

THE SEER AND THE SILVERMAN

Stephen Baxter

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Like many of his colleagues here at the beginning of a new century, British writer Stephen Baxter has been engaged for more than a decade now with the task of revitalizing and reinventing the "hard-science" story for a new generation of readers, producing work on the cutting edge of science that bristles with weird new ideas and often takes place against vistas of almost outrageously cosmic scope.

Baxter made his first sale to Interzone in 1987, and since then he has become one of that magazine's most frequent contributors, as well as making sales to Asimov's Science Fiction, Science Fiction Age, Analog, Zenith, New Worlds, and elsewhere. He's one of the most prolific new writers in science fiction, and is rapidly becoming one of the most popular and acclaimed of them as well. In 2001, he appeared on the Final Hugo Ballot twice, and won both Asimov's Readers Award and Analog's Analytical Laboratory Award, one of the few writers ever to win both awards in the same year. Baxter's first novel, Raft, was released in 1991 to wide and enthusiastic response, and was rapidly followed by other well-received novels such as Timelike Infinity, Anti-Ice, Flux, and the H. G. Wells pastiche—a sequel to The Time Machine—The Time Ships, which won both the John W. Campbell Memorial Award and the Philip K. Dick Award. His other books include the novels, Voyage, Titan, Moonseed, Mammoth, Book One: Silverhair, Manifold: Time, Manifold: Space, Evolution, Coalescent, Exultant, Transcendent, Emperor, Resplendent, and two novels in collaboration with Arthur C. Clarke, The Light of Other Days and Time's Eye, a Time Odyssey. His short fiction has been collected in Vacuum Diagrams: Stories of the Xeelee Sequence, Traces, and Hunters of Pangaea, and he has released a chapbook novella, Mayflower II. Coming up are a flood of new novels, including Conqueror, Navigator, Firstborn, Weaver, Flood, and The H-bomb Girl.

Baxter's Xeelee series is one of the most complex sequences in science fiction history, a tapestry of dozens of stories and many novels (Raft, Timelike Infinity, Flux, Ring, Cilia-of-Gold) that spans millions of years of time as well as most of the galaxy, and brings humans into contact (usually hostile contact) with dozens of alien races, many of them initially more powerful and advanced than humanity itself. Here, in a scenario roughly halfway through the entire arc of the sequence, he pictures the attempt of two Galactic Empires formerly locked in conflict to uneasily coexist—with the stakes about as high as they can possibly get.

[VERSION HISTORY]

v1.0 by the N.E.R.D's. Page numbers removed, paragraphs joined, formatted and spell checked. A full read through is required.

His mother's screaming filled the lifedome. "He's gone. The Ghosts have taken him. Lethe, Benj is gone!"

Shocked awake, Donn Wyman grabbed a robe and ran out of his cabin.

His mother and father were in the plaza, in their sleep clothes, clinging to each other. They were outside

Benj's cabin. The door was open. Donn could see at a glance that the room was empty.

Only seconds after waking, he had a sickening, immediate sense of what was wrong. The abduction from out of the heart of his home was bewildering, as if part of reality had been cut away, not just a human being, not just his brother.

"Now, Rima, don't take on." Samm Wyman was trying to calm his wife. He was a careworn man, slight of build and with his family's pale blue eyes. Donn knew that spreading calm was his father's fundamental strategy in life.

But Rima was struggling in his arms. "He's gone! You can see for yourself!" Her hair was wild, her face tattoos unanimated, just dead black scars on her cheeks.

"Yes, but you're jumping to conclusions, you always think the worst straightaway."

She pushed him away. "Oh, get off me, you fool. What else could it be but an abduction? If he'd gone out through the ports, the lifedome AI would know about it. So what good is being calm? Do you think you can just *wish* this away?"

Donn said uncertainly, "Mother—"

"Oh, Donn-help me look. Just in case he's somewhere in the dome, somewhere the AI hasn't spotted him."

Donn knew that was futile, but they had to look. "All right."

Rima snapped at her husband. "And you find out if he's anywhere else on the Reef. And call the Commissary. If the Coalition are going to meddle in our affairs, they may as well make themselves useful. They could start by finding out where every Ghost on the Reef was last night-and the Silvermen."

She stalked off and began throwing open doors around the rim of the plaza. The bots followed her, their aged servos whirring.

Samm eyed his elder son. "I already called Commissary Elah. Who knows? Maybe the Coalition goons will be some use for once. She's just taking out her anger on me. She'll take it out on you, too, before she's done. It's her way. Don't let it upset you."

"I won't, Dad. But this is bad, isn't it?"

"I'm afraid so, son. Go on, get searching."

Donn cut across the center of the plaza, the lifedome's central floor space. Much of it was given over to green, for the crew of this old ship, his mother's distant ancestors, had crossed the stars with a chunk of forest brought from Earth itself, a copse of mature trees, oak, alder, and lime, old enough to have wrapped thick roots around the struts of the lifedome's frame. But Donn, twenty-five years old, had never been to Earth, and to him the trees were just furniture.

Of course, there was no sign of Benj. Why would he have hidden away among the trees? Benj, at twenty-one, liked his comforts. And even if he was here, the AI's surveillance systems would have known about it.

Something whirred past Donn's face, tiny, metallic. It was a robot insect. And a fine spray of water descended on him. He lifted his face and saw droplets condensing out of the air, an artificial rain born in the summit of the lifedome and falling all around him. Above the rain, the transparent dome showed a star

field that had barely changed for centuries: the Association, a cluster of stars dominated by the Boss, a single monstrous star a million times as bright as Earth's sun, an unforgiving point of light. He was getting slowly wet, but he didn't mind; he found the sensation oddly comforting on this difficult morning.

"Beautiful, isn't it? The star field."

The smooth voice made him start. He turned.

Commissary Elah stood beside him. Her eyes were large and dark, her gaze fixed on his face, calculating, judgmental. Taller than Donn, she was dressed in a Commissary's floor-length black robe, a costume so drab it seemed to suck all the light out of the air. Her scalp was shaved, a starkness that emphasized the beauty of her well-defined chin and cheekbones, and her skin gleamed with droplets of the artificial rain. Donn had no idea how old she was.

"I didn't mean to startle you," she said.

Something about her made Donn pull his robe tighter around his body. "Commissary. It's good of you to have come out so quickly. My parents will be reassured—"

"I hope so. I've brought some specialist help. A woman called Eve Raoul—a Virtual, actually, but quite expert. This is what we're here for, the Commission for Historical Truth. To help." Her accent sounded odd to a Reefborn, slightly strangulated at the back of the throat—an accent from Earth. "The Coalition understands."

"I suppose it must," Donn said. "If it seeks to rule."

"Not to rule," said Elah gently. "To join all of scattered mankind behind a common purpose. And by helping you sort out issues like this with the Ghosts—"

"Nobody knows for sure if the Ghosts are behind these abductions."

She eyed him. "But the Ghosts aren't denying it. Are you loyal to the Ghosts or your family, Donn Wyman?"

"I—" He didn't know what to say to that direct question; he didn't think in such terms. "Why must I choose?"

She reached out with a pale hand and stroked the trunk of an oak tree. "Remarkable, these plants. So strange. So strong!"

"They are trees. Don't you have any on Earth anymore?"

She shrugged. "Probably. In laboratories. Earth has other purposes now than to grow trees." She glanced around. "You know, I've visited the *Miriam Berg* several times. But I've never stood in this very spot, beneath these trees. Trade, your profession, isn't it?"

"I'm an interspecies factor, specializing in relations with the Ghost enclaves."

"It's all so deliriously archaic. And anti-Doctrinal, of course, your way of life, your ship's existence, its very name, all relics of a forbidden past!" She laughed. "But don't worry, we've no intention of turning you out summarily. All things in time." She pushed at the earth, the grass, with a bare foot. "We're on the ship's axis here, yes? Over the spine. Your mother's family came to the Reef in mis ship, didn't they, a thousand years ago? I imagine there are access hatches. Is it possible to reach the drive pod from here?"

"That's nothing to do with you." Samm came bustling up. Beside Elah's cool composure, his father looked a crumpled mess, Donn thought, his hair sticking up like the grass under their feet, his face shining with the sweat of sleep.

"I apologize," Elah said easily. "You did invite me here."

With his arms outstretched, Samm escorted her away from the copse. "To help with looking for Benj. Not to go snooping around the *Miriam*." But as she walked with him, he backed down, nervous of offending the new agency from Earth that had taken over all their lives. "We're all distressed."

"I understand."

Donn lingered for another few seconds under the artificial rain. He wondered why his father should care about the Commissary, or any Coalition agent, snooping around this thousand-year-old heap of junk. Maybe he had trade goods tucked down there in the spine-given the Coalition's new tax codes, Donn thought that was quite likely-but if so, he couldn't have signaled it any more clearly. Not subtle, Donn's father, whatever other qualities he might have.

But as Donn stood there, the complexities of Reef politics faded, and the reality of his brother's loss crowded back into his head, the true story of the day. For months, the abductions had been an arbitrary plague. Nobody could rest, for at any moment, you could be taken, too, from the most secure place. What a horror it was. And now it had come here, to his own family. He wondered, in fact, how it was he felt so calm himself. Shock, perhaps.

He trailed after his father, and the Commissary. And in a lounge at the edge of the plaza, he found a Virtual woman trying to console his mother.

"Before I died, I spent most of my working life exploring the principles of remote translation systems."

The visitor sat beside Rima on a couch. Donn's mother's face was twisted with grief and anger. Bots hovered before them, bearing trays of drinks and pastries-breakfast; it was still early.

The visitor was slim, modestly dressed in a pale blue coverall. Her hair was gray, and she pulled at a stray lock of it absently. Donn had never seen anybody with gray hair before, though he knew it had once been the default shade for the aging. Evidently the visitor's projection was good enough to fool the serving bots, but Donn observed that her interfacing with the chair wasn't quite right, and a haze of tiny pixels shimmered around the underside of her legs.

Rima asked, irritated, impatient, "Remote translation systems?"

Commissary Elah said, "Teleportation, to you and me. Donn Wyman, meet Eve Raoul. The expert I told you about."

Eve stood. Donn clumsily offered this Virtual visitor a hand to shake. She bowed, apparently unoffended. "I'm sorry to meet you in such circumstances."

"Eve Raoul," Donn said, "do you have a connection to *the* Raoul, Jack Raoul?"

"He was my husband. I died before him." She gestured at her slim body. "It's thanks to him that this representation was reconstructed from my old Notebooks. He liked to have me around in person to counsel him about quantum mechanics and the like, in the course of his work. And in the work he did, his dealings with the Ghosts, there was a *lot* of that."

Elah said, "Eve is a specialist in the sort of technologies that seem to be deployed here-abduction through

some sort of teleport device, apparently. And so we employ her to offer advice and counseling to relatives of abductees."

"Counseling," said Rima, skeptical. "Jack Raoul died eight years ago." She glared at Elah. "Or rather he was executed for his 'crimes.' He was pretty old by that time wasn't he?"

"Over two hundred years old," Eve said softly. "He left my Notebooks to the Commission, and to the Ghosts."

"He must have loved you," Donn blurted. Jack Raoul was well remembered here, a hero for the Reef's multispecies community, for his work in bringing about constructive working relationships between humans and Ghosts. Evidently, he was capable of great passion, too.

But Eve grimaced. "I was his legacy to an alien species. That tells you all you need to know about what it was like to be loved by Jack Raoul. However, here I am. And, since I know you're thinking it, it's more than a hundred and fifty years since my own death."

Rima snorted. "Then what use are you? How can these Notebooks of yours be up-to-date?"

"It's the best we have," Elah said sternly. "Rima, much human knowledge was lost during the Qax Occupation of Earth. That was a deliberate policy of the occupying power, in fact. One of our purposes in recontacting lost communities like this one."

