Our Western do-re-mi is a subset of that. Turns out, people worldwide put *extra emphasis* on tones that correspond to the notes of the scale. We like doing it. You record people talking, they put more energy into those special notes."

Ellen said, "Really? I never noticed."

"Nobody does, we think it's natural. And it *is*! That's the breakthrough. Once we found this out, half a century or so ago, everybody thought it was a biological thing. Maybe we as primates heard birdsong, invented some crude music, and after that learned to talk. Kept the same scale-note structure, see?"

Tricia had heard all this before but it was fun to see the others react. Sure, they'd gotten squirts from Earthside about all this, but who had time—or more important, given how badly written most of it was, who had interest—in making their way through it? The *High Flyer* crew was enthralled, champagne forgotten—except for Piotr, who sipped automatically. She would have to remember that. Maybe he was the weak link in *High Flyer*.

"But for a long time," Franklin went on earnestly, "the math guys thought the scale itself came from harmonics, the ratio of numbers, all that Pythagorean stuff. Ancient history! Only it turns out to be right. See, the scale gives us pleasant harmony in music. That's why the twelve-tone garbage back in the TwenCen was the end of classical music.

"They forgot the scale! And we like it—have to! All of us."

Piotr scowled owlshly. "Am losing you."

"Oh. Sorry. Those low-frequency plasma waves we detected coming out? And turns out there were plenty more picked up on the Deep Space Network—Goldstone and all those others, Parkes in Australia, you know—at least the higher-frequency modes, the upper hybrid ones, the descending helicons that go"—he whistled a scale—"and they *all fit*. Lotsa data there. Plenty of cross-correlations. One big conclusion. In these Beings' speech—both the stuff they send us in English, or the sub-stuff, the cross-talk they're having with each other—in that speech, there is the same spectrum of harmonic emphasis."

Piotr took another sip of champagne. Nobody said anything. Piotr's eyes squinted as though he were looking upwind into a gale. "Is meaning?"

Franklin did not take this clue. "That the Beings communicate by a coding system that is like ours."

In Piotr the light dawned. "So . . . on that you—no, Earthside—can build a way to decode?"

"Yeah, right." Vigorous headshake.

"Amazing."

Vigorous headshake. "Yeah, right."

Tricia let out her breath. It was going to be hard to break in on all this, but she had to get some things straight. "Ellen? Can we take it into another cabin?"

"We call them rooms," Ellen said slowly. "Seems better, more homey. Uh, of course, let's—" Rising, leading the way out through a circular hatch rimmed by pale emerald emergency phosphors.

Tricia followed briskly. They came into a compact compartment she assumed was Ellen's captain's office, though no adornment of the inward-sloping faux-mahogany walls testified to this. They sat in contour chairs made of something pale effervescent blue and so thin that when she lifted it in the 0.38 g field Tricia flung it toward the ceiling—and, startled, let the slow-revolving chair spin with classical slowness into the corner. "Uh—oops."

She used this to break the ice between them. The act was not planned but who knew what the unconscious would or could do? She had learned to go with the flow of events and surf on it when she could. It was the only wisdom she could pretend to herself that she had actually discovered, instead of just reading about, but maybe it was enough. Anyway—"Let's talk as captains, eh?" Retrieving the chair with one quick swoop of her left arm, she sat.

"I'm actually not captain," Ellen said.

"What? Earthside—"

"I'm in charge of scientific matters. Piotr's captain, but he and I are married, so we have split the duties."

"That's completely contrary to—"

"Chain of command, I know. We cut a deal with Earthside. However they want to call it, fine."

Tricia kept her face impassive as a firm wall against the anger rising in her. "Because you're famous, you think you can abuse—"

"Use, not abuse." Ellen leaned on the slim black poly table between them. "Look, we're fifty million clicks from Earthside's regulations—"

"And you and Piotr," Tricia spat back, "the oldest crew in the astronaut corps, you're going to be in charge?"

"Not at all," Ellen said mildly, eyes fixed on Tricia as if to transfix her. "We have two ships so we have two captains. But we're on a scientific expedition and that means we have to agree on methods, results, risks. Piotr and I have more experience than you—"

"On Mars, which is an oven compared with Pluto. Why, I had a boot freeze right into the regolith on my first day out! Took steam piped from the ship to get me free. I've had a lot more experience—"

"Than we have at superlow temperatures, yes." Ellen's eyes narrowed, her mouth twisted wryly. "But the big problem out here, the reason for the gigabucks spent to put us here at top speed, is the bow shock."

"If it's a threat." Tricia's words rapped out. "Earthside weather hasn't shown any changes even though the shock wall has gone from 100 AU to 42 AU, in thirty years—"

"I know the data, for goodness sake! But a hell of a lot of numerical simulations show big effects in the offing. The molecular hydrogen that's leaking into the inner solar system, it'll build up and start reacting with the free oxygen in our upper atmosphere."



"And make water, big deal. Nobody knows—"

"Plenty of energy yield there, that's the point. Heat up the upper mesosphere, and that drives big changes below. Screws up the stratosphere temperature profile, and pretty quick that heat moves down toward the business end, where *our* weather gets made."

Tricia sniffed, nose turned up. "I see where you're going with this. We should be looking mostly at the shock edge, find out what's driving it. But Pluto is *key* here. That's what my, our discoveries show. Something's running all this and it isn't stupid."

"Nobody said the problem wasn't interconnected—"

"This isn't about dumb weather!"

"Okay, smart weather, then. Look—" Ellen sat back, as if she realized she was boring in on Tricia. "We can't start out like this, with a fight. We cooperate out here or we die."

Tricia nodded, thinking furiously for a way around this woman. Go crying to Earthside? Not her style. Try to marginalize her in future? Hard to do, on another ship. Okay, put that aside for now, but keep looking for an advantage. "Okay." She even made herself smile slightly. *Bad beginning. Try to lighten this up.* "One thing as captain out here; you learn that there are very few problems that can't be helped by orders ending with 'or die.'•"

Ellen studied her. "You've been on duty too long. You're worn down—"

"Now don't give me that. I and my crew are as fit for service as anybody."

"I'm sure," Ellen said stiffly, getting up. "Look, you and I haven't exactly hit it off—"

"I'll say!"

"—but let's keep it to ourselves."

"Right. Professional." She cocked a wry smile. "I guess this day was a total waste of makeup."

This made Ellen smile, too, seemingly almost against her will. "It wasn't wasted on my crew, believe me. The guys have had only two women to look at for a year."

"Same on *Proserpina*, only it's been years."

"Not easy, working in tight quarters. The hormones get going."

"Sure do, and not just among the men."

"Ha!—I'll say. But I have Piotr."

"Yes, a husband. I neglected that point before shipping out."

Ellen looked tentative, half-turned, then looked back. "A piece of advice . . ."

"In dealing with the men?"

"Yes, and not just for the men." A thin smile. "Always keep your words soft and sweet, just in case you have to eat them."

## Strange Symphony

Ellen was glad to see them go.

She had thought that she would be very glad to see fresh faces, but they wore out their welcome in a day.

Maybe she was getting too old for this spacer stuff. Or maybe her diplomatic skills were wearing thin. Anyway, the Tricia woman was abrasive, self-obsessed, smug—and those were her good points.

Ellen suspected that in a pinch the woman might also be careless, the one sin reality never forgave.

The first hour had told the tale. Of course they had more techy discussions, crews getting to know each other, all aware of the collaboration to come. But the edgy distance between herself and Tricia had been an undercurrent beneath every moment. Everybody felt it and, thank God, didn't talk about it. Until they were gone.

"You need rest," Piotr said flatly when the lock clanged down.

"Yes sir, Cap'n sir."

"Really."

"Point taken." She collapsed into a lounger. The logistics and tech issues had dominated everything, as one would expect of astronauts. But somehow all the time she was seeing their ship anew, through the others' eyes. They thought it wonderful, ornate, opulent compared with their fission-driven craft. Fat cats. Well, fair enough—fusion had come available at just the right time to make *High Flyer* a whole step up, and it showed. A great way to sail into the abyss, indeed.

The *High Flyer's* designers hadn't much consulted any of the future crew about interior design—it had all been done on the hustle—so it reflected Earthside's latest notions. Appliances and even furniture looked as though they had grown there—ductile, rounded, even drippy as if recently melted. The style was called "blobjects" and this look made them seem organic, natural. But they were the opposite, stuffed with smart chips that processed data without letup. If a crew member was carrying a virus, then *High Flyer* wanted to know it. If you had fallen asleep in the common room and were about to miss your watch, the room noticed and *High Flyer* beeped you awake. Even the stringy little microgravity "beds" at the axis that monitored low-grav sleep—they could mommy you to death, if you let them.

Like many of Earthside's cities, the ship embraced its inhabitants, keeping tabs and worrying over health, safety, supply and demand of air, moisture, heat, power, the works. She had found it weirdly claustrophobic at first and for weeks did not sleep well, feeling that *something* was watching. Then as they flew at great speed into cold, dark spaces with no humanizing glimmer of promising light, *High Flyer* seemed to become warm, comforting, restful. Which was the idea of her designers all along.

"The Vid Kids hauled off their stuff," Maxine reported briskly. Piotr nodded. On the way out they had labeled the *Proserpina* crew with that name because they had anxiously asked for the latest vids the *High Flyer* might have brought—indeed, it was a big part of the "mail" they'd asked for from Earthside.

"Maybe they don't like their own company too much by now," Piotr said with a wry eyebrow lifted.

"How long they been gone?" Maxine asked.

"Two years, five months," Ellen supplied. "Time wears out the best of friends. Be grateful we're riding a fusion torch, not a fission one."

"They also tried out the smart-ship functions," Maxine said, tossing her long hair irritably in the 0.38 gs. "One of them I found ordering a martini from ship's stores!"

"I know, I came in after you stormed out," Ellen said wanly. "And ship was delivering, too. I never thought to ask before."

Maxine said sharply, "You should've protested! Hospitality is one thing, but—"

"Yes, is waste of ship time and resources," Piotr said. "But is diplomacy here, too."

Maxine wasn't buying this, Ellen could tell. She was a brilliant all-round type, good at six different skill sets . . . but a bit wearing when she got on a Cause. Piotr started speaking in his mild, calming manner, and she left that job to the resident expert. She needed to get away from them all. *Far away.*

\* \* \*

Decades of Mars duty had taught Ellen to create her own privacy. Nothing like cramped quarters to focus the mind! She had learned to disappear within herself, walling out sounds and smells and vibrations, to create a still, silent space where she could live, rest, think. In the continual noise of the Hab, she had learned to hear well, diagnosing the ships vibrations. But just as well, she knew how to listen carefully,

and to deliberately not hear. An essential skill, taking only a few years of daily practice to master.

Living in space created rituals and customs, even taboos, to keep buffers between people. This extended even to language, allowing her to avoid, politely, any question she didn't want to answer.

She sat cross-legged.

Sunset watching on a personal wall screen was perfect for this. Listening to their interior rain—the fall of vapor sheets on each wall, images playing on their thin surfaces—brought delicate splashes into her concentration . . . and the present vanished.

So she had insisted on this careful cabin crafted of paper walls and tatami mats and small, delicate decorations. Simplicity made it easy to stay within her mass limit. And illusion helped. If it was high resolution enough, even knowing that a view was phony did not rob it of its effect.

The simple thatched hut sat on thick hardwood pylons above a sweep of immaculate white sand. Maples surrounded it and she approached it on stepping-stones so perfectly set in the moss that they seemed to have grown there. On the veranda were sitting cushions, for seldom would anyone want to sit inside, in the single room of hewn beams and rustic screens. This ceremonial teahouse was for tea and thought alone.

All hers for now. She shared it only with Hiroshi Okada. Crew needed their retreats, and Ellen had in the long decades on Mars come to understand well the Japanese cultural way of dealing with an ever-pressing crowd you had to get along with. Getting away was the only strategy. She and Hiroshi had pooled their allotted ship-space in this way.

She entered the massless retreat she had fashioned herself—the essentials of a classic garden: stone, water, bridge, pavilion. They all hung in the spaces of her own private space.

