THE SMALL POND

by C. Sanford Lowe and G. David Nordley

Being a big fish may be attractive, but can have correspondingly big disadvantages...

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Chapter 1

In the Solar System's Kuiper Belt,

9 May 2250

"Return? Return!? But we just got here! Nobody's even been down to the surface yet!"

The surface floated in front of Liz Avonford, forbidding, mysterious. She put a hand on the *Marsden's* observation window as if to touch the unknown planetoid below them. It drew her to it with a force far greater than its negligible gravity.

Salim shook his head firmly. "Orders from Dr. DeRoot. We have to go back. Besides, we didn't tell them we were going to land. I think Vitus DeRoot would rather someone else be the first on the surface. This is the biggest thing found in the Solar System in the last century—it's over 300 kilometers across! It's historically

important. The institute would want to be involved in the landfall decision. We've got a big fish here, and we aren't expected to be catching big fish. We should get permission."

"Nuts!" she said. At 3007 AU's from Sol, it was her call. "I'm going down for a couple of hours at least. We're too far out to be calling back to headquarters. It would take a month to get permission."

"Thirty-four days, sixteen hours," the *Marsden* added, helpfully. "25 August 2250."

"Look, they didn't say so in so many words," Salim said, "but..."

"Nuts to the politics! I found it. And I'm going to be the first one down."

Silence. She was the expedition commander and the legal authority in place, unless Salim or someone relieved her. And they would not do so over this; no one had expressly ordered her not to make landfall.

Liz grabbed the doorjamb and projected herself across the deck to the nearest excursion vehicle. She checked herself smartly with a hand slap on the cockpit rim, pivoting her legs onto the seat. A quick visual showed the standard equipment was all present, including a helmet and coveralls in the wire mesh locker behind the pilot's station.

"Activate and close up," she ordered the module.

Two hours later, she was on the planetoid's surface, leaving the first human footprints on its regolith of coal-black cosmic dust.

She crouched slowly to keep her feet on the ground and set an analyzer on the surface.

"How old?" she queried.

The display inside her helmet projected 7.219 gigayears.

"Salim, this thing is older than the Solar System! Over seven billion years! It didn't come from here!"

Salim's groan echoed through her helmet, so loud it made her wince. She sighed. Bad enough to make an uncoordinated landfall on a big ice ball, but this was an uncoordinated landfall on a major discovery. She would go down in history instead of someone much more senior. She straightened her shoulders. That, she thought, was just tough.

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Two months later, Liz was back on Earth at Saint Petersburg, in Vitus DeRoot's office at the top of a very tall ISA tower overlooking the Nevsky Prospekt. DeRoot, she thought, was all the more terrifying because of the way his

friendly avuncular manner could mask his anger.

"Shall we go through the particulars?"

Liz willed her fisted hands to straighten and shook her head. She had a good idea of what would be on the list—every piece of negative information about her performance since she arrived in the Earth's Solar System.

He was going to do what he was going to do.

"The executive committee feels that we should take advantage of your family connections and the public attention your exploits have received in our outreach program."

Visions of intro classes and faculty teas rushed through her head. "With respect, Dr. DeRoot, I've not had any university experience. I did my degree on-ship, on the way in from 61 Cygni."

He smiled. "Not to worry. We can accommodate you in both respects. Ginny Lu has a long list of elementary schools over the entire planet that need speakers. It would be a real treat for the children to meet someone who was born around another star, and is so famous. You'll be assigned to her. Anything else?"

"When does this all start? I have a milk run to the Black Hole Project in the asteroid belt."

DeRoot shrugged. "I wouldn't worry too much about the BHP; that's just too premature and grandiose—Director Zhau Tse Wen's political problems will shut them down before too long."

Liz felt a cold chill down her back. Was that what was behind this?

"Hilda Kremer, your sister, is on that project, is she not? I'm sorry." He frowned and looked down.

Liz bit her tongue.

"You colonials come back here with so much enthusiasm, but this is a very old solar system and a very old planet with agendas that go way back." He shook his head. "One needs to tread carefully. Are we done?"

DeRoot had simply made a personnel move based on "needs within the institute." It had already been decided. What was done, was done.

She left DeRoot's office and went to her apartment on the thirty-second floor. There she opened a bottle of Mayagues Port, went out on her balcony, and looked out over the Ploshchad Ostrovskovo, awash in the late summer sun.

She thought about her mother, the near legendary starship Captain Katherine Avonford, as she looked at the huge Russian monument to Catherine the Great. Its

larger-than-life scale also reminded her of her planet-sculpting father, Wotan Kremer. She had vowed not to be swallowed by her heritage but also, perversely, felt obliged to live up to it in some way, to be larger than life herself. She shuddered; time enough to get things back on track tomorrow. With that she set aside a couple of detox pills and proceeded to get smashed.

The next morning, Liz went back to her small office in the exploration division. The door wouldn't open. She groaned, then wiped her hand and the handle to aid the ancient fingerprint recognition system's ability to recognize her paw.

It still wouldn't open.

A soft beep sounded that only the person standing in front of the door could hear. Liz touched the net for admin.

I am sorry, but you are not authorized entry to this office, came the reply.

Of course I am! Liz sent. *I'm Elizabeth Avonford and this is my office. For a while, anyway ...* Her stomach tightened as she realized what had happened. Chaos! It had only been ten lousy hours!

A young man, a tall blond, came down the hall toward her, followed by a cartload of boxes. As he reached her, he smiled winningly and stuck out his hand.

"David Levi." He pronounced it dah-FEED leh-VEE. "A visitor already! As you see, I haven't moved in yet."

"It's my office," Liz said, knowing she was wrong.

Levi stared at her.

Liz sighed, deflated. "At least it was. I think my stuff is still in there."