"We weren't lost," said Donn.

Elah plowed on. "Our purpose is to reacquire such lost knowledge. And Eve and her Notebooks are a treasure. It's good of her to work with the Coalition, especially after the difficulties surrounding her husband's case."

Eve ignored this barrage of euphemism. "I have to tell you, though," she admitted, "that I may not be much help at all. Human technologists have never got very far with teleportation. How could a translation device work? Perhaps by scanning the position of every particle in an object, you might think. That information could be transferred somewhere else and a copy constructed of the original, exact down to the last electron."

Donn frowned. "But that couldn't work. The uncertainty principle—you can't specify a particle's momentum and position precisely."

"Correct," she said approvingly. "In quantum mechanics, such quantities as position are derived from probabilistic wave functions—mathematical descriptions that underlie all reality. *But* the principle says nothing about transferring exact data about the wave functions themselves. That was the approach I was working on, before I died."

Rima asked, "What about Ghost technology?"

"My husband, in the course of his career dealing with the Ghosts, came across one example of a teleport-like device. It was all to do with breaking up electrons: dividing indivisible particles."

They looked at her blankly.

Eve said, "Look—an electron's quantum wave function is spherical in its lowest energy state. But in its next highest energy state, the wave function has a dumbbell shape. Now, if that dumbbell could be stretched and pinched, could it be divided? If so, when the function collapses, it could be as if an electron leapt instantaneously from one bubble to another."

Rima was fighting her way through this fog of words. "Is that how the Ghosts took away my son?"

"No," Eve said regretfully. "I'm sorry. The sort of processes I've described would leave behind physical traces. Various exotic particles that your AI would record. We're investigating every case. I'm hopeful that when we do start to turn up physical traces of some kind—"

Samm said suddenly, "What about supersymmetry?"

Rima shook her head. "*What?*"

"Another corner of physics. Just an interest of mine. Have the Ghosts worked with that?"

"Not that we know of," said Eve.

Rima glared at her husband. "Don't waste time, you fool."

Donn felt he had to say, "Everybody keeps saying it's the Ghosts. We don't even know if it *is* the Ghosts behind this."

Rima said bitterly, "Oh, of course it's the wretched Ghosts. Everybody knows it." She glanced upward at the Boss, the gleaming star that cast shadows even here inside the lifedome. "I grew up thinking the Ghosts were all right. But things have changed. They're up to something. Everybody knows that. They say there's a new sort of Ghost up there, deeper in the Association. A Seer, who can see into past and future."

"Now, that's all rumor," Samm said. "Gossip. Trouble-making."

"No wonder they can take away our children, if *that's* true. Because if they can see into the future, they could sneak in here with one of those Silvermen of theirs."

"Oh, Rima," Samm said, distressed.

Eve said uncertainly, "Getting back to teleportation—"

"What use are you?" Rima snapped. "You don't know anything. You've said so."

Elah said smoothly, "She's here to assure you that the Commission is doing all we can."

Rima got to her feet and pointed. "And I suppose you brought *that* with you to reassure me."

They all turned.

A Silver Ghost hovered in the plaza, only paces away from them, a silver sphere, quite featureless, a mercury droplet as tall as a man. It shifted a little as it hovered just above the floor, as if its immense bulk could be pushed by the breezes of the air-conditioning.

"You took him," Rima said. "You took my son."

Samm tried to get hold of his wife. "Rima, be calm."

But she shook him away. "What have you done with him?" She ran at the Ghost, her fists flailing. Her fists just passed through its hull, scattering silvery pixels. The Ghost hovered impassively. Samm pulled Rima away. "Give him back," she begged. "Oh, give him back!"

Eve Raoul stood, obviously distressed, as if she longed to help. The Commissary simply watched, cold, observant. Donn was hot with anxiety and embarrassment.

The Ghost said: "I apologize for the intrusion. I am the Sink Ambassador."

Samm snapped, "The *what?*"

"The Heat Sink, Dad," Donn said, "which is the sky, to them. He's their Ambassador to the sky."

The Ambassador said, "Eve Raoul-it is good to see you again."

"I wish I could say the same," Eve said.

Samm, bewildered, tortured, looked from one to the other. "What do you want, Ghost?"

The Ghost rolled. "Donn Wyman, we need your help."

The Sink Ambassador said there was trouble in a bar called Minda's Savior, set in a generation starship near the heart of the Reefs three-dimensional tangle of ships-a Silverman, in some kind of trouble.

Elah faced the Ghost Virtual. "Ambassador to the Heat Sink, you call yourself."

"Yes."

"You know Eve through Jack Raoul."

"I worked with Jack Raoul on many complex and demanding issues. I like to believe we were friends, Eve and I, and Jack and I."

Elah laughed at that, the idea that humans and Ghosts could be friends. "And now you consult Donn Wyman. He's just a factor, a trade negotiator."

Donn felt dismissed, vaguely insulted.

The Ambassador said, "Since the collapse of the old Raoul Accords, the legal interface between Ghost and human communities has been shredded. But humans like Donn, and Ghosts like myself, must work together over trade; the Ghost enclaves here could not survive without trade. And individual contacts made in such circumstances serve well in trying to resolve other issues as they arise."

"There was no need to call on a mere factor," Elah said. "I am a Commissary. I represent the Coalition, mankind's highest authority."

"Then it is a good thing that you happen to be here," the Ghost said, without a trace of inflection in its artificial voice.

"And it's all about a bar. A Ghost artifact in trouble in a bar," Elah said. She laughed. "How squalid. How absurd. Such a thing could never happen on Earth."

"Evidently," Eve murmured, "this is not Earth."

"This is stupid," Donn said. "It's got nothing to do with Benj."

"But we need you," the Ambassador said simply. "You personally."

"Go," Samm said. "There's nothing you can do at the *Miriam*, for now. If anything turns up..."

"Mom?"

Rima, her face buried in a handkerchief, waved him away.

So the four of them crowded into the bubblelike transparent hull of the *Suzy IV*, Samm Wyman's aging flitter: Donn, Elah, the Ghost, and Eve Raoul. Where the Virtuals brushed against the Hitter's hull, they crumbed; Eve Raoul brushed stray pixels from her sleeve like flies.

You could get from any point to any other on the Reef by walking through the innards of the old ships, or by walkways and bridges thrown up over the centuries. Donn would have preferred to walk, to burn off some energy. But the *Suzy* would be quicker, and so here they were. Elah had insisted on coming along, as "trouble" of any sort was now the Commission's business, and so Eve had to come too—that or be shut down, Donn supposed, as Eve seemed tied to Elah, no doubt through some projection system lodged on her person.

So the flitter closed up around them, its systems humming, and rose from the Reef of ships like a stone thrown up into a bowl of stars.

Donn peered down as the Reef opened up beneath them. It was a logjam of ships, a roughly lenticular mass with ragged edges, entirely lacking in symmetry. The Boss was a fierce lantern at the zenith, so that the tangle of superstructures cast complex shadows. Many of the ships, like the *Miriam*, were of the ancient, durable GUTship design, a stalk topped and tailed by lifedome and GUTdrive. But there were more exotic designs, including the old generation starship at the hub of the complex, a frozen ocean of comet ice meant to propel its crew's descendants to a new world that had never been reached. Here and there in the long shadows of the Reef, you could see tangles of silver rope, ships without hulls or bridges or obvious drive units—ships that weren't of human design at all.

And today, ships of the Coalition's Navy hovered over the crowded craft. They were Spline warships, living ships, balls of flesh studded with sensor mounts and weapons emplacements. They rolled like threatening moons, the green tetrahedral sigil of a free mankind tattooed onto their flanks.

Elah lifted her face to the light of the brilliant star that hung over all this. "I've been stationed here a year already, and I just can't get used to the sky. Strictly speaking, the Boss is cataloged as VI Cygni Number Twelve. Did you know that? Recently it's been flaring—there's some remarkable imagery; I can show you if you like. And this grouping of stars is called the Cygnus OB2 Association. It's all so different from what you'd see from Earth. That central monster casts shadows light-years long from clouds of interstellar dust, shadows distorted by the finitude of lightspeed—quite astonishing."

Donn was more interested in the cultural side of what she had to say. "Cygnus? What does that mean?"

Elah waved a hand, dismissive. "An old name from Earth. Pre-Occupation. Its meaning is lost."

Donn had never given much thought to Earth, a place remote in space and in history—or it had been, until the Coalition came. "Where is Earth, from here?"

Eve glanced around and pointed. "About five thousand nine hundred light-years away, thataway. Right around the Galaxy's spiral arm."

"Can you see the Association from Earth?"

"You'd be able to see the Boss with the naked eye if not for dust clouds in the way."

"Humans have traveled far from their origins," the Ghost said.

"You bet we have," Elah said with fervor. She pointed at right angles to Earthward. "We're filling up this spiral arm, and we're heading that way—toward the Galaxy Core. We've already pushed into the next spiral arm inward, the Sagittarius Arm."

The Ghost spoke, its artificial voice sonorous in the enclosed space. "And that, of course, is the source of all our trouble."

Donn knew it was right. Thanks to the explosive expansion of mankind, suddenly the Ghost communities scattered around the Association, including the enclaves in the Reef itself, had become alien islands stranded in human space.

The Reef as a whole had moved several times since its formation, embedded hyperdrive engines lifting the whole shebang across light-years, always moving further from Earth, off along the star lanes of the spiral arm. The Association had proven a good place to live, with plenty of worldlets and asteroids to mine for resources—even a few human colonies, refugees of one calamity or another, to trade with.

And here the Reefborn had forged tentative links with the Silver Ghosts, who were undergoing their own expansion out of the heart of the Galaxy. They welcomed small Ghost colonies into the Reef itself. You could say that the Reef culture was a composite of human and Ghost, an experiment in cohabitation.

For a time, even after the Coalition had made contact, the Reefborn had profited from trade between two interstellar empires. There had been a strange period when autonomous Ghost enclaves had been granted room to live under the new regime: Silver Ghosts, living under Coalition authority.

But times had changed, and the Coalition's embrace had become harsh.

Those elderly hyperdrive engines had all been confiscated or disabled, for a start, to be refitted into Navy ships. The Reef would never again go jaunting out of human ken into the alien dark. And the Ghosts had been taxed, marginalized, and suffered discrimination of all kinds.

With the crises over the Silvermen and the abductions, the Ghosts' position was becoming untenable. And perhaps, Donn thought, it was all coming to a head, with himself caught mysteriously in the middle of it.

The *Suzy* began its descent into the forest of infrastructure.

Minda's Savior: the bar announced its name in signs written in several human languages, and some nonhuman. Donn had once been shown how the name was inscribed in electromagnetic patterns invisible to human senses but vivid to a Ghost. There was even an image, painted rather than Virtual, of a young human girl accepting the gift of its very hide from a hovering Ghost. All this was based on a story, three centuries old, that the first contact between humans and Ghosts had involved a young girl who had been saved from freezing by a Ghost sacrificing its own life for hers. But the official Commission line was that the Minda story was just Ghost propaganda.

Inside, the Savior was basically a bar, selling intoxicating chemicals of various kinds diluted by the ice of a comet that had once orbited Sol. But there was also a kind of mud bath, salty and warm, meant to accommodate Ghost patrons. The light in this corner of the bar came not from the usual hovering light-globes but from glowing rope draped from the ceiling, Ghost technology.

There was no Ghost in the mud bath today, no Ghost in the bar save the Virtual projection of the Sink Ambassador. Only the Ambassador—and a Silverman, standing like a chromed statue in one corner, confronted by an angry human crowd.