It was a cylindrical volume of falling mists, each a thin translucent sheet that descended in the light air as holographic projections played on its surface. A few feet away, the pleasant moisture tingled in the nose and the images framed the room into the Harmonies Garden of Wu Xi, a classic spiritual retreat. Cinnamon camphor trees perfumed the air. A tinkling waterfall splashed on worn stones. She sat in lotus position on tatami mats and watched the cascading stream leap over convoluted limestone. The walls had curious cylindrical holes that had been worked by flows millions of years ago.

Stone,  
Water,  
Bridge,  
Pavilion.

Until her next watch.

\* \* \*

Three days later, the bare nugget sun now lost in the glare of their blaring fusion torch, she sat with Piotr and Maxine and tried to make sense of it all.

Maxine played them the complex waveforms, souped up from their original very low, infrasound frequencies around 10 kilohertz, into the audible. It was the strangest symphony anyone had ever heard.

At times the haunting low notes were like the beating of a giant heart, of great booming waves crashing with aching slowness upon a crystal beach, playing the ceramic sand like a resonating instrument. Ellen felt the notes with her whole body, recalling a time when she had stood in a French cathedral and heard Bach played on the massive pipe organ. The organ sent resounding through the holy stone box wavelengths longer than the human body, so the ear could not pick them up at all but her entire body vibrated in sympathy. It was a feeling like being shaken by something invisible. And now the thing that made this strange symphony was tolling like an immense bell that itself enclosed an entire cathedral and used it for the slow, swinging clapper.

Into her mind came the memory of a whale she had sighted offshore Sydney, breaching fully into the summer air. The long shape had burst nearly free of the sea, flukes turning lazily in the sharp sunlight. She

had bought many recordings of their songs. Even if they had simple messages, she—found them haunting.

Sitting back, she tried to envision what would radiate waves tens of kilometers long. To such creatures, humans might be as inconsequential as the lice that pestered the skin of a blue whale. The longest wavelengths they had detected (barely) were truly gigantic, up to a million times longer than those that ushered in classical radio astronomy. The center of the galaxy had been picked up by Grote Reber, using a dish strung from ordinary household wires on a wooden frame, sitting in a backyard, using wavelengths as big as a human. What could humans glimpse in wavelengths a million times larger?

She reminded herself that it was only because they were out here, beyond the dense plasmas blown out by the effervescent sun, that they could detect anything at all in this region of the electromagnetic spectrum. By accident, *High Flyer* had strung its antenna elements along its great length, so they were seeing with an "eye" effectively hundreds of meters long. Yet even such an aperture could sense wavelengths of many kilometers only dimly. But they detected those waves, and that had changed everything.

The great virtue of discovery, she mused, was that it raised more wondrous questions than it answered. She had a quick image of humanity's perceptual universe, expanding outward in a sphere from the sun. To be sure, they came to understand what lay in that increasing sphere's volume, in time. But the price—or reward—was that the surface of that sphere, the edge of the unknown, also increased. There was more known, but always more to be known.

*Yes, she thought, and the unknown can masquerade as the unknowable.*

She thought of that sphere, and wondered if the sun at its center kept these huge beings at bay. Not so long ago, humans had kept the wolves prowling at the rim of their campfires—but not venturing farther in, out of fear. Did something like that keep these huge beasts from plunging into the realm of the planets?

And if so, should a mere ship venture into that dim twilight beyond the fiery campfire, where wolves might lurk?

## Tiny Things

<They are coming,> Serene sent from afar. It was cautious and wanted no part of any strange tiny things that intruded.

<This is your work!> Forceful said to Instigator.

<I did not bring this forth,> Instigator said. <And we did all approve my studies on the small world, to learn more of the small ways of life.>

<I sense danger here.> Mist's signal worked with worried low notes.

<If anything happens, it is your fault,> Chill said sternly.

<Isn't making things happen what we wish?> Instigator sent. <We seldom enjoy such opportunities to sample anything from the Hot.>

<We want discovery without danger!> Chill said.

Recorder said slowly, as bespoke its age, <The two seldom go together.>

## The Spider Net

Piotr was irked.

"Damn! We're flying straight, straight as arrow, they're not."

Ellen sat down in the parallel acceleration couch and, for some reason, staring at the sprawled array of data and indicators and views fore and aft, remembered when she had been a teenager and lived in a comfortably neat world, believed utterly in the civilizing power of fresh lipstick and combed hair and not talking out of turn. Things had changed.

"Not being proper and orderly?" she asked him lightly.

"Making this plasma wire trick hard to work."

"They're not holding to course?"

"Getting buffeting, they say. Lighter ship, could be so."

"Display the net?" Ellen asked Maxine. She did.

*Proserpina* was jiggling slightly, yes. The ships were thousands of kilometers apart, two piercing flames in the obsidian void. *Proserpina*'s fission glow was muted, its plasma not long-lived. *High Flyer*'s flared brilliant blue-white behind them, fusion plasma alive with a vibrant incandescence formerly seen only in the hidden hearts of suns.

Except—at higher resolution, the image picked out tendrils of snaky blue, each a thread connecting the ships. A spider net of plasma strands. The only way to listen to the deeps beyond. A grid for receiving waves of a scale no one had ever contemplated, until now.

Their plan had been worked out by myriad plasma physicists sweating over test chambers and calculating pads, back Earthside. The first idea had been to eject a wire with tiny rockets at both ends. Fired off, they would uncoil the wire from a central processor and power supply, all left in *High Flyer*'s wake. When the rockets played out, they would detach, leaving a wire a thousand kilometers long. This would unfurl the largest simple dipole antenna humanity had ever made. In the 1890s Marconi had made simple antennas like this, though those were about the size of himself—and he had changed the world. This time, a mere hundred fifty years later, they might use such an antenna to discover beings beyond the imagination of anyone in the nineteenth century—except, that is, H. G. Wells.

It had been a pleasant image, when Ellen first heard of it. Stringing wire, like the radio pioneers. But too awkward, the engineers decided, too . . . well, massive. Even hair-thin wires thousands of clicks long do add up.

So their ships carried plasma guns, not wires. The guns were marvels of artifice, able to emit steady streams of barium ions and their court jesters, the electrons. These beams ran from *High Flyer* to *Proserpina*, slender and elegant. Their own currents provided the magnetic fields that confined them to threads a bare centimeter wide. Unlike bulky wires, which can stretch quite little, twist only a bit, and often break, these plasma beams inherited the infinite flexibility of magnetic fields. These wrapped themselves around the currents that passed between ships. The bands of invisible magnetic loops could flex and swerve and contort to accommodate the varying distances between the huge spaceships. They kept contact going.

But they were also simply current carriers, like wires, only far more insubstantial and vulnerable. They worked as the effective wires of an antenna, stretched between the speeding ships at velocities of tens of kilometers per second.

These plasma pinches could pick up the waves incoming from the outer reaches, just as ordinary wires could. Processors aboard both ships then deciphered the oscillations in current and voltage as signals. H. G. Wells had never thought of this, much less Marconi.

"But what could make *Proserpina* jounce around?" Ellen asked. "This is empty vacuum, after all."

"Not quite," Maxine said. "We're getting close to the bow shock. Ah, yes—there, that ruby glow ahead." Diffuse radiance filled half the sky.

"But that's just where the plasmas meet. Thin stuff."

"Put it into a resonant wave, just about the size of your ship, and the effect piles up," Maxine said. "Like wind forcing oscillations in a bridge. Acting all along the side of *Proserpina*, it can hit that resonance. Or maybe just as bad, it's like a steady wind on a car. The faster we go, the bigger the effect."

"Ummm." Ellen frowned, alarmed. *A threat in empty space?* "Should we dive straight into the nose of the bow shock?"

"*Da*. Is closest part, the nose," Piotr said. "Like the prow of a ship, bow shock spreads out from it. We want to know what's up, best place to go."

Ellen reminded herself that Piotr was captain, even if she was sleeping with him. "If it can shove *Proserpina* around that way . . ."

"We are much bigger, heavier." Piotr grinned wickedly. "And will be fun. First persons to cross into interstellar space!"

Ellen laughed. "Once a pilot, always one," she whispered to Maxine, not so soft he wouldn't hear.

"Not just for thrill," Piotr said soberly.

"You haven't forgotten that we're down to twenty-three percent on water?" Maxine said timidly.

Piotr glowered. "Of course not. We can run another month on that."

Maxine said evenly, "We're not supposed to run less than twenty percent."

"We'll find iceteroid, no problem," Piotr said decisively.

"I thought they were supposed to be pretty far apart out here," Ellen put in. "We passed one a couple weeks back, though."

Piotr said bearishly, "We do not turn back."

"I didn't mean we should," Maxine said. "Just—"

"After we blow the nose"—Ellen grinned at him as she said it—"we'll look for some ice to melt down."

With a curt nod Piotr said gruffly, "What I had in mind."

Ellen could see that even after more than a year of crewing with them, Maxine was still working out how to deal with a married couple.

"Check spectrum locus, eh?" Piotr said, pretty obviously trying to change the subject.

Maxine called up the mapping their plasma-net antenna was making. Spotty, but the conclusion was clear—"Most of the really long wavelength stuff is coming from around the nose," Maxine said.

"It's not just noise?" Ellen asked.

In answer Maxine flipped on the audio. Long, humming chords. Thin leitmotifs atop that, skittering down the scale. A spray of sharp notes like harsh shouts in a distant fog.

"Working on the decoding?" Piotr asked, eyes never leaving the displays.

"You bet," Maxine said crisply. "I think I can break it into words soon."

"Words already? You're using just the SETI codes?" Ellen asked wonderingly.

"Well, with a bit of spin of my own." Maxine grinned. "I think the other side is making it easy for us."

"The . . . source?"

"Sources. Near as I can tell, there are plenty of them."

Ellen blinked. "You can tell them apart?"

"Except the rude ones. They talk over the others."

Piotr nodded. "Too many of us like that."

Ellen was amazed. Decoding the low-frequency, long-wavelength signals had been a feat of intellectual daring. After all, what could humans share with them? If the things that made the signals were large, in the depths of space beyond stars, maybe they were not even used to stable structures. She sat back and mused . . .

One could think of them as like jelly creatures, maybe, awash in a dark environment. They might not think mainly in terms of numbers, but of geometry. Their mathematics would be mostly topology, reflecting their concern with overall-sensed structure rather than counting, or size. They would lack combustion and crystallography, but would begin their science on a firm foundation of fluid mechanics, of flows and qualitative senses.

But others Earthside argued that no matter what the environment, creatures that made it in a harsh place would evolve basic ideas like objects, causes and goals. Still . . . what objects were hundreds of kilometers in size? Iceballs, all right—but creatures? And what about causes? Even in quantum mechanics, the idea wasn't crystal clear.

Still, every environment had limits. Scarcity would bite, forcing the idea of realizable goals. Hardship would reward those who caused goals to come to pass, acting on whatever objects the vast creatures could see.

So maybe there were universals, even if a bit abstract. The critical point had come with the realization that the harmonic structure of sound had a numerical key, that the notes of the scale were the ratios of whole numbers. This unlocked the code.

A noted TwenCen physicist, Richard Feynman, once said to the horror of some that "the glory of mathematics is that we do not have to say what we are talking about." So sense could fly on the wings of mathematics, of encoding, without having to point to common, shared objects—chairs, sunsets, bodies—to make a sentence that made sense.

Beyond that, the argument descended into ornate relays of mathematics. Or maybe it ascended; anyway, Ellen could not navigate the logic.

"What are they saying?" she asked.

"Sounds like . . ." Maxine paused. "Maybe warnings. Maybe threats."

Piotr grimaced. "Hard to know which I would prefer."

## Cascade

The eternal gale came howling in from Upstream. To meet it, a constant roar of the starwind came soaring out from the eternal Hot.

Sheets of heavy spray slashed at the Beings as they came to feed. Hot plasma streamers rose to smash against their outer wings. The curling waves were steep and breaking into coils. Some of these gnawing whorls were large enough to engulf an entire Being, and when one did it carried the hapless, rubbery shape of intense magnetic order down a slope of ravening turbulence, to dash it into rivulets that scoured its hide.