They weren't actively doing anything to it, not touching or harming it in any way. Yet they surrounded it, sitting silently, defiantly drinking the Navy drink called Poole's Blood, walling in the Silverman with human flesh. Donn knew some of these people. Here was Bareth Grieve, one of the Reef's elders, a friend of his mother's and a member of the Reef's Grand Council. This morning Grieve and the rest barely

acknowledged him. They were just a mob who had trapped a Silverman.

Elah was taller than most in the bar, as indeed was Eve. Donn had heard an insulting theory that Reefborn were becoming dwarfed, as populations stranded on islands often were, apparently. "What a spectacle," Elah said now, with utter contempt. "Makes you ashamed to be human."

The Ambassador murmured, "You can see why we have a problem. They've been like this for hours."

Eve said, "Something has been done to mat Silverman. Look, Donn-can you see?"

At first glance the Silverman was typical of its sort: a kind of sketch of a human figure, head, torso, arms, and legs, but shorter than an average human-like a statue in Ghost-hide silver. It lacked detail, it had fingers but no toes, no fingernails, no navel, no genitalia, the face just a bland outline, all orifices sealed up save the eyes and mouth. It was as identical to the rest of its kind, just as every Ghost looked the same as every other. But this one had a sort of collar around its neck, of some heavy blue metal.

"*That* doesn't look like Ghost technology to me, that collar," Eve murmured. "That's human. They've done something to this thing. What, though?" She snapped her fingers, and a data slate appeared in her hands.

"It is an eerie construct, that Silverman," Elah said. "Look at it, all but faceless, expressionless, walking among us... And if you were going to develop a weapon to penetrate a society like this, an assassin to work in a human environment of rooms and corridors, a human shape is exactly what you would give it. It's not surprising people are wary, especially in a politically underdeveloped society like this one."

Donn bridled at her casual insults. But the Silvermen *were* odd. They had only been appearing on the Reef since the arrival of the Coalition, while relationships between the Ghost and human communities on the Reef had steadily deteriorated. They wandered the Reef's corridors and haunted its bars and libraries, theaters and forums, even its churches. They simply *looked*. They stepped out of the way of humans. They would tolerate being touched, their silver flesh poked by curious children. They would speak if spoken to, answer questions if asked, but only of the most direct sort. But they volunteered nothing.

The Silvermen were a strange, eerie, uncomfortable presence. And they simply showed up, appearing as suddenly and as randomly as the human abductees disappeared. The Silver-men were antiabductees.

And they were clearly Ghost artifacts, for that silvery flesh was Ghost hide.

The Ambassador asked, "What are these people doing?"

"Maybe this is punishment," said Donn, "for the abductions. People want something to hit back at."

"They are not harming it."

"I wouldn't like being trapped like that. Pinned up against a wall, ignored."

"A human sort of harm, then. To learn such lessons is the Silverman's purpose. So I believe."

Donn stared at the Ghost. As far as he knew, this was the first time any Ghost had discussed a "purpose" behind the Silverman visitations.

Elah, naturally, had overheard, too. "It's here to learn, you say?"

"I speak at second hand," the Ambassador said. "You know that Ghost society is not like yours, not hierarchical. Our society is like our bodies, an embracing of diversity. But I believe that the faction behind

the Silvermen intends them as an experiment to learn more of humanity."

"By sending these homunculi among us as spies," Elah said.

"Not that. They are all but mindless, intended as passive observers. They simply live a facsimile of a human life, for a period. The way each of us thinks is shaped by how we sense the universe, how we experience it and manipulate it; we are our bodies as well as our minds. We understand what you are doing," it said bluntly to Elah. "Your Coalition and the Expansion it is driving. We do not understand *why* you do mis. Perhaps your restlessness is something to do with your ape anatomy, your manipulating hands, your heritage of the trees and the savannah."

Elah laughed. "You insult us without even trying, don't you? So do you think the experiment has worked?"

The Ghost admitted, "I don't believe we anticipated the hostility they have encountered."

Donn said, looking over at the Silverman. "It isn't human *enough*, perhaps."

Elah said, "In some corners of this Reef, people gang up on the Silvermen and dress them up in clothes! All to reduce that feeling of otherness about them. And in other corners, the Silvermen are insulted, abused by the families of the abducted. There's never been a physical attack before, however." She faced the Ambassador. "If you want us to help you, Ghost, you need to be honest with us. *How* are these homunculi being planted in the Reef? Is it through some teleportation mechanism? And is it the same mechanism that is used to abduct humans from the Reef?"

Again that long hesitation. "There is another faction-its motives are noble."

"Tell us, Ghost!"

"Yes," it said softly.

Donn blew out his cheeks. "I never heard it confirmed before, about the abductions."

Elah said stonily, "Are you disappointed?"

"Yes. Because it means that all the paranoids were right-all those who swallowed your anti-Ghost propaganda, Commissary."

"Don't push your luck, boy," she murmured.

"It does explain what they've done to that wretched Silverman over there," Eve said now. "I've been running some tests." She showed them a slate of results that meant little to Donn.

Elah nodded. "That collar they stuck on it is full of processors. It's a sentience booster." She smiled at Donn. "Do you see? This lynch mob has made the Silverman *smarter*. More self-aware."

Donn frowned. "Is that legal? And, *why*?"

"I don't think the law matters much here. And as to why-isn't it obvious? Yelling at those other dim homunculi was no longer enough to get rid of the rage. They made *this* creature smart enough to understand what it was suffering, what its perceived crime was. And who knows what they have planned for it once this long vigil is done? Can't you see the logic, Donn Wyman?"

At the sound of his name, the Silverman turned. It was the first movement it had made since Donn and the others had walked into the bar. "You are Donn Wyman?"

"Yes," said Donn uncertainly.

The Silverman walked straight toward Donn. It pushed through the barrier of drinkers, knocking a couple of men aside. Some of them got to their feet. "Don't you take another step, you Ghost monster."

But Elah raised her hand, a halting motion. The Reefborn had learned to recognize the authority of a Commissary.

The Silverman stood before Donn. It came up to his chest, like a boy dipped in silver. Even its eyeballs were silvered. "We need your help." Its voice was identical to the Ambassador's.

The Ambassador said, "This is why I asked you here, Donn Wyman. It has been asking for you, specifically. It's not very articulate, but it does seem to know what it wants."

"Sorry," said the homunculus.

"For what?"

"For this." The Silverman reached up and wrapped its arms around Donn's waist, a powerful, cold, unbreakable hug.

And the bar, the Commissary, the Ghost-all vanished.

No air.

His chest felt as if it would explode.

A raw sky, star-littered. Ice under his feet, hard, sucking the heat out through his thin boots. The Silverman's face before him, filling his vision, chromed eyes frosting over.

No air! He opened his mouth. Air gushed from his lungs, a shower of crystals. But when he tried to breathe in, there was nothing, *no air*. He was drowning in vacuum. His eyes filmed over. He could not blink. Pain stabbed in his ears.

Still the Silverman held him.

Machinery flashed, a blade, spinning in vacuum silence. The Silverman fell away.

Somebody stood before him. Short, slim, a girl perhaps, wrapped in a silver suit, her visor translucent. She held a weapon and a mass of silver cloth. She threw the cloth at him. It closed up around him, shutting out the stars.

Air flooded into his lungs. He gasped, and nearly fell. The silver material was squirming around his body, sealing itself up, forming sleeves and leggings. A panel before his face began to clear.

The woman's face hovered before him. "If you want to live, run." Her voice whispered in Donn's ears. She turned away.

He ran. But even as he staggered over the ice, utterly bewildered, the face of the girl stayed in his mind, delicate, beautiful, twisted in a snarl of anger.

His first few steps were like trying to walk in a deflating balloon. But gradually, step by step, it got easier, because the blanket itself was knitting itself up around him, the seams becoming finer around his limbs, the joints at his hips, knees, shoulders, elbows becoming more flexible. It was unlike any human engineering, silvered on the outside and oddly skinlike on the inside where it was in contact with his

clothes, his flesh.

He knew what this was, what it must be. It was the hide of a Silver Ghost. And if he now possessed this hide, then surely there was a Ghost somewhere that lacked it.

He ran on, stumbling.

Wherever he was, gravity was high, a bit higher than the Earth standard maintained by the Reef's inertial fields. The sky above was black, littered with stars. Most of the light came from one brilliant star directly above his head, a bright pinpoint source. Surely that was the Boss; surely he was still in the Association. It seemed brighter than he remembered, and he thought he saw a splinter of light coming from it, some immense flare. Perhaps he had come closer to the Boss then, deeper into the Association. But other than that-

He tripped on something, a ledge sticking out of the ice, and fell flat. He lay there, bewildered, winded.

He lifted his head. Where the girl ran, vapor exploded upward, a sparkling fountain with every footfall. "Wait," he called. "Please."

She ignored him.

He had no choice. He dragged himself to his feet. His chest where he had hit the ground felt like one vast bruise.

He came to structures, just bits of stone wall sticking out above the ice. The remains of a city? There was nothing like a human geometry here, no right angles among these bits of straight line.

He ran through a patch of some softer frost, lying over the water ice, that gathered in the lee of the low walls. It sparkled around his footfalls, evidently vaporized by waste heat. When he looked back, he saw traces of green in the boot prints that faded as suddenly as they had come.

He came to a hole in the ground, a well, ragged and dark. The girl waited. "You've seen the flowers."

"What flowers?"

"Look at this." She lifted something up. It was like a human arm, small, like a child's, with a perfectly formed hand. Done in silver, it was like a bit of a broken statue.

"It's the arm of a Silverman," he said.

"Correct. The one that carried you over. The little bastard got away, but I hurt him. Watch this." She took a knife from her belt and stabbed the arm, slitting its silver skin from the base of the wrist up through the pit of the elbow to where it had been severed. Then she hauled at the skin, briskly peeling it off. What was exposed was bloody and steaming. Without the containing skin it fell apart into individual creatures, bloodred and wormlike, some of which wriggled feebly, still alive, even as they froze. The girl dropped all of this on the ground. A cloud of vapor rose up, quickly freezing back to ice and falling back.

And all around the bloody mess, green things blossomed, a kind of moss, what looked like shoots of grass, even a kind of flower that fired off seeds like a miniature cannon. But the heat was evanescent, and the living things quickly shriveled and died.

"They wait for a bit of heat. Billions of years if they have to. And when it comes, they take their chances. The story of all life, isn't it?"

"Who are you?"

"I don't have a name."

He did not recognize her accent. It was flat, toneless. "Everybody has a name. My name is Donn Wyman."

"I only have the number the fatballs gave me. I am Sample 5A43 Stroke 7J7 Stroke."

"We call her Five," came a male voice, perhaps somebody down in the pit. "Quit showing off, Five, and get down here."

Five grinned at Donn. "All right, Hama." She kicked apart the bloody mess on the ground and made for the hole, climbing down easily.

Donn saw that there were handholds cut into the water ice. He followed with more difficulty, not trusting the grip of his Ghost-hide gloves, which continued to mold themselves around his fingers. He came to a membrane, stretched across the well. The girl had just dropped through this, so he followed. The membrane opened up around him, clinging closely like the meniscus of some high-surface-tension fluid; it was a tight band passing up the length of his body.

Beneath the membrane, he reached the bottom of the well. He was in a kind of cellar, walled by rock—maybe it was a natural feature, a cave. He had never visited a planet and knew nothing about rock formations. The walls were draped with silvery blankets, what looked like more Ghost hide. On some of them, tetrahedrons had been crudely scribbled, the sigil of free mankind. The light came from lengths of silvery, shining cable that had been draped over the walls, crudely nailed into place: Ghost technology. He saw low corridors cut into the rock leading off into the dark. Evidently this was a complex, down here under the ruins of an alien city.

And there were people here—not many, maybe a dozen. Some wore suits of Ghost hide, their hoods back. Others went naked. They sat in small groups, eating from silvered bowls, or they slept on ledges. One woman nursed an infant at her breast. They were all ages, from the infant up through adulthood to old age. Some glanced incuriously at Donn, standing there in his Ghost-hide suit; others didn't bother looking around at all.

The girl, Five, stood before him. She had pulled back the hood of her own suit. She rapped at his translucent visor with her fingernail. "It's safe to come out of there. We have warmth and air, thanks to the fatball hide panels."

"I don't know how."

"You just pull." She took hold of the hide over his cheeks, and hauled. His hood split open easily, sundering right down the middle of his visor. Warm, fuggy air washed over him; he smelled farts and sweat and piss, and a food smell, something like boiled cabbage. "Welcome to the rat hole," Five said.

With her help, he pulled the rest of his suit away. When he was done, standing there in the clothes he had worn in Minda's Savior, a man approached him. He was already naked, and Five was stripping down, too. The man was short, his head shaved, and his body was scrawny, his ribs showing. He was a typical earthworm, Donn thought.

"I am Hama Belk," he said. It was a Coalition accent. "You can see we go naked in here."

"I think I'll keep my clothes on, for now."

Five shrugged. "Suit yourself. We don't wear clothes because the fatballs don't bother with clothes for their Samples, so there's none to steal. Unless you feel like robbing a virgin Sample. That's known." Her face was as hard as her language.

She had short-cropped blond hair. She was slim, her body wiry and supple; it was hard to tell how old she was—no more than eighteen or nineteen, surely. She had obviously been badly damaged in her short life. Donn felt sorry for her—a ridiculous reaction in the circumstances.

He said, "Steal? Rob? Is that how you live?"

"This is Ghostworld. We are all escaped Samples." She gestured at the nursing mother. "Or the children of Samples. We came here with nothing. All we have, we steal from the fat-balls."

"Including their hides."

Five snapped, "We have a way of things here, virgin. You were saved by a Ghost hide. Now you must save in turn. You must kill a fatball and strip it of its hide, when you get the chance. Carry it with you, and save another if you can."

He recoiled. "I *work* with Ghosts. Look, my name is Donn Wyman. I work as a factor on the Reef—that is, I develop trading relationships with the Ghosts. Perhaps I—"

"I don't care what you do, or did. None of that matters now, your old life. You've died and been reborn. Now you're just another Sample, like us. You don't even have a number, as I do, since you weren't processed by the Ghosts before you were liberated."

"Samples. Numbers." Donn saw it now. "This, wherever I am, is where you go when you're abducted."

"You've got it," Hama Belk said. "Just as the snatching is random, so is the depositing. Usually you end up in a processing chamber, surrounded by a thousand Ghosts. That's what happened to me before the rats busted me out. Others end up on the surface, exposed—evidently the transfer isn't a hundred percent reliable. There are places where the strays end up, and we wait for them, with blankets; that's how Five found you."

"How does it work, this transfer, the snatching?"

"Well, we don't know," Hama said. "Does it matter?"

"And those exposed on the surface?"

"They die, if they aren't found in a heartbeat by Ghost patrols, or by us rats."

"Rats?"

"Us," said Five. "Wild humans, living in the cracks. Though I personally have never seen a rat, I understand the concept."

"How come you haven't seen a rat? Never mind. Have you heard of Benj Wyman? My brother. He was abducted only hours before I—"

"No," Five said bluntly.

"Look," Donn said, "you can see there's been some kind of mix-up. I'm not an abductee, a Sample as you call them. I came here with a Silverman. You saw it. You cut its arm off! Maybe if you hadn't chased it off—if I could talk to it—"

Five laughed in his face. "Every virgin Sample says the same thing. 'I'm not supposed to be here. I'm special, I'm a mother or a father, I have this or that back home.' "

"How do I get back?"

She just laughed at him again. She walked away, and knelt down by the nursing mother.

All at once, the hardness of her manner, the shock of all his experiences today, hit Donn. He staggered, and stumbled back against the wall.

Hama grabbed his arm. "Here. Sit down. Look, there's a ledge." He handed Donn a silver bowl. "Try to eat some of this. It'll warm you up."

"It's just so sudden." He looked at Hama. "I hadn't even taken in my own brother's abduction. And now--"

"Well, you've plenty of time to get used to it. Take the broth." It contained a brownish sludge, like a thick soup.

"More Ghost technology." Donn dipped a cautious finger in the bowl and tasted the gloop. It was lukewarm and tasted faintly of mushrooms.

"Yes. We just scrape up the green shit from our footsteps outside and drop it in. This is how they feed the Samples. Here, your ears are bleeding." He handed Donn a scrap of cloth.

Donn dabbed at his ears; the cloth came away bloody. "I don't even know where I am."

Hama shrugged. "None of us do. We're obviously still in the Association. And this is obviously a rogue planet, far from any sun. But aside from that, we can't tell. After all, as Five said, nobody's ever been back to tell the tale. We just call it Ghost-world."

Donn nodded. "It seems like a typical Ghost colony world, from what I know of them."

"Yes. We were taught all about Ghosts in our training, on the way here in the Spline ships."

The Ghosts' world was once Earth-like: blue skies, a yellow sun. But as the Ghosts climbed to awareness their sun evaporated, killed by a companion pulsar. The oceans froze and life huddled inward; there was frantic evolutionary pressure to find ways to keep warm.

"That's the story," Hama said. "Though many of us in the Commission wonder if this is true, or just some kind of creation myth. Or propaganda. Certainly the thing we call a Silver Ghost is really a community of symbiotic creatures: an autarky, a miniature biosphere in its own right, all but independent of the universe outside. Even the skin that saved you is independently alive."

"Even when you take it from the Ghost, it lives on."

"I wouldn't be judgmental," Hama said evenly. "I myself was a clerk in the Commission for Historical Truth. Working on the reeducation of the Reef population. I come from Mercury, actually, a sister planet of Earth. I hadn't been on the Reef long, before the lottery of the Sampling picked me. But none of that matters now." He looked at his hands. "All I have here is myself and those around me. And I do what I must to stay alive."

"Why do they bring us here? Why the Samples?"

Hama eyed him. "You said you worked with Ghosts. You don't know? I think it's because they are trying

to understand us, the Ghosts. They fear us, for right now the Third Expansion is overwhelming them. But you can't defeat what you don't understand."

"So they take us for study." Donn shook his head. "But these random abductions, of a child from a mother, a father from a daughter—my own brother was taken. The Ghosts couldn't antagonize us more if they tried."

"I guess that shows how little they understand us, yes?"

"And what about Five, the girl with no name?"

"Ah. She was taken as an infant, under two years old, I think. As she grew, she was surrounded only by Ghosts. The only human she ever saw was her own reflection in the hide of a Ghost. She grew up thinking that she was some kind of deformity, a mutant, disabled Ghost.

"Eventually, a rat pack broke into her cage. She thought they were as diseased as she was. I think they raped her. She was only thirteen, fourteen. What a welcome to humanity! Somehow, she came through that, and emerged as a functioning human being—I say functioning: all she knows is this, life as a rat, and all she wants to do is to kill Ghosts." He smiled. "She's inventive about it, though."

Donn watched Five with the mother. "I'll be wary."

"Yes, do. Don't get any foolish ideas of *saving her*. And there are worse. Rat packs that prey on humans, other Samples. Even at the moment of abduction."

Donn looked at him curiously. "And what do you want, Hama?"

"I came to the Association to save *you*, Donn, all of you living non-Doctrinally out here in the dark. If all I can do is live here as if in a guerrilla cell behind the lines, killing a few Ghosts before my short life is over—well, maybe that's enough. It is my duty to die. *A brief life burns brightly?*

Donn said carefully, "I think I'm more afraid of you than of the feral girl over there."

Hama laughed.

Five came to stand over Hama and Donn. Naked, lithe, her body was a pale streak in the silvery light, her nipples hard, her pubic hair a blond tuft. "Rested, are you? We're mounting a raid. You're lucky, Donn Wyman. We've been planning this one for a while; you'll be there for the payoff."

Donn made to protest. "I only just got here. I need to find my brother—the Silverman—"

But she was already walking away.

Hama nudged him. "That wasn't a request. Come on, on your feet."

Donn struggled up, his chest still aching from his fall.

A party of a dozen adults suited up.

They clambered up through the airtight membrane into the spectral stillness of the landscape. Donn was shocked that the Boss had shifted in the sky, moving away from the zenith, and the shadows it cast were long. But Donn had never seen a sunset, or a dawn; this was a planet, not an artifice like the Reef.

They checked each other's suits and were handed weapons. Donn was astonished to be given a spear. Then, following Five's lead, they set off over the ice.

The weapons were mostly crude, things with spinning blades, or even cruder than that, daggers and swords, pikes and spears, lengths of barbed wire and ugly tangles of spikes and hooks. But there were a few more sophisticated instruments, a kind of projectile weapon like a bazooka, even what looked like a Qax-era gravity-wave handgun, much repaired, polished smooth by usage.

They carried these weapons, walking to war.

"I can't believe we're doing this," Donn said to nobody in particular. "We're like preindustrial savages."

"I know how you feel," said a woman walking beside him. "I was a food technician back on the Reef. I'm the nearest thing to a biologist this little crew has. But by day I'm a spear-carrier." Brisk, purposeful, she was perhaps forty; she might once have been plump, but now the skin of her cheeks and neck sagged, as if emptied. "My name's Kanda Fors, by the way."

"I am--"

"We all heard who you are." She smiled, a dogged sort of expression. "We like to act indifferent. I guess that's to do with Five's hold over us. But wait until she's asleep. We'll all be at you then, finding out what you know of home, our families. We only get news from Samples. And it's all one-way."

With her calm Reef accent, she was more like Donn's family than anybody else he had yet met here. "This is real, isn't it?" he said slowly. "I think maybe I'm working through some kind of shock." He looked at the spear he had been given. It was clearly improvised from some ripped-off bit of equipment, not much more than a steel rod with its tip laboriously sharpened. "I really am stuck here, at the wrong end of a one-way funnel to this shithole in the ice."

Hama Belk said, "It isn't so bad here. It's not just a scramble for survival, you know. We're still human. We can still have higher goals."

"Like what?"

"Like science," Kanda said. "There is life here, for instance."

"I saw it. In my footsteps."

"That's what survives." This rogue world had been detached from its parent star by a close stellar encounter perhaps, or a gravitational slingshot by a wandering Jovian. "Any civilization must have been smashed quickly. Quakes, tides, even before the oceans froze over, water ice setting hard as rock, and then the air froze out on top of that. But there is life here, still. You saw it in your footsteps. And," she said dreamily, "there is *other* life. A more exotic sort, blown in from the stars, cold-lovers, psychrophiles, colonizing this cold world."

"Psychrophiles?"

"Watch." She took the index finger of her left hand in her right and squeezed the fingertip of her glove. A seam broke, and ice crystals gushed out into the vacuum. She bent and pressed this breach to the frozen ground, just for a second. Then she pulled back her hand and sealed up the glove. "Ouch, that's enough. I can do without frostbite. Now, look."

Where she had touched, a pit opened up in the ground, the width of a fist, the lip pulling back as if recoiling. The little pit closed up again in a couple of seconds. But when Kanda stirred it with a fingertip, it was broken up, like dust. "See that? Ice, permafrost, even rock, broken up to powder."

"What's going on?"

Kanda grinned. "Cryo-panspermia bugs."

There were ways that even terrestrial life could survive at extremely low temperatures. There was always the odd scrap of water even in the coldest ice, in brine pockets perhaps, or in nanofilms, kept liquid through pressure contact. And even on this frozen world, there were nutrients, seeping up from the core, or drifting down from space, comet dust.