Then the Being would be buried gloriously in the food it sought—gorged on it, lacerated by the very energies it needed to live. This paradox dwelled at the center of their art and philosophy, the contradiction between feeding and being ravaged.

At the worst, not merely to be flayed by the frying of dying magnetic fields, but to be Diminished.

Most Beings knew how to skirt the worst of it, skating the edge, while absorbing magnetic whorls and digesting them into stronger fields within themselves. They valued the helicity above all, the twisted fields that carried the tight strands like rubber bands, which enabled a Being to confine itself. Sinew gave strength.

Yet the awesome power of the Cascade never deterred, for this was the peak joy for them all. They rolled and basked and breached in the slide of the interstellar plasma, a torrent eternally incoming, smashing against the resolute wind from the distant Hot.

Together as always, Mirk and Chill were hogging over the crests of blithe helicity, sliding down their slick slopes. Their very perimeters sagged and staggered under the chop, absorbing energies and being seared by them, a thousand eating tongues forking into their magnetic skin.

Joy came sliding in with the spitting fear, always. Some Beings dreaded the necessity of the Cascade. Others longed for the shaking, slamming, pitching verve of it. Sunless and Dusk broke with glee through mountainous crests, skating on the seethe. Battered, they lunged into the roar of magnetic storms and spitting ions, rolled and swamped by them, besting them with cries of triumph. Hissing fires lit in their buffer-skins.

<Ah, the young,> Recorder said, feeding sedately on minor vortices.

<They are older than some stars,> Ring chimed.

<Tell me again whose children they are . . . ?> Forceful asked.

<Some of us,> Ring sent in diplomatic calming notes. <Time erodes such specificities.>

<Merriment has its place, and this is it,> Instigator sent as it lolled from one great churning crest of magnetic twist to the next. <Ah!>

It adroitly sucked in the morsels of delicious helicity, absorbing their angular momentum. Pleasure suffused its body, sleek and slim and the size of moons. It loved basking in the surges of energy as some of its unwanted hair-fine fields—ugly, with frayed ends, unsightly tangles and nets—dissolved in heat and plasma jets. Knots that Instigator could never unwind, it let meet other such repulsive, contorted messes fresh in from interstellar space.

Fizz! Hideous dissolved into balmy energy. Whenever fields of opposite direction were shoved together, the opposites canceled. Their energies flared beautifully along Instigator's lean flanks, lighting up its best features. It thought its elegantly tapered-in mouth was the best, a purse like no other among the Beings. And its marvelous antennas: streams of elegantly confined plasma, arcing to and fro as tasteful advertisement. Through these it knew the Whole, and what other agency of itself should be as beautiful?

Part of the refinement of this harvest was in just *this* state, Instigator thought. Bliss, while tumbling mouth-long into the abyss. The Cascade.

For they were shooting down the coiling rapids. At their backs pressed the Upstream, heavy and eternal, cool and certain. Here came the interstellar plasma and gas, the charged and uncharged wedded by their long association, all coasting along at their minor velocities between the stars. Until the Hot came plowing along its great path, the arc that would take it all the way around the Hub. In the frame of the Beings, carried along by the Hot's slow sway, the Upstream was the eternal storm that fed.

All along the parabola of the Hot's province, vast turbulence negotiated the collision of Hot and Stream. Squalls larger than worlds perpetually broke there, in energies comparable to the pale Hotlight that shed upon this.

<Something coming!> Mirk called.

<From the curl!> Chill supplied.

Curling out of the churn, they all caught the low-frequency wave front.

<Hotcloud!> Sunless shouted. These came seldom and could be rich.

<I do not think it is Sunborn,> Recorder said slowly. <Thick, fresh—not collisioned and slumbering.>



The occasional nuggets that came forth when the Hot was birthing fresh Ones, there would come Hotclouds. They came from the Ones that could burst into froth, and of course died. Hotclouds were therefore a bounty gained at the expense of a framework that might have made a Being. But it would be a rebuke not to feast upon the vagrant energies remaining in the Hotcloud, after all. The cloud was thick plasma, cooling and claspings its fields poorly. It was child's play—and if a child were nearby, it would be encouraged to be the first—to rip this poor bag and eat its momentary wealth.

Ring began, <We have no true children nearby—>

<The nearest is hundreds of Beings away,> Recorder said. This was the old way of measuring distance, though Beings varied greatly in size according to age and whether they had ever been Diminished. <And this coming thing is not good food.>

It smelled wrong, scorched and bristling—too . . . alive. Hotclouds had settled into decay and were easily torn. This torch cut upward through the waves, not minding the curl of them, boring outward.

<So tiny but so angry,> Ring observed warily.

<We should back away!> Chill said, the nearest to it. Chill flexed away from the speeding bite.

Forceful spoke for the first time. <All avoid it. Now!>

Too late. The hotpoint punched through the strong field blanket Chill had raised to protect itself. Fields flared and died as the onrushing lance of plasma punched through Chill. Long, agonizing peals came from Chill. Shells of opposite currents peeled away. The very tones of Chill's outcry shifted as layers swamped and filled with virulent plasma, stifling chords.

<It is too quick!> Recorder sent.

<Catch the shells as they uncoil!> Instigator called, struggling toward Chill's raked image. <They will die quickly if we cannot—>

A sudden, searing wail froze them. Chill was being stripped by the warm, fast electrons. Flowing faster than field knots could impede them, they made new conducting paths within the vast body. Charges long held apart suddenly united. Frenzy. Memories and parts of Chill moaned in pitiful low tones and fell silent.

<Pull away!> called Dusk from afar but it was much too late.

Chill screamed constantly now. They all rushed to capture parts of Chill as it shredded. Colossal flares burst among the body as fields, newly connected by the ravaging plasma, canceled each other out. This liberated raw energy blew apart more parts of the rupturing body.

<I can see the center of it,> Instigator said. <I matched speed with it—so fast!—and above the center all is dark.>

<Your damnable cold things!> Sunless shouted.

<It is tiny,> Instigator went on carefully. <Not anything I—we—have made.>

<Do not mind what it is, kill it!> Forceful sent in shrill tones.

Instigator said, <I think the hotness spews from the coldness.>

<Impossible!> Sunless sent. <Hotter makes hot.>

<Not now.> Instigator's words carried menace. <I will try to stuff the hotness into the tiny cold creature.>

Mirk sent mournfully, <Parts of Chill, I am finding parts . . .>

<I compacted myself.> Instigator was grim. <I clasp the hotpoint—now.>

Mirk sent, < . . . that is all there is now.>

<I have it! I choke it!>

## Ram Pressure

"Drive fail!" Piotr shouted. "Right in middle."

"Burn failing in the core?" Maxine asked. "I'll—"

"No—getting back pressure." Piotr's hands flew in the command gloves but the complex, luminous display hanging before him did not change.

Maxine called Hiroshi for backup while the picture before them both worsened. The plume they saw from two aft cameras was bunching up, as if rippling around some unseen obstacle. The logjam thickened as they watched. Vibrations came through the deck, all the way from hundreds of meters down the long stack.

"Getting a lot of jitter," Maxine reported. "Building up."

"Ram pressure is inverting profile," Piotr said crisply. "Never happens, this. Not even in simulations."

"I can *feel* it," Maxine said. "This much vibration, this far away, the whole config must be—"

"Too much plasma jamming back into the throat." Piotr gestured to where the side profile of the engine showed the blue magnetic hourglass-shaped throat. No matter could survive the fused plasma that flowed along that pinch-and-release flaring geometry. Made of fields, it could adjust at the speed of light to changes in the furious ions that rushed down it, fresh from their fusion burn. But it could only take so much variation before snarling, choking—and blowing a hole.

"I must shut down," Piotr said with icy calm.

"But we'll—"

"Go to reserve power."

"That won't last long," Maxine said as she did it.

Ellen burst into the active control space, face flushed. The sphere of electrosensors registered her presence and decided to ignore her. Piotr's hands moved in the air, capturing and changing ship controls. "What's—" she began, and seeing Piotr's face, shut up.

A long, low note rang through the ship. No one had heard that sound since training. The drive had not been off since then. Muted, yes—as they maneuvered near Pluto—but never gutted and silent.

Over audio came a buzzing. "What's that?" Ellen asked.

"Not from the engine," Maxine said, "that's for sure."

"Can you localize?" Piotr asked, eyes not moving from the control space before him.

"Yeah, it's—hell, all around us." Maxine looked puzzled. "Low-frequency stuff."

"Listen," Ellen said softly, "it's almost like a song."

## Sore Diminished

<You killed it!> Ring cried with glee.

Dusk echoed all their joy. <Crack the cold thing!>

<I cannot,> Instigator sent. <I have no way to hold it. The fields at its end, they sucked back into the cold body.>

<Afraid!> Forceful celebrated.

<How is Chill?> All wanted to know. Even distant Beings, just hearing on the fast frequencies of the attack, chimed in, much delayed.

<Fragments. Sore Diminished.> Mirk was dazed, slow.

<It will repair,> Ring said. <I will give of my parts to rebuild.>

<Thanks to all,> Mirk broadcast as others poured in with promises of help. Already streamers of augmented field nuggets began to arrive near the Chill spaces. Gingerly, parts of the great body began the slow labor of remaking their inventories, pressures, currents and knots. What memory remained within Chill itself would of course be honored in the reconstruction and spliced in seamlessly. But some was lost forever. To be so rudely, abruptly Diminished was the worst of fates. It meant strands of selfhood cut, continuity amputated. Among all Beings near and far, a loss.

<I am alongside it, wrapped around.> Instigator sounded firm and sure but with a slight undernote of apprehension it could not disguise.

<Very good,> Forceful said. <I am coming to help.>

<It is a small cold thing, slippery in my grip.>

<I will coil in from your topmouth,> Forceful said.

<I feel the pressures again,> Instigator said. <It feels like—>

In defense, Instigator had formed a hollow column of itself. Actinic violence flared there. Instigator screamed. A white-hot lance gouged in its bowels. The cutting sword shot out of the cold thing, roaring in mad rage. Instigator unwrapped, coiling away from the flaring plume. It tried to veer away from exploding radiance but left shreds of itself behind.

Panic. A chorus of screams pealed into the distance as Beings sensed the eruption.

<I am burned,> Instigator sent. <But safe.>

<I am alongside!> Forceful called. <Hurry, it is going fast away.>

<Clear from its path!> Ring ordered all those younger, which was many.

Recorder sent, <It is so small, on the end of this lance. Can we use that?>

Forceful said angrily, <We can knock the cold off the hot!>

<If all together—yes, come!> Instigator was almost joyful. <If we all together—>

In a rush, pressures gathered from all those Beings within range. Magnetic fields can thicken and flex as quickly as light, bringing vector forces to bear.

<All on one side!> Forceful sang, in its element.

They heaved and worked. All Beings nearby sliding sections of themselves together into a thin disk. This cut against the tubular throat at the base of the small cold thing. The arc shuddered and fought along its length as the throat that formed it worked feverishly to adjust to sudden sideways thrusts. The system could not cope with the canny way the magnetic disk cut, moved and tilted, cut again.

<It is toppling!> Forceful sent in triumph.

## Tumbling

"Damn! Have to shut down again," Piotr said grimly.

They were all rotating slowly, hanging sideways in their couches. The entire ship moved as it had never been meant to. Creaks and groans ran along it, big booms and warning clangs echoing down the softly lit passageways.

"The throat's going?" Ellen asked.

"Malfing." Piotr spoke clearly through clenched teeth. "Big error signals. Does not explain itself."

"Yeah, systems analysis says it doesn't know why," Maxine added. "No simulation—"

"Going to shutdown again," Piotr said. The rumbling aft faded. Eerie popping noises came through the support beams around their cabin. Creakings. A sour stench of something scorched. The display space before Piotr and Maxine seemed calm.

"That buzzing again," Ellen said.

"I got better directionals this time," Maxine said firmly. "I rotated some aft antennas, the sideband controllers too."

"Where's it from?" Piotr asked. "Around us, yes?"