"At these temperatures, you can't be ambitious," Kanda said. "You don't aim to grow much, just repair a bit of cellular damage once every millennium or so. Chemistry can be a help. There is a gloopy, starchlike material called exopolymer that has a way of preventing the formation of ice crystals. To such creatures, though, even the Ghosts are refugees from a warmer regime, balls of liquid water, like lava monsters. There's a whole ecosphere here, Donn, that we know hardly anything about. I long to come back here someday and do some proper science. Fascinating."

"Fascinating," Donn repeated. "While we march to war like apes."

"But there is science in the fighting, too," Hama said, almost enthusiastically. "Most analysts think it will take millennia of war before the Ghosts are exterminated. There will be plenty of need for hand-to-hand combat—it's always true in any war. So the ways we learn to fight the Ghosts, here today, could be remembered forever."

"That's a lovely thought."

Kanda frowned. "Listen, Donn Wyman. You'd better take our miserable little war seriously. We need the resources we steal from the Ghosts, or we'd die. Simple as that. So when Five tells you to fight, fight. We don't have a lot of spare capacity for passengers. Of course, she can hear every word we say."

Five turned. "Yes, though at least the Ghosts cannot hear your pointless babbling. Ever trained to fight a Ghost?"

"No." The very thought shocked Donn.

"The easiest way to bring him down is just to puncture his hide, and follow the trail of excrement and blood and heat until he dies, which might take a day or two. We'll show you how to skin a fatball later."

"You're a monster," Donn blurted.

"No. I'm alive." She smiled at him, her beauty dazzling.

After perhaps an hour's walking, only a few kilometers, they crested a frozen ridge. And here Five had them hunch down and approach more cautiously.

So Donn got his first glimpse of a Ghost city. Sprawled over a valley carved by some long-frozen river, it was a forest of globes and half globes draped in a gleaming netting. The colony lacked a clear center, and there was no simple geometry; it looked as if it had grown in place, and perhaps it had. A slim tower dominated, silvered like the rest, with a sharp electric-blue light pulsing at its summit.

Ghosts streamed everywhere, following their own enigmatic business, like silver blood flowing through the open carcass of their silver city. The Boss cast highlights from every hide, so the city gleamed, as if it had been scattered with diamonds.

Five grinned at Donn. "So what do you think of your prey, hunter?"

"I'm no hunter. I'm surprised we're so close to a city."

Hama shrugged. "We are all escapees from the Sample zoos in that city, or else we were teleported to the ice nearby."

Five said, "Actually, everywhere on this world is near a Ghost city. The planet is filthy with them, the fatballs, billions or trillions, swarming."

That electric-blue light winked mournfully. "What's the tower?"

"Well, we don't know," Hama said. "Best guess is, it's a Destroyer tower. The Commission knows of such things on other Ghost worlds."

"Destroyer?"

"In ancient times, the Ghosts' ancestors understood full well that it was the rogue pulsar that was destroying their sun. So they venerated it. They made it a god."

Kanda murmured, "Actually, it's fascinating. Humans have always worshiped gods who they believed created the world. The Ghosts worship the one that destroyed it."

"Quiet," hissed Five. "This talk is purposeless."

"Talking is what people do, child," said Kanda.

"We are not people. We are rats. We are here to fight, not to talk."

Donn looked down at the extraordinary, beautiful city in dismay. "Fight for what? Resources? Hides, equipment-"

"That," Five said, "and the destruction of the Seer."

Donn frowned. "What do you know of the Seer?"

"Not much more than you do on your Reef," Hama said.

Five said, "The Ghosts talked of it, when I was in their zoos, when they thought I could not understand. Those who dealt with me were far from the centers of power. Yet it exists."

"So what is it?"

"We don't know," said Hama. "But if the chance arises to destroy it, we should take it. The Green Army has learned that Ghost concentrations are hard to defeat, short of out-and-out genocide. It's like stabbing on a pool of mercury with a fork; it just fragments and runs away. They lack hierarchies, like human societies, which makes them impossible to decapitate. Assassinations are useless. But in this particular case you have this Seer, whatever it is, a source of power. So if we could get to that, we could indeed inflict a great defeat in this war."

"We're not at war," Donn said.

"Oh yes, we are."

Five whispered, "Let's move in." She waved them forward.

Donn approached the Ghost city, running at a crouch from one bit of cover to the next, watching the silvered backs of his companions running ahead-silvered as the city itself was silvered, for their suits were made of the same stuff.

The city itself loomed huge before them now, a sculpture park of silvered monuments that hovered off the

ground, utterly still. Light rope trailed everywhere, linking one floating building to the next, and filling the whole with a silver-gray glow. And Donn heard music. The ground throbbed with a bass harmonization, as if he could hear the heartbeat of the frozen planet.

Five raised a hand to call a halt. They were at the head of a kind of thoroughfare that led into the heart of the city, reasonably clear, reasonably straight. The rats got to work, laying barbed wire and spiky obstacles across the smooth surface of the roadway.

Donn murmured to Kanda, "What are they doing?"

"Setting traps," she replied. "Ghosts don't follow human ideas of geography, you know that. But if they need to evacuate fast, they'll use thoroughfares like this. In fact, they come swarming along the ground when they're alarmed. Some primitive instinct, but useful for us. They'll hit the traps."

"What is going to make them evacuate?"

Five grinned at him. "We are. Come on."

Leaving half a dozen hunters behind at the barricade, the rest moved deeper into the city.

The crowded tangle of light ropes grew thicker over their heads. In the complexity, Donn saw denser concentrations-nurseries of Ghost subcomponents, perhaps, or control centers, or simply areas where Ghosts lived and played-little more than patches of silvery shadow in the tangle. It was characteristic Ghost architecture, vibrant, complex, beautiful, alive, totally inhuman.

And there were Ghosts all over. They drifted over and through the tangle, following pathways invisible to Donn, or they would cluster in little clusters, whirling in chains like necklaces, apparently for the fun of it.

In one place, Donn saw an orderly queue of Ghosts, almost like a line of human schoolchildren waiting for a punishment. They filed patiently into a floating dodecahedral box that opened to embrace each Ghost, closed around it, and opened again, empty, ready for the next.

There must have been thousands of Ghosts in the patient line, he saw. And as the dodecahedral chamber hovered, far from any building, it was hard to see where all the Ghosts it swallowed were going.

He pointed this out to Hama. "What's that?"

"I suppose there are two possible answers," Hama said. "It's either an extermination chamber. Or it's a teleport."

The thought excited Donn. "Like the Sampling, the abductions. So where are they going?"

"We only have rumors," Hama said cautiously. "Briefings from the Commission, gossip from the zoos. It may have something to do with the Seer."

"Or," Kanda said, "it may have to do with the instability of the star. The Boss-all that flaring."

"You're suggesting the Ghosts are trying to mend a failing star?"

"We know they think big," Hama said. "Anyhow, it makes no difference to us."

Donn stared at the chamber, avid. For if this was a teleport terminal, it might be a way off this dismal planet. But the dodecahedral chamber wasn't their destination.

The party came to a big transparent sphere, apparently pressurized. At the center of the sphere, a big ball

of mud hung in the air, brown and viscous. It seemed to be heated from within; it was slowly boiling, with big sticky bubbles of vapor crowding its surface, and it was laced with purple and red smears. Tubes led off from the mud ball to the hull of the pod. Ghosts clustered there, sucking up the purple gunk from the mud.

Donn crouched with the others, awed. "The Ghosts are *feeding*."

"Yes," Kanda said. "This is how Ghosts live. Even on their home world, deep beneath their frozen oceans, a little primordial geothermal heat must leak out still, dragging minerals up from the depths. Life-forms feed. And the Ghosts feed on *them*."

So this mud ball was a kitchen-and no wonder the Ghosts liked a little sea-bottom ooze to play in at Minda's. "So what are we doing here?"

Kanda murmured, "It's not the kitchen itself that's the target. It's about the warmest place in the city. What we intend to do is release all that heat, dump it into the environment."

"Why?"

"We're going to give them indigestion," Five murmured. "Positions."

The hunters spread out. Their projectile weapons were aimed at the feeding pod and that antiquated handgun.

Five called, "Three, two, one."

Fire burst from the projectile weapons, and cherry-red star-breaker light ripped from the ancient handgun. The pod's wall was elastic; it burst like a soap bubble, and that big floating mud ball splashed to the ground amid a hail of ice droplets.

Steam flashed, instantly frosting. The feeding Ghosts fled in panic.

And as the mud's heat was dumped, the ground subsided, a pit dilating open, like an immense version of the fingertip dimple Kanda had made on the walk here.

Kanda said, "We've been seeding this whole area with cryo nests for weeks. If you hit the cryos with too much heat, they have ways of hitting back."

Away from the smashed pod, larger structures began to slip into the widening pit, or they floated away, gravitational anchors broken. The disruption spread rapidly as buildings far from the center were hauled over by the rope tangle. The hunters started to make the damage worse, slashing light cables with chain saws.

Ghosts spilled out of the tangle. They poured down the open throughway and flowed over the ground out of the city, just as Kanda had suggested. And they started to get caught in the traps the humans had set.

Five stood in the open. "We'll have fifteen, twenty minutes before they organize to get rid of us. Let's get this done." She raised her spear.

Donn watched Five slaughter one Ghost.

Its skin was already punctured where it was snagged on the wire, and bloody water and air fountained, crystalline, from the wounds. Now Five leapt on the Ghost, landing sprawled on its hide. Gripping with her legs, she coiled her back upward and struck down with a stabbing sword, as hard as she could. The

blade was buried up to the hilt in the Ghost's carcass. But the hilt was attached by a rope to a stake driven into the hard ground, and as the Ghost thrashed, its own motions tore gouges into its flesh.

Five slid to the ground, then lunged in again. This time she used a tool like a long-handled hook to dig into the gaping wounds, and she dragged out a length of bloody rope, intestine perhaps. It coiled on the ground, steaming and freezing.

All around Donn, the humans labored at the trapped Ghosts with chain saws and axes and swords and daggers. Hama and Kanda worked as hard as the rest. One man thrust a kind of lance into the side of a Ghost. Donn couldn't see its purpose, the wound didn't seem deep, but it thrashed in agony. Kanda told him it was a refrigeration laser, cannibalized from a crashed Ghost ship, invisibly pouring out the Ghost's precious hoarded heat.

Above their heads, even as the slaughter went on, Ghosts fled from the collapsing city, shimmering mercury droplets drifting away.

Five approached Donn. She held out the knife to him, handle first. "Here. Finish this one. Easy first kill, my treat."

Donn took a step forward, toward the Ghost she had eviscerated. He actually held out his hand, holding the knife. He knew this was the only way he was going to survive here.

But all the emotions, all the shock of this extraordinary day, focussed into this moment. He felt detached from the ice world, from the grinning girl before him, detached from it by more than the smear of frozen blood on his Ghost-hide visor.

He stepped back. "No," he said.

She glared at him. She took back the knife and cut through the Ghost's intestine with a savage swipe. Dark fluid poured out, congealing onto the ice, freezing immediately. The Ghost subsided, as if deflating. Five faced Donn. "I knew you were a weak one the minute I saw you."

"Then you were right."

"We only survive here by killing Ghosts. If you won't kill, you have no right to live."

"I understand that."

She held out her hand. "Your suit. Give it back to me. I'll find a better use for it."

He nodded. He had nothing else to say. He reached up and pinched his hood by the cheeks. One firm tug and-

"Wait."

A human being came walking out of the calamitous Ghost *city-walking without a pressure suit*, of Ghost skin or otherwise. It was Eve Raoul. And a Ghost rolled at her shoulder. It was the Sink Ambassador, Donn knew it must be.

The humans, Hama and Kanda and the rest, stood back from their butchery. They were crusted with frozen blood, weapons in their hands.

Trembling, exhausted, Donn felt *irritated*. It could all have been over in an instant. No more changes, no more transitions, no more choices. Death would have been easier, he felt, than facing whatever came

next.

Around them, the Ghosts were starting to organize.

"We can still get out of here," Five said, "if we run. Now."

"No more running for me," Donn said. "Whatever happens."

"That's wise, Donn Wyman," said the Ambassador.

Eve Raoul stood at its side. She looked down at her feet, up to her ankles in frozen air. The Virtual protocol violations must be agonizing for her, Donn thought; it was *supposed* to hurt if you walked out into the vacuum without a suit. She turned to the Ambassador. "I did the job you wanted. I snagged their attention." Yes, Donn thought. As no Ghost, among a million Ghosts, ever could. "Let me go now. Please."

"Thank you, Eve Raoul."

Eve turned to Donn. "Listen to the Ambassador. Do what it says. It's more important than you can imagine." Her voice trailed off, and she broke up into a cloud of blocky pixels that dwindled and vanished.

Donn said, "How did you know I would be here?"

"You are not hard to track," the Ambassador said. "Your biochemical signature-none of you can hide. Not even you, Sample 5A43."

Five flinched. "You know where we are, our bunker?"

"Of course we do."

"Then why don't you hunt us down, kill us?"

"For what purpose? We brought you here to understand you, not kill you."

Hama said, a knife in his hand, "Perhaps seeing humans in the wild like this helps you understand a bit more, eh, Ambassador?"

Kanda said, "You do not stop us even when we come to slaughter you?"

The Ambassador lifted off the ground and hovered over the deflated corpses of its kind, impaled on the crude human traps. "We seem to have trouble anticipating such actions as this. We do not think the way you do. I suppose we lack imagination."

Donn said, "What do you want, Ambassador? Will you take me home?"

"Not yet." It was another voice. A Silverman came walking from the chaotic *city-the* Silverman, Donn saw, the one from Minda's Savior, with its human-tech neck band and one arm lopped off above the elbow. "We need your help."

" 'We?' Ambassador, since when have you and the Silver-men constituted a 'we'?"

"Since you made this one as smart as any Ghost. You Reef-born made him intelligent enough to suffer. But sentience always has unexpected consequences. In fact, he has been intelligent enough, and human enough, to be able to anticipate what humans will do next."

"Do?"

"When you learn what we have been up to. Donn Wyman, we need you to tell the humans. They would not listen to us. You, though, might be believed. We will show you. Come."

The Silverman turned and walked back toward the city. The Ambassador followed.

Donn saw that they were heading for the dodecahedral transfer station. "You want me to get into that thing?"

"Yes," said the Ambassador.

"Where will it take me?"

"To somewhere beyond your imagination."

"And what will I meet there?"

"The one known in your human rumors as the Seer."

Kanda laughed. "You lucky cuss. Go, man. Go!"

But still Donn hesitated. "I'll come with you if you let these others go. Back to their cave under the ice. And send them home. Don't harm them further."

The Ambassador didn't pause. "Done."

"Thank you," whispered Hama Belk.

Kanda grinned. "A brief life, Hama?"

"Not that brief, thanks."

Donn said, "One more thing, Ambassador."

The Ambassador rolled. "Jack Raoul would have admired your nerve."

"Find my brother. Benj Wyman. He's here somewhere, one of your 'Samples.' "

"Not mine. The faction who—"

Donn cut him off. "Find him. Send him home, too."

"Done."

"All right." Donn took a step toward the Ambassador.

"Wait." It was Five. "Take me with you, virgin. If you're to meet the Seer, I want to be there."

"Why? To kill it?"

"If it's necessary, you'll need somebody to do it. *You* won't, that's for sure."

Donn asked, "Ambassador?"

The Ambassador rolled. "Abandon your weapons, Sample 5A43."

"Five. My name is Five."

"Abandon your weapons."

Five was obviously reluctant. But she took her heavy projectile weapon and her quiver of arrows and her stabbing sword and handed them all to Hama.

Donn held out his hand to her. "Come, then. But no more of the 'virgin.'"

She clasped his hand; he could feel her strength through the double layer of Ghost fabric. They walked together, following the Silverman and the Ambassador, back into the devastated city.

The flow of Ghosts into the dodecahedral transport terminal had stopped, perhaps disrupted by the chaos the humans had caused. But Ghosts were still pouring out of the crumpled heart of the city, while more were flowing the other way, as a purposeful operation of recovery began. Donn found it hard not to flinch, as if all these suspended masses might come tumbling down on his head. The Ambassador assured them they would be safe.

Five's gloved hand grasped Donn's hard.

Donn asked, "So how are you feeling?"

"Like I'm two years old again," she said. "Stripped of everything I've built for myself. They've got me back, haven't they?"

"No," Donn said firmly. "You walked into this—your choice. And you'll be walking back out of it, too."

She thought about that. "You promise, virgin?"

"I promise." *And you were wrong, Hama*, he thought. *I did get to save her after all—or at least there's chance.* "So, Ambassador. This device—is this how you've been snatching people?"

"Shall we avoid such loaded words, Donn Wyman? We have been developing a new nonlocal transportation technology. It is the outcome of a wide-ranging program of physical research."

The Ghosts' origin, under a failing sun, had led them to believe they lived in a flawed universe. So they wished to understand its fine-tuning.

"Why are we here? You see, there is only a narrow range of the constants of physics within which life of any sort is possible. We study this question by pushing at the boundaries—by tinkering with the laws that sustain and contain us all. Thus we explore the boundaries of reality."

"While snatching children," Five said.

"Get to the point, Ambassador," Donn said.

"We have found a way to adjust the value of Planck's constant, which gives, in human physics, the scale of quantum uncertainty."

Donn frowned. "Jack Raoul was involved in a situation where Ghosts messed with Planck's constant. They reduced it."

"Yes. We were endeavoring to produce an AI of arbitrarily large capacity."

"It was a disaster."

"Well, yes. But in the end, a useful technology was derived—Ghost hide, as you call it."

Five was struggling to follow all this. "And is this what you've done here? You've decreased this Planck number again?"

"No. This time we have increased it, Five."

Donn saw it. "You've increased the uncertainty in the universe—or a bit of it." He thought fast. "A particle has a quantum function, which describes the probability you'll find it in any given location. But the probability is nonzero *everywhere*, throughout the universe. And if you increase Planck, then you increase all those probabilities."

"You're beginning to see it," the Ambassador said. "It is hard to imagine a more elegant mode of transport, in theory: you simply make it more likely that you are at your destination than your starting point."

Donn was stunned by this audacity. "*In theory.*"

"The engineering details are soluble."

Donn laughed. "Evidently. Or we wouldn't be standing here, would we?"

"Soluble."

'Evidently' " Five stared at Donn. "You're talking to this Ghost as if all this is *normal*. As if you're discussing a new kind of stabbing sword." She turned to the Ambassador. "*How* do you change the laws of physics?"

"Quagma," said Donn immediately.

He understood some of this. The principle of the GUT-drive, which powered ancient ships like his mother's own *Miriam Berg*, was related. Quagma was the state of matter that had emerged from the big bang, a magma of quarks—a quagma. And at such temperatures, the fundamental forces of physics unified into a single superforce. Quagma was bound together only by the superforce. And when quagma was allowed to cool and expand, the superforce decomposed into the four sub-forces. By controlling the decomposition, you could select the ratios between those forces, ratios that governed the fundamental constants—including Planck's constant.

Humans knew the importance of quagma. Donn's father's family had a legend of an earlier Wyman involved in a jaunt nearly two hundred years ago, when humans had raced Ghosts to retrieve a lode of this primordial treasure.

Donn said, "You scare us, with what you do, you Ghosts. You always have and always will."

The Ghost rolled and bobbed. "Sometimes we scare ourselves, believe it or not. Shall we proceed?" And it swept boldly into the open dodecahedral chamber. Doors dilated closed around it, and when they opened, only a second later, the Ghost had gone, a tonne of spinning flesh vanished.

Donn and Five were left alone, surrounded by anonymous shoals of Ghosts. Donn grabbed Five's hand again. "Together?"

"Let's get on with it."

The chamber was a blank-walled box, silvered like all Ghost architecture. When the doors closed behind them, they were suspended in the dark, just for a heartbeat.

And when the doors opened, they were not in the dark anymore.

"Do not be afraid," said the Sink Ambassador.

The Ghost hovered before them, bathed in dazzling light. Behind it Donn saw the silent figure of the Silverman, the stump of its severed arm a jarring asymmetry.

Five squeezed Donn's hand. "Virgin?"

"It's all right. I mean, if they were going to kill us, they'd have done it by now. And stop calling me 'virgin.' Come on." Deliberately, he stepped forward, into the light. Keeping tight hold of his hand, Five followed.

Donn found himself standing on a silvered platform, three or four meters across. The Ghost hovered before him. He couldn't see any support for the platform, though gravity felt about normal. They were entirely bathed in pure white light, above, below, all around, an abstraction of a sky. The light was bright, not quite dazzling. And as Donn's eyes adjusted, he gradually made out structure in the light: billows like clouds, all around, slowly evolving, vacuoles boiling.

When he glanced back, he saw that the dodecahedral transit chamber had vanished; somehow he wasn't surprised.

The Ambassador said, "Where do you think you are?"

"In the heart of a star," Five said. "Where else?"

"But not just any star."

"The Boss," Donn said. "But that's impossible. Isn't it, Ambassador?"

"How did you phrase it earlier? 'Evidently not. Or we wouldn't be standing here, would we?'"

The Silverman said, "I understand, Donn Wyman. I am human enough to fear falling. Don't be afraid. Step to the edge. Look down."

Five wouldn't move. She stood there, her hide suit still stained by Ghost blood, bathed in starlight. But Donn stepped to the rim of the floating disk.

And he looked down on a Ghost base in the heart of the star. It was a hollowed-out moon, a rock ball that must have been a thousand kilometers wide, riddled with passages and cavities.

The disk began to descend. The motion was smooth, but Five lunged forward and grabbed at Donn's arm.

The moon turned into a complex, machined landscape below them. Ghost ships and science platforms swept over the pocked landscape, tangles of shining net. And Ghosts themselves drifted up from the chambers and machine emplacements, bobbing like balloons, shining in the star's deep light. Behind the moon, there were threads of a more intense brightness, just at the limit of visibility, dead straight. All over the moon's surface, vast cylindrical structures gleamed. The Ambassador said these were intrasystem drives and hyperdrives, systems that had been used to fling this moon into the body of this star and to hold it here.

And there was quagma down there, the Ambassador said, little packets of the primordial stuff, buried in the pits of ancient planetesimal craters. *I knew it*, Donn thought.

"The work here is hard," the Ambassador said. "Often lethal. We have poured workers into this mine of light endlessly." And Donn thought of the stream of Ghosts he had seen filing patiently into the transportation booth on Ghostworld. "Few come back, despite all our precautions. But now the work is nearly done."

Five asked, "So how come we aren't all burned up? We're in the middle of a *star*."

"Perhaps you can see those illuminated threads? Those are refrigeration lasers. By making ourselves hotter even than this star's core, we can dump our heat into it. Of course, what you are seeing is a representation, heavily processed. Starstuff is in fact very opaque."

Donn said, "You are messing with physics again, aren't you, Ambassador?" He thought back to the Coalition's recent observations of the Boss. "We've been observing flares. Are you trying to mend the star, to stop the flares? No, not that. Sink Ambassador, *are you destabilizing this star?*"

The Ambassador rolled. "How would Jack Raoul have put it? 'Guilty as charged.' What do you understand of stellar physics?"