Maxine frowned. "Intensity plot—well, look at this. Max on the sides. I thought it'd be in the rear someplace. Something to do with the nozzle shutdown."

Ellen watched the shape form up in the space before them all. "Damn," she said. "Running alongside us. Keeping up. Even though we're tumbling."

"The emission region, look. Big, yes—we have found the source of the low waves," Piotr said. "Nasty, too, they are."

"What'll we do?" Ellen asked. "We can't tumble like this forever. The plasma antenna grid—it's out of commission like this."

"They won't go away, I bet," Maxine said.

"Me either," Piotr said. "So we punch back. I'll fire a small side jet, rotate on the other axis, take our aft around on them."

Ellen saw what he meant as his hands traced a command-system into being in the space before him. A faint rumbling began. The ship began to slide sideways, or that's how it felt to her. Multiple-axis accelerations had never been her strong point in training, and that had been decades ago. Her head spun, her stomach lurched.

Piotr glanced at her, frowned in concern. "Is okay?"

"I'm glad somebody knows what to do."

"I try, is all." He winked.

The sliding feeling got worse and something strummed deeply, amid more popping noises.

"Ready power up?" Piotr called to Maxine. "We be fast now."

"Roger."

The surge made Ellen's gorge rise. Whirling, wrenching—she held on.

"*High Flyer*, coming in on port approach," came Tricia's clear voice. "We're out at 1,237 clicks, closing slow. Gather you have trouble."

"Something we can't see, yes," Piotr called back. He brought up a picture with *Proserpina*'s bright flare at its center. Wisps of ivory luminescence crawled across the image, blurred as if out of focus. "To port. Acquiring your close-upped image. Your burn looks stable."

"Right, but between us there's something vague," Tricia said. "Like worms."

"Plasma discharges, I'll bet," Maxine said. "I saw some in my lab work. They're diffuse but kept in long threads. Means there must be pretty powerful magnetic fields around them."

"Ummm," Piotr murmured, staring at the trceries that moved like kelp in the slow wash of tides. "Magnetic pressure we can counter with plasma pressure, right?"

"Good idea," Tricia said sharply. "Bringing our tail around."

"Da."

*Proserpina*'s image began rotating. The bright flare of its drive glared as it came around to point in their direction. Ellen could see filigrees of exhaust licking out across the great distance, moving at tens of

kilometers per second, to judge by the scale. Where the wash of it struck, the threads of ivory plasma shredded, blown apart. Their soft glow dissolved.

"Got them!" Tricia called.

"Pour it on," Piotr called happily. "I'm bringing ours around, too."

More lurching and a nasty rumble in the deck. Ellen hung on.

## Hard Plasma

<It cuts!> Mirk cried. <Sharp!>

<The other hotshot has turned!> Dusk called. <It expands now—so fast—>

Mirk called, <We are caught between them.>

<Back away, all!> Recorder sent at high amplitude.

<I am wounded,> Forceful reported calmly.

<I too,> Dusk admitted, its tone carrying lacings of skittering pain.

They were all withdrawing, trailing some fields they would lose in their haste. The example of Chill had brought caution to them all.

<It burns as bright as ever,> Instigator said ruefully. <We did not hurt it, only interrupt.>

<Let us keep pace, however,> Recorder said. <We are not so hurt as to let this affront pass.>

<No, no, no,> all chorused—all but Chill, who was silent and probably would be for some time. With Diminishment came not only damage, but loss of status. <Do not let them escape.>

<To where?> Recorder said. <Both came from the Hot, and show no signs of wishing to return.>

Mirk sent, <See—they turn, as if to run alongside the Cascade.>

Their pursuit had carried them safely upstream of the roaring Cascade, but they still felt vibrations and shocks from it reverberate through their bodies.

A long silence hung between them. Each mended its skin and currents, rebuilding where hard plasma had torn raw gouts in filmy magnetic structures. In the quiet, upstream from the thunder and boom of the Cascade, a faint whispering came to them. Jittery spikes came from the two tiny cold things.

<Hear that?> Sunless and Dusk sent together.

<It is not froth from the Cascade?> Ring asked. <So busy!>

Sunless sent a slick burst of layered nuances, piling language into stacks. <See? This is how they arrange their speech.>

<You think it is speech?> Dusk asked. <So noisy!>

<We can decode it, I think, in time.> Sunless answered <See, it is not too different from the orderings we receive in the startalk frequencies. There is a mathematical ordering here. If we can find its cues . . .>

<Work, yes, Sunless.> Forceful said. <There must be sense to all of this.>

Recorder sent a long, thoughtful roll of waves, whose import was, <Do we think—is it possible?—this an intermediary from the true ancient Sunborn?>

Mirth greeted this. <Impossible!> Forceful said.

<Such as we cannot grow from tiny cold kernels,> Dusk dismissed the idea.

<We came of grander stuff,> Ring added. <And not cold! Not solid!>

Recorder recoiled a bit from the chorus of derision. <But these come from Inward, and so may know how the Sunborn fare.>

<Such notes?> Forceful said. <What could they know?>

Dusk added, <No true intelligence can reside in chilly specks!>

Recorder said patiently, <We should always ask ourselves how to use any new thing, to gain access to the Well.>

Forceful sent striations of red disagreement. <We are living in a fortunate time. The Cascade presses in toward the Hot, as it has not done for a long era. Let us take advantage of this moment!>

Recorder's aura became more uneasy. <I remind us all that the last time the Upstream delivered such high flows, forcing the Cascade inward, we made no progress in learning of the Sunborn. And we learned nothing of how to speak to the Children of the Hot—if they exist at all.>

Forceful bristled, shimmering its outline. <Failure is not an argument.>

<We have experienced many of these inward incursions of the Cascade.> Recorder sent them all a picture of past ages. Images laced among them all—of eras when, under the Upstream's rising pressure, the Cascade had pressed in upon the orbits of the giant worlds. <Each time we venture a bit inward, and fail to learn much that is useful.>

<Remember those who became trapped inward,> Dusk added, <and are lost to us.>

<We have not forgotten,> Ring sent mournfully, tinged with a sad aura.

They all knew that Ring was the closest relation to the Being lost long ago to inward, near the Hot—a tragic, historical agony.

<Do not forget our successes,> Instigator insisted. <Remember how we pushed some of the little iceballs inward, carefully targeting them to strike the inner worlds. That was a triumph!>

<So from the flares of the iceballs' impact, we learned some of this 'chemistry' you love so much,> Ring said adamantly. <I am not impressed with knowing such dirty facts.>

<All learning can be useful,> Instigator said adamantly. <Will be useful, in time.>

Into the middle of this came a long, pleading note. <I petition to address you all.> It was Chill.

Forceful sent, as custom required, <Approach and speak.>

<I apologize for my failure in our engagement with the small, solid thing. I am humiliated by my wounds and ask to be Diminished.>

A rustle of concern washed among the Beings, who had drawn nearer.

Forceful said, <We need your abilities, not merely your presence. Diminished, you would be of less use to us at this pressing time.>

Chill replied with a clear shame aura. <I have begun to compose my poem-song that by custom I should create.>

Consternation swept through the Beings. This was a major step, one that left no doubt about Chill's resolve.

<Oh no, please do not!> Dusk sent.

<I must.>

Beings could fray, dissipate, then recompose. Feeding lustily in the Cascade ran the risk of such erosions. This was where the more primordial of Beings had learned the arts of suffering loss and then rebuilding themselves. By running soft currents, carefully using the eternal laws of induction and conduction, those early, rather dim intelligences had with agonizing slowness mastered Resurrection over Diminishment. The galaxy had spun in its eternal gyre fully fifteen times before the Beings had fathomed how to become Immortal.

But only if they wished. Resurrection soon—on a time scale whose long unit was that gyre—became

of far greater significance. The Resurrection skills allowed Beings to Manifest in fresh form. To choose Diminishment—not merely to *suffer* it from the outrageous surges of the Cascade, or the magnetic insults of a passing molecular cloud—was an act of nobility and honor. It could lead to the highest status among all Beings, near and far.

One's fate in life, all Beings held, was set by deeds performed in past Manifestations. Previous wise acts yielded, in time, superior magnetic shapes in this present life. Bad or stupid acts gave the reverse—bad character, low status, even ruin.

Since the Origin, Beings had passed through many Manifestations. Some traces of these past lives and deeds still lingered in core memory. Those feather-light remembrances were the breath of Eternity, the high wisdom of previous selves.

How beautiful life therefore was, and how sad. How fleeting, with no past or future but a limitless *now* that embodied all that had come before, but was still now. Such was the state of Being.

<I forbid it!> Forceful sent.

Chill insisted. <I asked permission to subtract by humble self-reconnection.>

<We need you now,> Dusk said anxiously.

<I could use a time, going into the great void before ReManifestation.>

Recorder said, <Permission refused.>

<Might you approve later?> Chill asked plaintively. <I beg again to end myself.>

Recorder said, <You are needed.>

<Then I apologize. Allow me to do something of hazard, that I may redeem myself.>

Instigator fizzed with excitement. <I do have an idea, one you could aid in. Chill, you are a smaller Being. If Crafter's arts can be brought to bear, you might be able to insert yourself into these tiny solid bodies. It would be dangerous.>

The other Beings sent cries and shimmering auras of alarm. But Chill answered, <Show me how.>

## **Burnt-yellow Fingers**

Ellen had learned to spend more time alone, and the aftermath of the assault had made her retreat into her meditations. But after time in the sliding vapor world of her Japanese garden, she knew what to do next.

Years before, adapting to Mars, she had discovered by web browsing the melancholic poetry of A. E. Housman, an English poet dead now well over a century. A particular piece of that man's wisdom she and Piotr had applied:

*Ah, spring was sent for lass and lad,  
'Tis now the blood runs gold,  
And man and maid had best be glad  
Before the world is old.*

Sex, after all, was the flip side of death.

Before, she and Piotr had answered a brush with danger by making love, laughing, shouting out their joy in the moment—thumbing their noses at gloomy ol' Fate. *Ah!—Yes.*

After, they talked. The crew could keep track of the electromagnetic blizzard their plasma-net was delivering. Tricia was flying in clean formation now, so they were using all their gossamer plasma-web

ability. And Earthside was gobbling up the broadband data feed, analyzing, theorizing, decoding the long strings of mystery.

So they talked about mysteries, too. The discovery of life on Mars had ignited an ongoing debate Earthside, of course. The prevailing view now emerging was not that of the chattering classes of the long-dead TwenCen. Back then, all the smart folk thought that the universe was a pointless cosmic joke, on us. Now the Martian experience—weirdly sentient, ornate molds—had opened the plausible case that the universe was a meaningful entity. Increasingly, it seemed to be made down at the lawmaker's level to generate life and then minds. Brute forces seemed bound, inevitably, to yield forth systems that evolution drove to construct models of the external world. Inevitably, those models worked better if they had a model of . . . well, models. Themselves. A sense of Self.

So if even slime molds could evolve in Martian caverns into thinking beings—if, admittedly, of rather inscrutable traits—then a whole landscape of Mind opened. Perhaps the evolution of beings who could discern truth, apprehend beauty, maybe even yearn for goodness and define evil, experience mystery and feel love . . . well, that was a compelling possibility to just about everybody.

Piotr was, of course, ever the skeptic. "What of these things that try to disable my ship?"

Ellen grinned, suitably relaxed. "We're on their turf. Remember, when Leif Ericson landed in the new world, the first thing that met him was a flight of arrows."

Piotr scowled. "These things, big as buildings—already I see on Net that ignorant people Earthside think these are gods or something!"

Ellen poked him and wrestled around among the bedding until she was sitting on top. "So what if they do?"

Piotr snorted. "Is childish. People want gods who pay attention to them, is all."

She held his wrists down and demanded, "You mean, can humans claim any spiritual special status? Compared with what?"

He gave her a broad, silent smile that said he could easily tumble her off, but wouldn't. She persisted, "Look, we both came out of a Christian background—"

"Not me! Was brought up to be proper atheist."