Every star was in equilibrium, with the pressure of the radiation from its fusing core balancing the tendency of its outer layers to fall inward under gravity. A giant star like the Boss, crushed by its own tremendous weight, needed a *lot* of radiation to keep from imploding. So it ran through the hydrogen fuel it used to fuse quickly, and a detritus of helium ash collected in its core.

"But that 'ash' can fuse too," the Ambassador said. "The fusion process produces such elements as carbon, oxygen, silicon, each of which fuses in turn. The chain ends in iron, which cannot fuse, for if it did so it would *absorb* energy, not release it. And so an inner core of iron builds up at the heart of a star like this. A core bigger than most worlds, Donn Wyman!"

Five asked, "So how come it doesn't just collapse?"

"Its components are already crushed together as far as they will go. This is a property of atomic matter. Humans know it as the Pauli exclusion principle. Of course, in time, as the dead zone spreads through the heart of the star, the repulsion will finally be overcome. Electrons will be forced to merge with protons, producing neutrons—a neutron star will be born, smaller and denser than the iron core. And then there will be a collapse of the outer layers, a catastrophic one. But not yet, not for a long time; this star is stable."

"Or it *was*, before you came along," Donn said. "But now you're changing things, aren't you? Planck's constant again?"

"Jack Raoul would be proud of you, Donn. Like you, he was a good guesser."

"If you were to use your moon-machine to reduce Planck in the star's core—"

"Then Pauli repulsion would be reduced. The iron core would collapse prematurely."

The Ghost showed them a Virtual representation of what would happen next. The implosion would rapidly mutate into an explosion. Shock waves would form and rebound from the inner layers, and a vast pulse of neutrinos would power further expansion.

"The Boss will be blown apart," said Donn, wondering.

"Yes. A detonation over in seconds, after years of preparation. But the explosion will be asymmetrical, that layer heated by the neutrinos turbulent. This is the key to such explosions, and it is this turbulence we are hoping to control. For the asymmetry will blast the neutron star out of the debris of the Boss—it will

leave with a significant velocity—while releasing a pulse of gravitational wave energy that we would hope to tap and—

"A supernova," Five said. "That's what you're talking about, isn't it? You're going to turn the Boss into a supernova."

"We believe it will be the first *artificial* detonation of its kind in the evolution of the universe. A supernova used as a cannon to fire out a neutron star, directed as we please! History is watching us, Donn Wyman."

The Silverman comically raised its stump of an arm. "Magnificent!"

Donn paced around. "You're insane."

"Now you do sound like Jack Raoul," said the Ambassador.

"You will devastate worlds!"

"Actually, stars, too," said the Ambassador. "Nearby *stars* will be boiled away."

"And the Reef," Donn said grimly. "Surely, we're too close to survive."

Five said, "The Reef is ships joined up together, isn't it? I don't remember. You could just fly away."

"We don't have hyperdrive," Donn said. "Confiscated by the Coalition for their Navy ships. I don't imagine they will be handing them back." He turned on the Ambassador. "This is mass murder. Why are you doing this?"

"Because of the Seer." The new voice was a woman's: Eve Raoul's. Donn heard her words moments before a cloud of pixels popped into existence and coalesced into her thin form.

She stepped to the edge of the platform. "My. Quite a view. Quite a drop, too." She reached out absently, but none of them had a Virtual hand to offer her, and she stepped back.

"I wasn't expecting to see you again," Donn said.

"Well, I didn't expect to be revived again," she said with a trace of bitterness. "At least I'm not in any pain this time. I guess it's good to be useful."

"Useful how?"

The Ambassador said, "Eve is helping us understand an entity of our own creation, an entity whose wishes have brought us all here today."

Donn's heart thumped. "You mean the Seer."

"Turn around, Five, Donn."

They turned. The Silverman was holding, in his one hand, a box, a tetrahedron ten centimeters or so to an edge. It seemed to have clear walls, and its interior was black and full of stars, stars that swarmed—that, at any rate, was Donn's first impression. Five and Donn both stepped closer to look. The "stars" were no more than dust motes, pushed to and fro by random currents in whatever air filled the box.

Donn said, "It's like a toy. What is it?"

"The Seer," Eve said.

The Ambassador said, "The control of the core of a giant star during a catastrophic explosion is ferociously difficult. Even modeling it was beyond our processing resources. So we devised a new generation of AI."

Five said, "This box of dust?"

"This box of dust," Eve said, "is about the most advanced AI we're aware of. For a machine like this, physically you need components that are small enough to be influenced by quantum effects, yet large enough to feel the effects of gravity. A swarm of smart microprobes—dust motes."

"A machine like what?"

"A quantum gravity AI."

"On the *Miriam*, we have quantum AIs," Donn said.

"Right," Eve said, nodding. "And that gives you an edge. A simple switch can only be in one state at a time—on or off. A quantum switch holds information about *all* possible states of the switch at any one time. And so you can use it to do parallel processing. Many inputs, many outputs. You get a speed advantage, and a significant one.

"But a *quantum gravity* machine goes one step further. You abandon causality altogether."

The blurring of position and velocity in quantum mechanics made traditional causality problematic. And in relativity, too, lightspeed limits ensured that causality was more an aspiration than an iron law.

Donn started to see. "And if you put quantum mechanics and relativity together—"

"In a quantum gravity computer, cause and effect are thoroughly mixed up. You don't even need to have input before output, causally. In practice, I think, the Seer is able to glimpse the outline of a solution to a given problem even before it has begun its calculation, and so can guide its processing efficiently to that outcome. In retrospect, its thinking feels like guesswork, an unlikely series of inductive leaps. But it's always right, and very, very fast."

"The Seer really can see the future," Five said, "just as the rumors say."

"But its visions are limited to the outcomes of computing algorithms a few microseconds ahead-or to the furthest future, millennia or more away."

Five glared at the Ambassador. "So why the tetrahedron, fatball? Why is this ultimate brain in a box the shape of the symbol of human freedom?"

"A tetrahedron was the most suitable shape for—"

"It's a totem, that's what I think. Some of the Samples believe Ghosts are starting to worship humans, because we're becoming so good at killing you. Hence the Silvermen, walking human statues. Hence the tetrahedral box."

The Ambassador said evenly, "We Ghosts do have a propensity for worshipping that which destroys us, it is true. But you are not yet a goddess, Sample 5A43."

Donn said sharply, "Enough. Eve, you said how the Seer's thinking *feels*. How can you know that?"

"Ah. Good question. Because, not for the first time, the Ghosts had trouble with an AI that ended up not performing *quite* as specified."

"Like the Silverman."

"Well, yes. And, not for the first time, I, or an avatar of myself, was asked to help interpret for it." She looked at Donn, her gray hair shining in the light of the stellar core. "It sees the future, Donn. And it is afraid."

Donn watched Eve. Her eyes were unfocused, and he thought her representation was degrading, her skin smoothing from lack of definition, a lock of her gray hair flickering. He wondered how it must be to *be* her, a representation every bit as sentient as he was, and yet having endured multiple lives already—and now locked into a consciousness like no other.

She said, "The Seer is sentient, born of dust into a baffling, acausal universe. But it is a Ghost artifact. And so it shares Ghost values, Ghost assumptions. The Ghosts survived the death of their world through symbiosis, dissimilar life-forms gathering together. The Ghosts have faith that the life-forms of this era of the universe, a transient age of light- and water-based chemistry, will similarly use cooperation and symbiosis to survive the transition to the new cold age to come when the last star dies."

Five shuddered. "How can you *think* like that?"

"This has happened already, in the universe's history," Eve said. "There are life-forms extant now, in this age of matter, that are survivors of earlier epochs, the age of radiation and of annihilation and of superforces and of—"

"Enough," Donn said. Her speech had become rapid, automated, as if she was hypnotized. "Go on, Eve."

"But when this age ends, when dark energy comes to predominate and the fabric of space-time is torn apart—when this happens, and the Seer can *see* it—there will be no Ghost left alive to witness it, and no symbiotic descendant of the Ghosts."

"Why not?"

"Because of *us*," said Five savagely. "Because of humans. *We win*. I don't need a quantum-gravity computer to tell me that!"

"You must understand," the Ambassador said. "The detonation of this sun—we do this because we, this Ghost enclave, have been cut off from our home range by the forces of your Coalition. Billions of individuals, a whole world, trapped behind the lines. We were desperate. We looked for a way to change the parameters—the rules of the game. That is our way of resolving problems. We were looking for a way out. Now we see we must do more than that; we must take the Seer and its dreadful counsel to our home ranges. We need time to consider what must be done."

"Such as what?" Five asked.

"Such as escape."

Escape to *where*? Donn wondered. Where could the Ghosts go to escape a rampant, Coalition-led mankind? Out of the Galaxy? Out of the *cosmos* altogether? He tried to focus on his own situation. "Then why have you brought us here? Why tell us this?"

"Because of me," said the Silverman. He stepped forward, still cradling the Seer. "You made me smart to punish me. But I am human enough to guess how you would feel about an exploding star."

The Ambassador said, "We did not mean to engineer this star as an act of war, only as a means of escape. We understand now that humans might not see it that way."

"You really don't get human psychology, do you?" Donn said.

"No," said the Silverman cheerfully. "Donn Wyman, you must warn your people. Make them believe, as we could not. Make them flee. And make them believe the Ghosts did not mean war."

"That's a tall order."

"You are our only hope," the Ghost said simply.

Donn felt empty. Could it be true that so much was pivoting on this moment? *Because if so*, he thought, *I am not strong enough to deal with it.*

"You don't have much time," said the Ambassador. It floated toward the lip of the platform.

Donn followed and looked down at the engineered moon. Ghosts swarmed, pinpricks of dazzling light against the worked regolith. "How long?"

"The mathematics is uncertain."

"There are human colonies scattered through the Association," Donn said. "Many of them have hyperdrive, I think. But the main human concentration is the Reef. And we no longer have hyperdrive."

"Ask your father," the Ambassador said.

"What?"

"I, too, approved of the Silverman's wish to contact you personally, Donn Wyman. Because I know that your family has resources. We will send you home now, Donn Wyman."

They pulled back and stood in a row, the Silverman with the tetrahedral box, the looming Ghost, and the Virtual of Eve, gradually disintegrating.

Eve raised her hand. "There is more," she said solemnly. "Human and Ghosts must both join the great confluence of mind in the far future, join with the rest. That is the only way the next transition can be survived *by either of us.*"

Donn was shocked by this latest bit of bad news. "And if humans destroy the Ghosts—"

"Then *neither* will survive. Remember," she said, her voice scratchy. "Remember—"

Five ran toward the Silverman, who stood stock-still, slow to react. She raised her fists and slammed them down on the Seer. Her hands passed through its substance, scattering pixels.

Donn pulled her away.

"Just an avatar," she said, breathless. "Worth a try. To strike such a blow... it would have been magnificent."

The Ghost and its companions were surrounded by a cloud of pixels now. The star's light flickered.

And Donn was home.

His mother ran up to him and grabbed him. "Oh, Lethe, Donn! I never thought I'd see you again!" He let her weep on his shoulder. "Benj is back, too," she whispered. "He's back!"

Donn saw Five, still in her bloodstained Ghost-hide suit, looking even more scared and bewildered than

in the center of the star. There was Samm, his father, grinning hugely, grabbing onto Benj as hard as his mother was to Donn. The Commissary, Elah, was here, too. She looked as shocked as any of them at Donn's sudden appearance, but she was looking up into the sky with some alarm and muttering into the air, evidently communicating with her Coalition colleagues.

Donn couldn't resist grinning at his brother. Benj was wearing a plain white bathrobe; all his hair had been shaved off. "Benj, what happened to you?"

"I've been a stark naked lab rat for a day. If it was you who got me out—"

"It was. You owe me."

"Damn."

There were twin concussions, soft explosions, and a breeze of displaced air. Hama Belk and Kanda Fors had coalesced, under the lifedome. Grubby, scrawny, they both staggered in the sudden change of gravity, and they clung to each other in shock. Then they realized where they were, and their clinging turned to a hug of joy.

Then Hama spotted Elah in her black Commissary's robe, and he went over to her immediately.

Donn gently disengaged his mother. "Mom—you have guests."

Rima turned. "Do I know you?"

Kanda, recovering her composure quickly, came forward. "Kanda Fors. Food tech, from the *Michael Poole*. We met a couple of times, I think... I've been lost for a number of years."

"It's a day of shocks for us all." Rima stepped forward, and the women clasped hands. Rima's face tattoos flared electric blue, and Donn was proud of her.

Amid more concussions, more of the ragged rats from Ghostworld started to appear, many naked, bewildered. One woman cradled a baby.

Donn took Five by the hand and led her to his mother. "Mom, this one's called Five. Long story. I think she'd appreciate some help, her and her people. Some clothes, for a start." But Five flinched back. "She's been living wild," Donn murmured. "It will take some time."

"We've all the time in the world. Come, child. And, Kanda, you'll be wanting to tell your family you're back?"

"I feel nervous about it. Yes, of course."

"And you—Five, was it? What about your family?"

"I don't remember them."

"I'm sure we can trace them. Come on, we'll sort it out."

Donn approached his father. "Dad, I need to talk to you. We're in trouble. The Boss—"

"I know. Look at this." He showed Donn an image, returned by faster-than-light inseparability links from a Coalition drone observer close to the giant star. It was spitting, flaring, ejecting knots of plasma large enough to swallow Earth's sun whole. "It's becoming unstable."

"It's worse than that." As urgently as he could, he told his father all he had witnessed, the Ghost experiments at the heart of the Boss—the coming supernova. Samm listened gravely.

"You do believe me?"

"Of course I believe you."

"As do we," Elah said, walking over.

Hama followed in her wake. Though he was just as grimy and underfed, he didn't seem to Donn to be the same person he had been on the Ghostworld; he had immediately retreated into his role, like a shadow of the Commissary.

"What you say," Elah went on, "ties in with the projections we have been making of the star's instability."

Samm folded his arms. "You say you're here to protect us, you of the Coalition. What are you going to do about this?"

"We have already put out a warning to the other human colonies in the Association. Most of them have hyperdrive ships; they will be able to flee in time. Other Coalition centers are arranging refugee facilities."

"Blankets and hot water. Great. But what about us? You know damn well the Reef contains the largest human population in the Association. You took away *our* hyperdrives!"

"In order to serve the greater needs of the Third Expansion."

"That star's going to expand before long, and cook us all. Going to give us back our technology, are you?"

"That isn't practical," Elah said simply. She listened absently. "Come," she said to Hama. "The flitters are lifting Coalition personnel from the Reef in fifteen minutes."

"And us?" Samm tried to grab her arm, but she shook him off. "What of us? You're leaving us to die!"

From nowhere, Elah produced a handgun, a starbreaker. "This conversation is over, regrettably." Backing up, she and Hama made for the door cut into the lifedome.

Samm made to follow, but Donn stopped him. "Dad, let me. Wait, Commissary." Cautiously, he approached Elah and Hama. In a few rushed words, he tried to tell them more of what the Ghost had told him within the star.

"The Ghosts don't want this to be seen as an act of war."

"Then they shouldn't detonate supernovas in human space," Elah said.

"They're only doing it to escape the cage we put them in."

"*They* put humans in cages. Your friend Five, Hama here."

"They fear we will drive them to extinction. That's what the Seer foresees. And if that's so, we may destroy ourselves as well."

Elah thought that over. "Better a Galaxy in ruins," she said, "than a Galaxy that is not ruled by *us*. Good luck, Donn Wyman." She backed to the door, and left. Hama looked back once, but it was as if he barely recognized Donn anymore, and he followed his superior.

Donn went back to his father. "I failed."

"Well, what did you expect? You aren't going to overturn an ideology like the Coalition's with a couple of sentences. But the Commission for Historical Truth records everything that *transfixes-everything*. Maybe they will figure all this out one day, after a couple of thousand years' study in some library on Earth—maybe you planted a few seeds for the future. In the meantime, we've a supernova to deal with." Samm eyed his son. "So, did your new Ghost best buddy give you any advice?"

"It said I should ask you."

Samm sighed. "Smart of it. Okay, son. I guess it's time you learned a little family history." Carrying his data slate, he walked off toward the copse at the center of the dome, chlorophyll green leaves shining under the light of the burgeoning supernova.

Donn hurried after him. "Where are we going?"

"The engine room."

The kilometer-long elevator descent along the ship's spine was slow, frustrating.

Donn knew his way around the control room at the heart of the *Miriam's* GUTdrive pod. He used to come down here as a kid, to play with his brother, and later, as a young man, to learn about the technological legacy of his mother's family. There wasn't much to see: a couple of seats and couches, a water dispenser, an emergency pressurized locker. The instruments were blank, antique data slates tiling the walls. All around this space, vast engines brooded, capable of harnessing the energies of cosmic inflation to drive the ship forward. But the engines hadn't been fired up in Donn's lifetime, not once.

Donn expected his father to boot up these control slates. He didn't. Instead he took the small portable slate he had carried down from the lifedome and pressed it against a wall. It lit up with a crowded panel of displays. "There you go," Samm said. "Two hundred years old, and it fires up like it was brand-new."

"What does?"

"This." He tapped the slate and showed Donn an external view of the *Miriam*, seen from below, its lifedome embedded in the rough plane of the Reef, its spine and engine compartment dangling like a lantern. Samm zoomed in on the hull of the engine compartment, where a black slab clung like a parasite.

Donn leaned forward and stared. "What is *that*?"

"The family secret." Samm eyed his son. "Look, Donn—you aren't the first Wyman to have run into the Sink Ambassador. Your grandfather a few times removed—his name was Joens Wyman—got involved in a kind of intergalactic race with the Ghosts. He was an entrepreneur. And he wanted to get his hands on—"

"A cache of quagma," Donn said. "You told me about this."

"The trouble was, the cache was somewhere over twelve billion light-years away—the figures are uncertain. Too far even for hyperdrive. But Joens Wyman didn't use hyperdrive. He used an experimental human technology. It was called a Susy drive."

"Susy? That's the fritter's name."

"The flitter, and a secret space drive. It was kind of risky. It's not like hyperdrive. Look, they taught you at school that the universe has more dimensions than the macroscopic, the three spatial, and one of time.

Most of the extra dimensions are extremely small. When you hyperdrive, you sort of twist smoothly through ninety degrees into an extra dimension, and go skimming over the surface of the universe like a pebble over a pond. Simple. Whereas with supersymmetry, you're getting into the real guts of physics."

There were two types of particles: fermions, the building blocks of matter, like quarks and electrons, and force carriers, like photons. The principle of supersymmetry had it that each building block could be translated into a force carrier, and vice versa. "The supersymmetric twins, the s-particles, are inherently fascinating, if you're a physicist, which I'm not," said Samm. "But the magic comes when you do two supersymmetric transformations—say, electron to selectron and back again. You end up with an electron, of course—but an electron in a *different place*."

"And that's the Susy drive."

"Yep. A principle the Ghosts have never explored. Joens Wyman pumped his money into this thing, and got as far as a working prototype. But in those days, nobody would invest in human research and development; it was always easier and cheaper to buy alien tech off the shelf. Joens hoped to cut his losses by sending his Susy-drive ship in search of treasure nobody else could get to."

"The quagma. What happened?"

"Joens finished up with nothing but the Susy drive and the clothes he stood up in. He fled his creditors."

"He came here."

"Yes. Good place to hide, beyond Coalition law—anyhow, it was then. His son married into your mother's family, who owned the *Miriam*."

"And he lodged the Susy drive on the hull of the ship."

"Yeah. So it's come down the generations. My father told me about it and gave me the data on this slate. I think Joens always thought this old monster might be useful as a last resort. Well, he was right."

Donn stared at his father. This was a side of him Donn hadn't seen before, this decisive adventurer. But maybe no son saw that in his father. "Dad, you're not serious. You're not planning to fire up this Susy drive, this two-hundred-year-old disaster."

"You have a better idea?"

"When was it last tested?"

"When do you think? Look, according to these displays, the field it generates will envelop the whole of the Reef. We'll get out of here, all of us. And then you and I will go down to Minda's Savior and drink free Poole's Blood for the rest of our lives."

"If it works. And if it doesn't work?"

"Then what have we lost?" He tapped the screen. It switched to the external image. Panels blew out from the black casing fixed to the base of the pod; a zoomed-in view showed them the jeweled guts of the Susy drive.

Then the data slate chimed an alarm. The Susy-drive display cleared, to reveal an image broadcast from the Coalition monitor drone—an image of an exploding star.

"Damn," said Samm. "I didn't imagine it would be so quick."

"Dad, look." The explosion was strongly asymmetrical, a flower of ugly light splashed across the slate.

And there was a denser knot to one side of the supernova.

Samm tapped the screen, overlaying analyses of mass density and velocity vectors. "That's a neutron star. The core of the Boss? It's been spat out of there like an apple seed—thousands of kilometers a second." He brought up a Galactic display. "Look at that! It's been fired straight out of the Association toward the Sagittarius Arm."

"The Ghost home range." Green asterisks began to appear around the fleeing neutron star. "What's that?"

"Ghost technology... Ghost ships, popping up out of nowhere. Settling into orbit around that neutron star. And, wow, look at *that*." A major green anomaly. "It has to have the mass of a planet."

"The Ghostworld."

"Looks like it. How are they bringing all this to the neutron star?"

Donn said, "Just by making it more *likely* that the planet should be in orbit around the neutron star than wherever it used to be."

"What?"

"To move an entire planet has to take a mess of energy. The gravity waves from the supernova? The Ambassador talked about tapping into that. They must be shielding the world from the supernova shock, too. They did it, Dad! Just as the Ambassador said they would. Oh, the Coalition ships can pursue them, but a runaway neutron star will smash through the Coalition lines as if they were made of rice paper."

Samm brought back the Susy display and began to scroll through outputs. "Let's just hope this damn Susy drive lands us outside the Coalition's clutches, too."

"Dad—don't you *know*?"

"I told you. It's kind of unreliable. We ought to end up just a little above the Galactic plane, however. Okay, it's ready."

"As quickly as that?"

"Well, that supernova shock wave is going to take a while to get here—years, as we're light-years off from the Boss. But we can't expect rescue for years either, even if the Coalition is willing to try; the gravity waves from the detonation are going to churn up hyperspace for a long time. Best to get out of here now if we can—and if this doesn't work, we might have time to figure out something else. I've sent an alarm out through the Reef."

"Shouldn't we ask Mom first? It's her ship."

"She'd only say no. Hang on to that rail. Good luck, son!" He stabbed a finger at his data slate.

The Association stars turned to streaks and disappeared.

So, just as his father had tried to explain, Donn was leapfrogged through Susy-space. What he hadn't been told was what it would *feel* like.

Susy-space was another universe, laid over Donn's own. It had its own laws. He was transformed into a supersymmetric copy of himself—an s-ghost in Susy-space. And it was... different. Things were blurred. Susy-space cut through the distinction between Donn, here, and the stars, out there. Donn could *feel* the

scale of the journey, as if the arch of the universe were part of his own being. Distance crushed him.

But at last it was done.

The Reef of ships popped out of Susy-space, sparkling with se-lectrons and neutralinos.

Samm and Donn stared at each other. "Let's not do *that* again," said Donn.

"Agreed." Samm tapped his data slate, to get an external view.

Darkness, broken only by the faintest smudges of gray light.

"Are they galaxies?" asked Donn.

"Oops," said Samm.