"Yes, another gift of the Soviets." She remembered the church her family had attended, pillars and vaulting white as plaster, like the cast around the broken bone of faith. Still . . . "Christianity has the most to lose from intelligent aliens, right? Jesus was *our* savior. Dolphins and gorillas and supersmart aliens—he didn't die for them."

"Um." Piotr sighed, resigned to a discussion. "Jesus was God's only son, yes?"

"The Bible says so."

"So unless God has the same son go around to every planet . . ."

"Or wherever these things we've found live—"

"Dying at every one of them, seems cruel."

"Worse, it means part of God has to go around dying all the time."

"Am glad I'm not a theologian."

"Me too. I looked up this stuff and there's even a quotation about Christianity and extraterrestrials from Thomas Paine, the American revolutionary—over three centuries old! He said"—she glanced at her notepad, on their side table—"Lessee, 'He who thinks he believes in both has thought but little of either.' Ouch!"

"I wonder if is right way to think of intelligence, anyway. They have consciousness but how about ethics? Sin?"

"I'm pretty sure they'll fear death. Sin? Hell, I don't believe in that! And ethics—well, sure, in the sense of social rules."



"Social rule is like take off hat when enter room. Ethics, you need philosophy."

"Okay, any social being will need some philosophy. But—"

"I am social, do not need philosophy."

She grinned. "You only think you don't. We don't know how to think about ETs, that's for sure. Can one become a Muslim? A Jew?"

Piotr gave her a soulful look, big brown eyes liquid in the hard incandescent light. "Your meditation, the Japanese thing—it's about this?"

She sat back uncomfortably. "I suppose. The Buddhists and Hindus seem the least threatened by advanced aliens—they took the Mars mat in stride, remember?"

"Does idea of alien Jew make sense?"

"To who? Maybe not, to us. But they do have a big, open idea of God."

Piotr frowned. "Those Baptist guys who attacked the Mars mat finding . . ."

"Right, they're the opposite. But they've been losing out, Earthside."

"So now we have a big God, coming out of cosmic evolution, give us the biological universe? Better than the supernatural one of the ancient Near East, sure."

"I'll buy that."

"Only makes me wonder. These things we find—are they extraterrestrials?"

"Oh, I see—do they have a planet?"

"Maybe they live on iceballs, maybe not. Hard to see how they get so big on small worlds."

She frowned. "But they must've."

"Or are they maybe this big God you talk about?"

"Oh, come on—"

"This God might show up in person—wrong word, but you know what I mean—sometime."

"Now? Here?" She chuckled uneasily.

"We are at edge of Solar System. Maybe once we get out of our cage, we get a prize."

"Hummm . . . And you said you didn't deal in theology."

An alarm clanged. Their comm beeped. Hiroshi said, "We're getting a lot of high voltages in the plasma net. Big signals."

"How's drive?" Piotr demanded.

"Running hot and smooth," Maxine said.

"Coming!" Piotr called.

They got up to the bridge double time. The audio piping in a spectral summary of the electromagnetics was blaring through the spaces where the entire crew was on duty. Ellen said, "Turn it down," and from the lower frequencies came again the strange symphony she had heard, haunting in its sense of meanings layered in harmonics.

"Big voltages in the whole antenna system," Maxine said tersely.

"Damn!" Hiroshi waved his hands in the active control space, trying to keep ahead of the surges. Piotr barked orders to them and the other crew, all in their work pods. A sour smell of tension crept into Ellen's nostrils, and the scent was not all her own.

"We're getting feed-through," Maxine called. "Something's putting big inductive voltages in the whole damn plasma array."

Piotr blinked. "How far away is *Proserpina*?"

Maxine rapped out, "One thousand seventy-three clicks."

"What can put voltages all along a plasma conductor *that* long?" Maxine asked.

Nobody answered. The visible control display surged with red readings. "We're getting in deep here," Ellen said softly.

Maxine cried, "Systems crash!"

Hiroshi leaped up. "I can't shut down the antenna systems at all. It's feeding *back* into us—"

A yellow arc cut through the space before them. They all bailed out of their couches and lay flat on the deck as the snapping, curling discharge twisted in the air above. Piotr called, "Stay down! It's some high-voltage phenom—"

The crackling thing snarled around itself. Sparks hissed into the air. Coils flexed, spitting hard orange light. When a coil approached the metal walls it veered back, into the open space. A smell like burnt carbon filled the air. The foot of it flared into blue-white, keeping contact with the wall terminals where the antenna systems all fed. Ellen watched it, keeping flat on her back.

Piotr said, "To break down air, the voltage is—"

"Megavolts," Maxine snapped. "Stay flat. Stick your head up, it'll draw current, fry you."

"They—it—is trying to kill us," Hiroshi said through clenched teeth.

The audio raged. Sparks snapped. Nobody moved. Then the discharge arched and twisted and abruptly split. Yellow-green strands shaped into . . .

"Human shape!" Piotr said. "Making . . . like us."

The shape was like a bad cartoon, never holding true for long. Elongated legs, wobbly head, arms that flailed about in crimson disorder, hands jutting out, flailing, and then collapsing into sizzle and flicker.

Ellen felt her heart thump. "They can see us! So they're sending us an echo, an image to—make some kind of . . . communication?"

The figure wriggled and sputtered. Ellen raised her right hand slightly into the singed air. A long moment. Then slowly, agonizingly, the figure moved, too. It raised its left hand, mirror image. Wavered. The hand flexed, and with a feeling of visible effort, shaped itself carefully into . . . fingers. Thumb. The skin of it was yellow-bright, surging like the surface of the sun in hot brilliance. Meanwhile the body faded into a pale ivory discharge, an electrical fog flickering on and off as if barely able to sustain the sizzling voltage.

Ellen slowly flexed her fingers. The echoing fingers moved, too, suffused in a waxy, saffron-mellow glow. It hovered in the air unsteadily, holding pattern, all energies focused on the shimmering, burnt-yellow hand.

"Let's try—" Piotr began.

The arc snapped off. There was nothing in the air but a harsh, nose-stinging stench.

Maxine was sobbing softly. Hiroshi jumped up and turned in all directions, but could see nothing to do. Somehow there was in the space an aching sense of vacancy.

Piotr patted Maxine on the shoulder, mouth open and working but unable to say anything.

Hiroshi said, "They . . . want to talk?"

"Talk?" Ellen recalled that a long time ago Piotr had said, *This God might show up in person sometime*. She laughed with a high, nervous edge.

## Stick-outs

<They are tiny!> Chill cried joyously.

<Who?> Crafter's tones were, as always, somber and of exceptionally long wavelength. The other Beings had to strain to hear them.

Chill's voice wavered up the narrow spectrum, from the blanket Chill had formed around the solid moving motes. <The ones who rule the motes. I slipped in—such small spaces!—and framed my eyes into receiving antennas. I saw them! Shaped so odd. Not like a classical figure at all. Not elegant, like us. Is there such a thing as a chemical shape, Instigator?>

<I have no idea,> Instigator sent, deeply confused. Chemistry was the province of itself and of Crafter, because they were the only ones who cared for such ugly, liquid matters. But a chemical shape? What would masses driven by such blundering energies make themselves into? It strained the imagination. <Describe.>

<Five stick-outs from a rectangle—I can say it no better. I saw four of these shapes.>

<How did they change?> Ring asked.

Chill's aurora surged with excited puzzlement. <That is the oddity. They kept shape! Instead, one of them moved one of its stick-outs.>

Instigator was beginning to doubt all this. Chill might be merely having delusions, brought on by the extremity of what it had attempted. Even with Crafter's help, the task was probably impossible, after all. <How?>

<They hold to shape,> Chill answered. They could all see that he had unwrapped from the speeding mote, careful to not diffuse into the plume of hard plasma that bloomed behind it. <Stick-outs upon stick-outs—very strange. Then it moved. I moved to echo. It did too!>

<Chemical intelligence?> Forceful fumed redly. <Nonsense.>

<Not!> Mirk shot back. <Chill has redeemed itself supremely. Has discovered more than even Instigator.>

Forceful said, <I will go into the thing. I do not like these motes. Crafter! Come—help me.>

Chill sent, alarmed, <Do not!>

<Must.> Forceful made its way toward the flaring, killing plume. <Must.>

## **The Violence of the Amperes**

They were standing around, babbling in the way people have when tension is suddenly released, nervous and quick-eyed and chattering. Primate patterns.

Then the alarm clanged again. Hair stood on end.

Ellen dove for the floor. Maxine did, too, but she was the last to do so and she paid for it.

The burnt-yellow discharge surged from the antenna board, snarling. The air bristled. A tendril shot forth and caught Maxine as she fell. She crackled with the violence of the amperes that surged through her. Ellen watched as Maxine's mouth opened, a shrill shriek escaped—and then the mouth locked open, frozen. Smoke fumed from her hair.

Maxine jerked, screamed. Her blue coverall sparked at the belt. She struck the deck, tiny fires arcing from her fingers. Her hair burnt away in a flash. She shuddered, twitched—was still.

A vagrant spark struck Hiroshi. He jerked, screamed. His jaw slammed shut, opened, slammed down again. "Ahhh—!"

Again the electrical energy vanished.

Seared silence. The acrid air stung their nostrils.  
Piotr said bitterly, "They want to talk, do they?"  
Hiroshi's breath whistled between broken teeth.  
Ellen sobbed beside the singed body.

## Tube Worm

Tricia flinched. The video feed was all too clear.

"The damned thing's invisible!" Franklin said. "I can pick it up on all the low-frequency bands, sure. But it's not even plasma."

Tricia gazed at the charred lips of Maxine's corpse as the *High Flyer* crew lifted it, carried it away. Her whole face was swollen, bruised, already darkening. Only a few days before she had seen that mouth lifting in a smile, laughing, sipping expensive champagne that fusion power had hauled a hundred million miles. . . .

"It's whatever holds plasma," Tricia said. "See? Those strands, they're confined by magnetic fields. Just like our plasma receiver net. Currents lock in the ions and electrons."

Franklin nodded. "A magnetic intelligence?"

"Thousands of kilometers long," Tricia said. "And we thought the zand was a strange form of life!"

"It was—is. But this . . ." Franklin stared at the video feed, then looked over at the multiple screens that showed the sources of the low-frequency waves they were receiving. "I've got that new software running, pulling these weak cyclotron harmonics out of the noise. Look—"

Tricia had trouble focusing on what he was saying. But indeed there were images, flickering at the very edge of detectability, on the whole-space screens.

Franklin's hands swept the air, sharpening the images. "There's a *shape* that's making those waves. Wrapped around *High Flyer*. Look—"

Once he pointed it out, Tricia could see the filmy, foggy form. A long tube with many small openings, like puckers or pores. And a big tubular opening—a mouth?—at the head of it. Head? Yes, it moved forward and the front weaved as if it was scanning its surroundings. A huge magnetic tube worm . . .

"So that's what they look like," Franklin said wonderingly. "But look beyond—in the higher cyclotron harmonics."

Tricia felt a visceral nausea. "Disgusting."

He upped the register and drew out of the background more faint tracteries. "Those are much farther away. My God, they must be *huge*."

"This one's closer, smaller," Tricia's mouth narrowed, lips pressed pale.

"Yeah, it's wrapped around—"

"Let's give it some of what it gave us," Tricia said bitterly. She had met Maxine once and liked her immediately. Hiroshi, too. His front teeth were shattered, only stubs left.

She grabbed the controls. "Where's that bastard?"

## Sudden Pride

The darting fire caught Forceful. Burning hard plasma blew away its outer layers in a single gout of raging fire. It veered to avoid but the flame followed.

<Come, help!> Forceful called.

<We come!> Crafter's low drone was welcome.

<The two motes are turning. Both!> Ring was alarmed. <They concentrate the plasma on you.>

<I flee!> Forceful turned and wriggled away. Its magnetic columns flexed into quick, darting parts. It could dissolve into smaller, coherent structures and run faster, it knew—but the price would be a long, agonizing reassembly. And some humiliation, too. Sudden pride filled its strands.

It bellowed, <To flee before the enemy!—No!>

Resolute, it turned. <I flee no more.>

The hard plasma came into it and the searing pain was suddenly everything.

## The Eaters of Gods

Ellen felt wan, pale, sad. They were drifting now on minimal thrust. It seemed plausible that the magnetic creatures were somehow drawn to the plasma of their fusion drive, for some reason. So this was an experiment. More than that, they all needed time to recoup. Maxine's death had shattered their peace of mind. They all knew it was dangerous out here, but *this* . . .

And what of those creatures? Downloading Franklin's improvements on the signal/noise software that Earthside had sent, the *High Flyer* crew had numbly looked at the images traced out by the weak cyclotron emission.

The wormlike thing that had electrocuted Maxine was moving away, shredded and pocked. Beyond it, the entire sky seemed filled with dim images of many more. The scale of them, implied by the intensity and apparent size . . . Her mind boggled.

*So huge, they were like gods. Or were they worse? Could they be the eaters of all the gods that humanity had ever imagined?*

Only hours after Maxine's death, when they had to get back to work—a spacecraft under boost needs tending—did Hiroshi discover that their antennas were dead. External cameras showed that they were fused. The intensity of the current-voltage surges had simply melted their fragile wire webs. So they had to fix those, and right away. If their attackers returned, *High Flyer* needed to know about it. Hiroshi was aft, getting the robots set up.

Piotr worked beside her as she stared mutely at the images. Ever the practical one, he was assembling radar images of their vicinity. "This one looks good," he said.

"Oh?" She came out of her daze. A pale greenish blotch swelled in one of the side screens. "An iceteroid?"

"We better try to refuel. That last time, I burned up a lot of water."

In the end, all long-distance rockets were steam rockets. Whether liquid hydrogen married to liquid oxygen, or water passing by slabs of hot plutonium, or through a fusion burning core—they all flashed into plumes of steam.

Real space commerce demanded high energy efficiency. Realization of this returned to NASA in 2005, with the hesitant first steps of Project Prometheus (every bureaucracy loves resplendent names). The first rush of Mars exploration had proved the essential principle: refuel at the destination. Don't haul reaction mass with you. Nuclear rockets were far easier to refuel because they only needed water—easy to pump, and easy to find, if you picked the right destination. Nearly all the inner Solar System was dry as a bone. If ordinary sidewalk concrete were on the Moon, it would be mined for its water, because everything around it would be far drier.

Mars was another story. It bore out the general rule that the lighter elements had been blown outward by the radiation pressure of the early, hot sun, soon after its birth. This dried the worlds forming nearby, and wet those farther out—principally the gas giants, whose thick atmospheres churned with ices and gases. Mars proved to be wetter overall than Earth, though without much atmosphere. Not massive enough to hold on to its atmosphere for long, its crust had been sucked dry by the near vacuum. Beneath the crust were thick slabs of ice, and at the poles lay snow and even glaciers. So explorers there could readily refuel by melting the buried ice and pumping it into their tanks.

In time the moons of Jupiter and the other gas giants would become similar gas stations, though they orbited far down into the gravitational well of those massive worlds, demanding a lot of delta-V, tens of kilometers/sec, just to get to them. This made Pluto a surprisingly easy mission destination. Small, deeply cold, with a large ice moon like a younger twin, it took only a kilometer/sec delta-V to land upon. And beyond it, now, the refueling targets were even easier.

"What's its size?" she asked.

"Looks to be two-three-seven clicks diameter," Piotr read off the flickering scale. "Surface grav, maybe a hundredth of a g."

Easy to approach and hang alongside. Hard labor, lugging the hoses around, melting that incredibly hard, deep-frozen ice. But it would be R&R, too—as her mother used to say, *Your mind working too much? Use your hands instead.*

"How far?"

Piotr beamed. "Two days flight, with some time for delta-V. I was worried maybe we not find much ice near this bow shock."

"Enough time to fix the antennas?" Ellen asked.

"Some, anyway." Piotr grimaced. "We'll all have to run the bot teams. And get them ready to operate on this iceteroid, too."

Ellen finally managed to rouse herself from her lethargic depression. She had lost team members in the long decades on Mars, but never so brutally. And never to an enemy other than carelessness and bad luck. "I'll go help."

Maxine had been principally in charge of the robots. Her loss meant they would all pitch in. Ellen found in the first hour that she was rusty. In the flight outward, Maxine had done too much of the work, and tutored too little. But then, they had all been infernally busy. A new ship is a fresh menu of troubles.

On *High Flyer* robots did maintenance and repairs outside and in the fusion region. If they got hot near the reactor, they then cooled off in a shielded vault, nestled beside the huge water cylinders, until ready to use again. They never entered the living quarters. If they themselves needed repair, the work was done by other of the semiautonomous robots, operating under telepresence.

"How're they looking?" she asked Hiroshi in the midpod, between life systems and the water columns.

"Cranky." He looked distracted, punching in commands to a big, cylindrical stack of multipurpose armatures. The many arms made it look like a very dangerous Swiss Army knife with jets attached.

"Lemme see." She started on prep.

None of the ship's robots looked remotely human. Spindly ones operated in the zero-g sections near

the axis, and on the hull when they were not boosting. Other bulky ones had multisocketed arms, so they could lurch from socket-hold to tie line in the rugged radiation environments of the drive. Slender snaky forms labored to check and patch the vast water cells that had to be kept from freezing. Water circulated by sluggish pipes to the warming zone of the reactor, but the joints had a tendency to pop.

They were smart bots, of course, because they had bodies. This elementary point had eluded the TwenCen AI savants: intelligence builds up from sensory-motor experience, not from logical rules. Start with a body and build a mind. Not the other way around, bestowing scholarly programs and then splicing in worldly knowledge.

So the rise of the robots, starting in the early twenty-first century, meant that AI came into its own. No more software and wiring diagrams; bring on the neural plasticity and learned patterning. A working robot was not a set of abstract reasoning software walking around in a metal skirt. It was instead a mind brought up on inertia, friction, torque and balance. All along through the 2020s and 2030s, machines learned from animals, not from logicians. In space, they crawled and slithered and even flew—all using methods mimicked from worms and rattlers and octopi.

She told the hull bots to check for flaws and damage, delegating a special team with big hands to install Faraday shields around the microwave antennas, once another team had replaced them. These cages were just wire cages, with grid spacings greater than the emitted microwavelengths. Since the big power they were getting came in far longer wavelengths, this should insure their comm gear against overload and blowout.

Robots grew up in a technouniverse that was getting embedded, smaller, sneakier, and everywhere. The *High Flyer* was not made on the mode of the stalwart *Titanic*, splendid gray iron in hull and hammering engines. It was instead a moving bulk ruled by a nervous system of chips and bots—buggier, not just bigger.

"Hey, Piotr, we need zero-g now," she was finally able to send on comm. "Gotta get these bots out."

"Was quick," he said approvingly—and the rumble of the drive cut off. Ellen clung to a beam and the bots went into their automatic, gyro-stabilized positions, ready to work.

Out the bot hatch they went—a long tube leading to an automatic air lock. They popped into space, got oriented, and started. Ellen watched and corrected.

She could feel the whole system at work, in the working immersion pod. Tuning into the embedded, fixed sensors, she picked up the whole-body feel of the Swiss Army cylinder balanced intricately on a gas jet. It was remarkably like sensing the entire *High Flyer*, because the perception-space was the same. When Piotr let her immerse in *High Flyer*, she could feel how its fusion flame adjusted its flight, sense the throb as pumps moved its arterial water and air through capillaries, see the framed scenes as eyes peered into circuit tangles and even the fusion hellhole.

She would never forget the first time she saw their drive, from the inside. She had paid little attention to fusion, believing—as the skeptics had said for half a century—that controlled fusion power plants lay twenty years ahead, and always would.

But the sudden advent of a high-quality fusion rocket made her hit the books—or rather, the Net—and fathom the magnetic doughnut that held the ions of boron and hydrogen. The ions snaked around the geometry and then slammed into each other, giving forth brimming radiation, spitting hot alpha particles out. Then the doughnut collapsed. Ions let fly. The rocket engine was this flickering, come-and-go doughnut, holding the plasma, then letting it fly as the doughnut died.

This work called up the memory of scuba diving in Hawaii, on the north coast of Oahu, offshore Turtle Bay. The wonder of it had charmed her. Hanging upside down above a coral reef, she had learned to blow bubbles that, rising, formed into rings. They were magically exact, thinning into hoops a hand wide but of thickness less than a little finger. Toroids, she remembered from high school geometry. A fat one was like a doughnut. She floated thirty feet down, utterly relaxed, and blew the floppy bubbles that shaped themselves into beautiful rings, order emerging from chaos, another of nature's miracles.

Like now: another doughnut of fierce fires, dying. The ions escaped down a magnetic gullet that became a throat, shaping the plasma into a ferocious fire that jetted out the back. The doughnut died, crumpled magnetic field lines sagging. *Another torus*, she remembered from Hawaii, seeing them shape magically into toroids, into rings. Nature found so many uses for the same geometries.

Tending the bots was not so romantic. When she switched the immersion pod to the bot-world, she sensed the moving, momentary minds that puzzled over their driver problems, moving flanges and lifting hatches and turning tools—all to do the myriad minor jobs a giant needed. But a proper ship bot worked as a simple AI, all done below consciousness, please—like digestion and excretion, not suitable subjects for meaningful discourse.

## Iceteroid

Their nozzles burning soft and pale at low drive levels, the two long cylinders swooped down toward the pale gray iceteroid.

The astro guys Earthside said there were over 40,000 iceteroids like this out in the dark—Pluto wasn't really a planet, they said, just the biggest of these "cometoids" that others wanted to call "Plutinos"—so maybe it wasn't surprising that they found one fairly near the nose of the bow shock. Still, it was suspicious, because the blocky body *looked* odd. They expected the usual dirty gray ice, but it was a dull green.

"Lots of current in the plasma around us, too," Franklin reported.

"Reminds me of Pluto," Tricia said, frowning. "Warmer than it should be— Look, there's a funny brownish haze around the thing. An atmosphere!"

"Now, that's plain impossible," Franklin said. "A chunk of ice can't hold on to a gas at all."

But it was there, all right. "Methane, the spectrum says," Franklin admitted.

"One other thing . . ."

"What? It's pretty thin stuff, not much of an atmosphere—"

"No, the spin." Tricia pointed. "It isn't."

The chunky, potato-shaped mass held steady on the screen. Franklin said, "Ummm . . . maybe it's really slow?"

"No, been tracking it for hours. Zero spin. Never saw a natural object that didn't have some."

They came gliding in carefully, *High Flyer* on the other side to provide maximum coverage of this miniworld, which they had decided to call Iceball.

Tricia sent one of her bulky bots shuttling over to gingerly touch down. *Proserpina* had no need of water—they had refueled on Pluto's glimmering ice fields—but Tricia wanted to see if further clues to the zand could be here. The incoming Darksider machines dropped on Pluto had to come from somewhere, and Iceball was upstream of the currents from the bow shock. Somehow, all this diffuse energy had to fit together.

*High Flyer* was deploying bot crews on the other side. Their teams set to, hauling out pipelines to melt ice and suck up water. *Proserpina* would have first crack at the science, then. Their bots hit gingerly in the microgravity, sinking anchor lines through the odd green-brown splashes that covered about half the ground. Franklin ran the chemical analyzer bots, Tricia the patrol bots. Her point-of-view choice was a bot that didn't anchor, jetting instead over the visibly curved, bumpy surface.

"Y'know, this is damned strange," Franklin said on comm from his control pod.



"Tell me about it." Tricia's bot had arced over a brown crest. Beyond stood a complex construction, house-sized and spiky, with contorted flanges, tubes, valves, chutes and prongs like a big arc-welder rig. "Got an artifact here."

"A Darksider?"

"Maybe the factory that made them."

"A working factory?"

"I can see parts moving. Some dust in a column, spinning around. Purple sparks, too, jumping around inside the column. There are pipes, transparent pipes. With fluids pumping through them—liquids I can see shining by their own light."

Franklin said, "Wow. Me, I'm getting boring readings on methane and ammonia and—wait, looks like maybe complex organics in the stew here, too."

"Y'know what I think? This is somebody's workshop."

"Like Pluto, you mean. Yeah. Sure ain't natural."

"Hey, the fluids are awfully bright. I wonder if they're—well, metals? In some kind of plasma discharge, not solid—but metals, yes."

Franklin's doubtful tone was clear even over the raspy comm. "You got spectra?"

"Here—" She shot the data over and was gratified when, in less than a minute, he replied, "Yep, there's iron and nickel and copper. Uranium, too."

"So it's—what, a plasma foundry?"

"Yeah. Here, where ambient's—lemme see—36 Kelvin!"

"And we thought *we* were engineers . . ." Tricia watched as a scoop slowly descended from the porcupine-like structure. With a huge claw it scooped up material from a tray and deposited the man-sized pile in a hopper. Something sucked the material into a cylinder and some actinic flashes came from the studded walls of it. Then the tray began moving away on invisible jets, lifting and sailing over the horizon.

Tricia made her bot lift some dirty ice a meter and let go. It took a minute to fall, straight down. "Y'know, the zero spin makes sense. Moving takes nearly nothing, and it's easy to do when there's no rotation to mess you up."

"Easy if you're a machine calibrated that low, yeah," Franklin said. "Not easy for our one-g reflexes."

"This"—in an instant she was sure of it—"this is where the Darksiders get made."

"Yeah?" Disbelief colored Franklin's voice. He sent his bot scooting after the loaded tray. "Let's see."

From the bot point of view the gray ice shot by below. Small gas bursts altered its straight-line path to curve around the close horizon. Franklin was hard put to keep the tray-flyer in view. Then a large, tangled structure rose over the rim. Columns of moving, electric blue dust whirled in the vacuum, somehow confined. They passed through the dark struts and corridors of the—*well*, Tricia thought, *might as well call it a factory; it sure looks like one*—and electric green arcs flashed every few seconds, sending weird shadows stretching across the plain and up through the twisted towers above.

"Look there," Franklin said.

The flying tray had disappeared somewhere in the labyrinth. On the dirty ground at the factory's edge stood half a dozen constructions, in various stages of assembly. Small machines worked over them. "I'll bet when they're finished, they'll be Darksiders."

"No bet—good call." They watched silently as myriad small machines prowled the strange, shadowy structure.

"Hey down there!" It was Ellen on comm. "We're in good range again."

"Can't talk much," Tricia said. "We're watching the natives." She sent a cam-view attachment on a sideband and was gratified to hear Ellen's gasp.

"What are they?" Ellen whispered.

"Minions," Franklin whispered back. "I always wanted to use that word, and these sure seem to fit."

"Minions of . . . what?"

"The magnetic beasts, I'll bet," Tricia said. "Certainly not the other way around. Ever since I saw my first zand, I was sure it couldn't be natural. I mean, couldn't have arisen and evolved on Pluto."

Franklin made his bot extend a tool, effectively pointing to a team of three small devices that skimmed out from the edifice, over the ice, and then swarmed around a partially finished Darksider. "Right, no way. There's not the complexity of a natural biosphere. No pyramid of life, nothing. Just raw materials and . . . machines."

"Ummm," Ellen said. "Like a biosphere designed by something that didn't know the steps?"

"Or wanted to cut to the chase," Tricia said.

"Something in a hurry," Franklin said.

"Now the diplomacy begins," Tricia said. "We're on the ground, might as well introduce ourselves."

"Think they'll notice?" Franklin asked quietly. "They've sure ignored us so far."

"Look," Ellen said, "ants crawling across your desk don't know they're interrupting a superior being reading her e-mail. They don't notice you at all."

Tricia nodded. "So we use something they will notice."

Ellen asked, "What? We don't—"

"We hauled it all the way from Pluto and it's been itching to get out. Let's deploy that Darksider I caught."

## Toroids

Forceful hurt. <I should be grateful . . .> It paused to summon energies. <. . . that I did not suffer more . . . Diminishment.>

<You were brave,> Ring sent. <Gallant!>

<I was damaged,> Forceful sent sourly. <And they both got away.>

<Not far,> Sunless said. <They are within the outer skirts of my own body now.>

<They are at the Orb?> Instigator asked with alarm.

<Very near, yes,> Sunless said. <I did not think that significant, compared with Forceful's losses—>

<Never mind Diminishment, even if suffered from such motes as these,> Instigator said. <Quick, what are they doing?>

<Nothing,> Sunless said. <Drifting. Their fires burned low and now are out. They hang like the dead beside the Orb.>

<They are attacking my experiments!> Instigator sent.

<We must converge,> Recorder sent to all. <This series of incidents strongly suggests that we are suffering an incursion from life-forms who wish us no good.>

<But the two fire-breathers together!> Sunless cried.

<We will surround them.> Forceful sent weakly but with a calm ruthlessness. <With our fields concentrated—intermingled—we may be able to apply enough pressure to gutter them out.>

<You wish revenge,> Chill said carefully.

<Who would not?> Forceful said.

<Very well,> Recorder said, signaling an end to discussion. <Together, now—>

## Wanjina

Ellen took a long break from the bot-controlling job and walked to her private preserve. There was something brewing here and she needed to be centered to fathom it. She shut out her ship's eternal hum and concentrated.

The sliding sheets of water again caught the projected scenes she had not seen in person now for decades. One of the obliging, scanty comforts of Mars had been its sometimes eerie similarity to the great red interior of Australia, where she grew up.

So she called up in the walls around her the abrupt scarps of sandstone in Australia, the lashing rains pouring over them, and shortly after, the scorching summer turning the rock to furnace heat. Yet the grand rocks looked redder after the rare rains, standing out in sunsets against lush grasses as wide swags of pearly cloud hung over the floodplain. In the northwest she had once seen wall paintings of spiritual beings, *Wanjina*, with huge eyes and no mouths—beings who saw all but judged nothing.

The memory came to her abruptly. The human legends of higher creatures *who saw all but judged nothing—yes*. The pressing human need, embodied in legends of goblins and angels and golems and trolls and faeries and so many—the need to find another voice in this indifferent universe.

Was it so demented? Pathetic?

And now here was the possibility.

But how to talk?

She remembered a classic story from Kyoto lore.

\* \* \*

*Two men were watching a beautiful pool and the koi fish that swam just below its calm, clear surface.*

*"The fish are happy," said one man.*

*The other asked, "How can you possibly know?"*

*"How can you know if I know?"*

*"How can you know I cannot?"*

*"That is not the point," the fish said.*

\* \* \*

So how to think about this?

Expect the unexpected.

She left her security of the personal space and trudged out into the command deck. Piotr was there, dealing with details as their complex sensorium sampled and delved and fidgeted with the immense landscape presented by the panoply of sensors High Flyer carried. The new software gave them a holistic view of things never glimpsed by the human eye: magnetic fields, plasma fluxes, the slow clash of pressures and shock waves at the boundary of Things Solar and Things Stellar. Humans had evolved in the flat dry plains of Africa, and their sensory inputs (to use a computer freak's terms) were of a blithe Euclidian geometry of obliging infinite spaces, flat planes and simple forms. Human eyes were not made for the surge and suck of such three-dimensional turbulence. But they tried.

Instead of talking, that blunt medium, she simply embraced him.

Took him to bed. Made love and made it matter.

There is always something ultimately fatal about sex, for its flip side is death.

\* \* \*

*What use to rise and rise?  
Rise man a thousand mornings  
Yet down at last he lies,  
And then the man is wise.*

\* \* \*

But it doesn't have to be so, she realized.

Something clicked.

"I've got it!" she said.

"I thought you just had," Piotr said, lounging.

"No, not that—I mean I understand."

He snorted. "Having done experiment, we now get the theory?"

"No, the magnetic things, creatures, whatever. They can reconnect their field lines, the way the Earth's magnetic fields do after they've been battered by a solar windstorm. They can rebuild! So they don't have to die."

"Everything dies. Is evolution."

"Not evolution out here! They don't have to die. Imagine a creature that from the very beginning, however they first were born, had the ability to tailor its cells, its basic units."

He blinked. "Animals do not know they will die—is almost definition of animal, right?"

"Animals, yes. And maybe that's the big difference between us and these things. We fought them off. But to them this may have just been a maneuver, a temporary loss—nothing really important."

"I thought the scans showed that we wasted the magnetic bastards."

"No, just that some of their field structures—those arcades and archipelagoes, remember?—they glowed and seethed and then—zap!—they were gone."

"We killed them—it—whatever. Da."

"No, we didn't. Damaged, but not dead."

"So—this stuff I see on all the screens, closing in on us—it's the same things? Beings?"

"Creatures, yes. And they know what happened, they were there, we can negotiate with them."

"They seem not interested in negotiation."

"But they're not dead! So essentially all life is a negotiation, 'cause they never die."

"All measures are temporary?" He wrinkled his forehead.

"In a way we can't ever know, yeah. Everything's temporary. Like the weather. The only thing that ever lasts is them."

Piotr arched his heavy black eyebrows, bemused. "Interesting theory. Makes our job out here harder, though."

His words jerked her out of her gauzy speculations. "Huh?"

"We were sent to see what makes the bow shock come in closer and closer. These things must be the reason, the cause. And we cannot hope to kill them."

## Free Radicals

"I've got it figured," Franklin called joyously. "I know what makes those lichen possible."

Tricia was carefully maneuvering their Darksider toward the factory complex, across the soft starlight plain. But she, too, had wondered at the puzzle of how anything managed to live on a dab of ice under lower illumination than a flashlight's. "Oh? Fill me in."

"My chem-sampler bot—it's fished up a whole soup of stuff, yeah—but the telltale is, this iceball is *rich*."

"Um." Her Darksider was twitching, but her bot had it in three claws and wasn't letting go. Whatever had made Darksiders, it had little appreciation for gravity. Her bot, on the other hand, could maneuver in a full Earth g if it had to. It was maybe a hundred times stronger than the Darksider and she had to be careful not to cave in the Darksider carapace with too swift a movement. The two of them scooted slowly toward the spindly dark factory. "Uh, yeah?"

"It's richer than Earthside ocean water. See, thing is, this iceball has been here many billions of years, doing nothing but sopping up cosmic rays. Free energy. The high-energy cosmic rays barrel into it and create ionized atoms. On Earth, it's warm enough that they find each other right away and recombine. Not here. The radicals stay frozen, ready for the lichen stuff to eat."

"Yummy." She brought the bot over the horizon, made it survey for suspicious movement, then went ahead. None of the Darksiders parked in front of the factory showed any reaction.

Like most technoguys, Franklin took any vague murmur as encouragement. "So the simple molecules can sometimes find others, build up more complex stuff—just like in our ocean, only at fifty degrees Kelvin. Amazing!"

She slowed and descended. No reaction from the lined-up Darksiders. So she let hers go. It settled to the surface, taking a full minute in which she searched for any sign of reaction among the others. Franklin was talking organic chemistry, carbon and its many friends, her least favorite subject in university, and it went right by her.

"Not only that, the ice has plenty of uranium 235 in it. Another energy stock. That's what this fungus stuff we see is doing—burrowing through the ice, collecting the U235. Uses it for warmth, eats the organic compounds left by the cosmic rays—it's a whole ecology. Ice worms crawl around and gobble up the fungus."

"I don't see any gobbling going on," Tricia said warily. Her Darksider was shuffling forward toward its kin. "Things're pretty slow out here."

"Well, sure," Franklin said with undiminished enthusiasm. "Low temperatures—but lots of time, maybe since the galaxy formed ten billion years ago. The turtle beats the hare—it's wonderful."

"Hey, they haven't beaten us yet." The Darksider convention was in slow motion. Hers lifted one of its odd, X-shaped grapplers and touched one of the others. A pale yellow spark arced. Nobody moved. Then another spark, but this time from the other Darksider to hers. "And . . . they look like they're communicating with jolts of electricity."

This interested Franklin enough that he tapped into her bot sensorium. "Ummmm, makes sense, kinda. So damn cold here you have to give somebody a smack just to get their attention."

Tricia blinked. The Darksiders suddenly moved, forming a circle. They projected arrays of wires above their "heads"—knobs of tool assemblies, really—and a sudden crackling came into her ears. "They're sending something in microwaves," she said. "A . . . buzzing."

"Sure," Franklin said happily. "They're talking to their gods."

"What?" She got the sudden impression that her Darksider had reported in, and now all of them were . . . praying? "No, maybe just reporting in."

## Plasma Dragons

Forceful said, <We must attack. These cold solid things will cause us much damage if they suddenly flare to life.>

Mirk added, <When we are bunched together so, yes. We have not met this way in—how long? My memory of such an event is in long-duration storage, and slow to revive.>

<Too long, by my measure,> Recorder said. <But I know—nearly one galactic rotation.>

<So long!> Ring responded quickly, since it was so nearby. <I can feel the strums of us all, our digestive juices flowing, our dim internal murmurs.>

<But wait!> Instigator called. <I have touched my experiment. It calls to me. My emissary to the Large Cold Place has returned—brought by those solids!>

<Impossible!> Ring derided.

<Not. I can sense them grouped.> Instigator paused, puzzlement creeping into its emission. <They report strange things. There is one of the several-spoked things near them.>

Dusk ventured, <They are . . . studying us?>

<Through Instigator's inventions,> Sunless said. <How symmetric.>

<How so?> Recorder asked.

<We were persuaded long ago to let Instigator proceed to study the Hot by making actual solid manifestations. Tools. Now they study us through our own tools. The several-spoked things—do they look like our tools?>

Instigator answered, <No, not at all.>

<Then the several-spoked are tools, too, I would wager.> Sunless bore down upon the point. <Symmetric.>

<Then the large solids that burned poor Chill and Forceful?> Recorder pressed. <What are they?>

<They must be the true intelligences. They are plasma dragons!>

A tremor swept through them all, detected as fast ripples in the basic background magnetic field. The spatter of this fizzy noise sobered them.

<That is an old, discredited legend,> Recorder said primly.

<These are real!> Forceful insisted. <They spit plasma of a hardness and sting we have not known.>

<That does not mean they are the ancient dragons. I firmly believe the conventional wisdom of the far voices. Those were descended from a mongrel form of sun, angry at the other suns because of their far greater size. Those explode in wrath, leaving only the dragons. Then the dragons spit and fume and damage such as us—who never did anything to a star, and surely are the very children of the suns.>

Instigator said mildly, hoping to calm them all, <The plasma dragons these might be, but they are small. We can overwhelm them.>

<Yes!> Forceful seized upon the moment. <Let us!>

## Creatures as Gauzy as Lace

"They're coming!" Franklin called. "The big guys for sure. Lots of strong magnetic waves on the ship antennas."

Tricia was watching the bots maneuver. "Damn! I want to see what they do next."

"They've called down their makers, I'll bet." Franklin was agitated. He pulled out of his sensorium hood and said directly to her, a meter away, "We'd better tuck in, and pronto."

"Okay." Tricia jerked her head out of the confines of the sensorium hood and looked around. In the mild, air-conditioned deck nothing seemed awry. Yet she knew huge things were coming, creatures as gauzy as lace but as deadly as a viper. "What'll we—"

The deck shook. Circuits in the wall fizzed with overload currents.

"Ellen!" she called. "What're you—"

"It's slamming us around. Hard." Ellen's voice over comm had lost the calm, captain's tone. That alone shook Tricia. "We've got to damage these damned things!"

"Damage?" Tricia felt a quick burst of irritation. "They're trying to communicate!"

"They're behind the bow shock that's moving in—obviously."

"We don't know that." Tricia struggled to keep this civil.

"I'm under orders from Earthside to stop the bow shock from moving farther in, if I—we—possibly can."

"Thanks for adding the 'we', Cap'n."

"What's that mean?"

"Sarcasm is just one more service we offer out here—to newcomers."

Ellen's voice was suddenly cool, controlled. "Captain, you *will* assist me. I do have overall command of this expedition."

"Don't remind me."

"I want us to coordinate our thrust vectors to bring our exhaust plumes to bear on the same volume of space. That should maximize—"

"We've got to *talk* to them. I damn well didn't spend a year on Pluto to see you—"

"You *will* comply, Captain. Switch on your full screens—I noticed from your internals that you've been too busy arguing with me to tend to business—and run the new software we got from Earthside. So you can envision the magnetic structures."

"Why, I—"

"So we'll know where we're shooting."

Tricia sucked in a dry breath, made herself breathe out—*calm, calm*—and nodded to the rest of the crew. Their eyes were white.

Franklin sprang to the central position on the bridge. They both strapped in as other crew dashed to their stations. Tricia watched the screens anxiously as the ship rattled and creaked with stresses. On the screens the fluxes whirled and merged, mere digital analogs of a reality no human eye could grasp—beings bigger than continents, sweeping in on them like furious tornadoes.

Pluto had been a lot easier.

## Smoke Rings

Ellen felt her ship shudder. Considering its immense length and mass, this spoke powerfully of the net pressure even a filmy, lacelike filigree of magnetic field could exert.

"Let's go!" she ordered Piotr. "Give them some prop wash."

*High Flyer* surged onward, a relentless kick in the pants, accelerating on coils of fresh, snarling plasma. The mottled iceball fell away. Far off, *Proserpina* too flared and followed. Between them snaked forth bright electron beams, marked by their gauzy radiance where they excited the clotted hydrogen that backed up from the raging bow shock. Starlight sprinkled the ship as auroral fires danced along its flanks. Energies born of magnetic fields pressed at them.

"I'm getting a lot of that same low-frequency hash," Piotr said.

"The high-power stuff that started all this?"

"*Da*, is same." He looked significantly at her. "Your creatures."

"Hey, they're not *mine*." Though she had to admit to herself that she didn't want to kill them. Still—"They're drawing in close?"

"I'm not getting a good image . . ." Piotr thumbed over to the *Proserpina* link. "Send latest, eh Franklin?"

Their screens brimmed with twisting shapes. Ellen had learned to make out structures in the shifting magnetic topo maps, like looking down on hills that kept moving around, growing taller or shorter, restless blobs. "Bunching up at our tail, looks like," Ellen said.

"Time to spring trap?"

Ellen wondered. Poking them with the fusion drive's lance might just get more of her crew killed. She doubted that anything could dismember such moving mountain-sized things for long. She called out, "Tricia! Come alongside us—we'll have to use both torches."

"Mine's a lot less cutting than yours," Tricia sent back. They were both gunning it and weaving together in programmed dodges, to throw off their pursuit. But flies can't dodge trucks, as many windshields have proved. Ellen could see big bunched masses of high magnetic fields converging on both ships.

"Let's get close together, then turn our thrust at the maximum field points," Ellen said.

The idea of dueling with such beasts was laughable, and both their ships were like lumbering tank ships. But she sent *High Flyer* into a long curve toward *Proserpina*.

"Punch that way!" Tricia called. "DIS—navigation override: DEC 48, RA 23."

They seared the sky together.

Fuming, the magnetic whorls backed away. But the ships could perform this gravity-free gavotte only so long—then their plumes drove them apart.

Long minutes ticked by as both crews watched their screens. The magnetic stresses crept back in.

"Damn!" Piotr said.

"We can't do this forever," Ellen said.

"They'll figure out a new trick," Tricia said. "This is their turf."

Ellen took a long breath of the ship's dry air, smelling the sweaty fear around her. Nobody spoke. She had to get them out of this trap, this endless cycle of violence and terror.

"*That is not the point, the fish said.*

"Yes, but how to break the . . ." She pursed her lips. *Some problems just curve back in upon themselves, and that is the only solution . . .*



Was that it? *The figure that curves on itself.*

She said to Piotr, "The fusion equilibrium, it's a torus, right?"

He was busy and his fingers danced in useless, fretful patterns. "Is working fine, don't worry."

"Can you clean the system now?" she pressed him.

"What?" He sputtered. "We do that only to go to shutdown."

"I know. You pulse the top magnetic fields, force the toroid down through the magnetic nozzle."

"But only to finish the burn!"

"Do it."

"What?" Disbelief.

"Now."

He peered at her for a long moment. "It is our defense, the exhaust—"

"Now. Please."

It took more long minutes but he did it. The great circulating doughnut shape squeezed downward, heating further as it compressed through the knothole of the curved magnetic nozzle—and popped free. It was hotter than the ordinary exhaust and brimmed with fresh virulence, burning saturation holes in their aft view screens. The doughnut expanded, cooled, and tracers worked along its slick surface. All this they witnessed on the same grid display that showed the magnetic structures. The toroid was small, tiny compared with those. But it grew. Dimmed, cooled, but grew as its magnetic field lines tried to straighten out.

Tricia called, "What the hell—?"

"Calculated risk." Ellen was suddenly full of doubts. She had acted on impulse, on a hunch. She had done that on Mars before and it had worked. But here . . .

She whispered, "Piotr, better start building a fresh toroid."

"I will have to reset the induction coils, prime the plasma guns—"

"Please, yes. In case we have to run for it."

Tricia said, "I thought you were the one who wanted to zap them. Stop them from pushing in the bow shock."

"I do—but something I remember . . ."

Then the screens brimmed again with furious activity. In the whorls of magnetic turbulence she saw again a spinning, spitting *torus*—the shape she remembered from Hawaii, when she had blown bubbles and seen them shape magically into airy toroids; in the core of her own fusion rocket, the magnetic torus that kindled ions—a geometry so sought by nature that it appeared in vastly different places. Now it condensed into an immense, wobbly doughnut shape. Both ships speared through the hole of it.

"Like a noose that can choke us," Piotr said sourly. He turned back to work on reboosting their fusion core.

"Or . . ." Ellen let the word hang in the tense air.

"The toroid . . ." Tricia said. "They're making themselves, all of them, into one huge . . ."

"They are echoing us." Ellen watched the giant structure form, a curve thousands of kilometers long. Capable of pressing against their ships, yes. Or doing another job?

"They echoed our human shapes and killed Maxine." Ellen was guessing, but it felt right, and she had learned to shoot such rapids with no qualm. "Now they're echoing our fusion doughnut. But it's *their* shape as well, this time. So they know there is some sort of basic kinship between. A love of geometry—particularly of geometry that works."

## The Path of the Hotness

They had to wait months, through long and sometimes tedious translations, to discover the truth—or a version of it.

The Beings were not instigators—though one of them went by that name. They were opportunists. Every now and then, the Beings said, clots and clouds drifting in the realm between the stars would wander into the path of the Hotness—which apparently meant the Sun. Its increased density and mass would smack into the prow of the Solar System. For a "short while"—which seemed to mean centuries—the interstellar wilderness where the Beings thrived would press inward. Most Beings avoided that turbulent zone. But this local group relished the chance to feast on an enhanced Cascade. They ventured inward.

It was not clear why. Ellen felt that they were just born curious. Tricia thought there was something more ancient. She carefully scanned the Beings' word choices, for terms like *epoch*, *age-span*, *eon*. "I think they want to find out where they came from," she said. "The Hot."

"Somewhere in the Solar System?" Piotr scowled doubtfully.

"That's what they say—I think. These SETI codes aren't perfect."

They were not, but in time they served.

So the day came to pass that they watched the great Toroid of Beings shape and condense and strengthen. It tightened not about the two ships like motes, but into a knot that bunched against the inner rim of the bow shock.

Then the Beings—shoved. Their collective ram pressure slowly, agonizingly pushed the bow shock back outward.

It would be the work of . . . well, epochs, age-spans, eons.

The Beings understood that this was needed. For now. For the tiny lifetimes of the chemical motes.

## The Tiny Ones

<After all,> Forceful said, <the tiny ones have some intelligence. They can help us.>

<I assume you mean, for my grand prospect,> Instigator sent.

<Your experiments? To create more of the chemical life on cold orbs?> Mirk asked.

<No, no,> Instigator insisted. <To find our origins. They, the tiny ones, they can lead us inward. Assuming they do not die. They seem to be extremely mortal.>

Recorder was skeptical. <Find our origins? How?>

Instigator admitted, <I do not know . . . yet.>

<That is *far* too dangerous,> Chill said.

<Of course,> Forceful said with skating joy. <That is the fun of it!>