"Oh, dear." Levi looked concerned. "Let's see."

He put this hand on the pad and the door opened. The office was bare.

"Damn!" Liz said. She'd only had it for three years, and most of that time she'd been in space. Still, there were memories—her first real job.

She looked at the wall where the pictures of her family had hung. The empty shelves that had held a few precious real books. Even her snow kitten doll was gone.

Levi looked mortified. "I'm sorry, I ... They just assigned it."

Liz shook her head and wiped away a tear. "It's not your fault. I'm sure the service robots have stashed my things somewhere." She composed herself. "Well, what do you do?"

"Bionanotechnology. I got my doctorate at Jerusalem United fifteen years ago and finally got a position." He stepped aside and the cart moved into the office with

his things. “Only so much to do and a hundred and twenty-three billion people to do it.”

Liz smiled and shuddered inwardly. She had a sudden insight into what resentment there might be towards her or any other colonials taking up positions.

“And you are?” Levi asked.

Liz hesitated, then sighed. He’d find out soon enough. “Elizabeth Avonford.”

His eyes went wide. “The person who just discovered the new planet three thousand AU’s out? Captain Kate Avonford’s daughter? And I’m taking your office? I’m very sorry!”

She smiled falsely. “Bureaucratic error. Uh, ten days before spring or after autumn equinox, the sun sets right behind the old fort. Enjoy it. By the way, it’s a kuiperoid or planetoid or whatever—not a planet.” She turned and walked to the elevator.

As she entered her apartment, she realized she had to talk to someone. She touched the net for her older sister, Hilda.

Hilda, I just got my ass fired. She took a breath. *Help!*

A few minutes later, her sister was on her wall screen. Hilda had inherited wide-set blue eyes from their father, Wotan Kremer, and a long nose so much like her own that, in certain positions and lighting, it was almost like looking in a mirror. But Hilda’s hair was an almost platinum gold, while her own locks were more reddish brown, attesting to Catherine Avonford’s Celtic lineage. And Hilda had a strong chin. Liz often thought about having her own enhanced.

“Good morning, Liz. What’s happened?”

Liz unloaded. “I don’t know what to do next,” she concluded.

Hilda appeared thoughtful. “Look, Dr. Sarah Levine has changed her mind about going to Lacaille 9352 to work on the fabrication and the launch of its impactor for the BHP. You’re used to command and an expert in space resources. Interested?”

Liz caught her breath in the thrill of the offer. Eleven light years away, at a start-up interstellar colony, she would likely have a major role. Then she hesitated. “Hilda, I don’t work for people very well. I’m, well, kind of bullheaded.”

Her older sister smiled knowingly, but instead replied, “You’ve led four expeditions since you got into Earth’s Solar System, all successful.”

“Well, yes, but when I do an expedition, it’s my show.”

Hilda looked pointedly into the camera. “That’s what I’m going to

recommend."

Liz opened her mouth and couldn't close it. *In charge of the whole show? No boss, no politics? Eleven light years from Earth with nothing to do but make it happen?* She looked at her sister, excited, almost breathless. "You're kidding ... You're not kidding. You think I'd have a shot?"

Hilda laughed. "That bullheadedness, along with your ability to improvise, is probably just what we need. There's a man out there named Gunheim, former PM of Queensland, given to grandiose schemes. He'll probably be in local politics out there, and if he starts interfering, it will take a strong will to stand up to him. We've got a planning meeting in a few minutes, so I've got to go. Should I ask Tse Wen?"

Liz caught her breath. The responsibility would be huge; a monstrous projectile of precisely the right mass would have to leave Lacaille 9352 at just the right time and reach just the right velocity to meet the three other projectiles with nanosecond precision at the experiment vertex. A small pond, yes. But she would be the big fish in it. That excited her. And making the Black Hole Project happen would be an exquisite revenge on that arrogant, disingenuous bastard, Dr. DeRoot. But...

"Hilda, we haven't had much time together."

"I know. But I may be heading out myself. Dad's headed back to New Antarctica; he and I have some issues to put behind us. The project needs a local lead. There are other political problems, though. Sis, we have all eternity ahead of us. Let's get together at New Antarctica when it's done. Maybe mom will come."

Liz grinned. "Now *that* would be interesting. Okay, I'm in. If Tse Wen wants me, I'm ready."

She signed off and touched the net. *Any starships headed for Lacaille 9352 in the next year?*

The C.E. Singer, *Peter DeRoot commanding.* It would leave Venus Equilateral in eight months.

DeRoot? Any relation to the Director?

Brothers.

Probably irrelevant, Liz thought, but just bad luck if not. The *Singer* was her only choice. She stored the information and turned to her apartment window. Gold and pink clouds floated in the sky beyond the Ploshchad Ostrovskovo. She looked to the northwest, toward the lands of the Vikings and of Nansen and Amundsen. There was so much she hadn't taken time to see.

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Chapter 2

Between Sol and Lacaille 9352,

23 September 2264, Sidereal Reference

In her third day after emerging from hibernation, Liz Avonford lay on a towel on the grass by a tiny pond under the warm artificial sun of the starship recreation dome, eyes closed. Linked to the computational power of the starship via bioradio and the local net, she was hard at work, simulating orbital motions in the Lacaille 9352 system.

At a time compression of 10,000, the planets of the system traced their orbits. Two small ones, Sunbeam and Canning, lay close in, surrounded by the orbits of a pair of larger worlds, Venus-like Carlisle and Mars-like Martin. Further out was a thin belt of asteroids, then a pair of gas giants, Munro and Spencer, which might have been twins to Uranus and Neptune. Beyond those rolled an icy Plutonian world, Rayl, at the inner edge of a wide ring of kuiperoids.

A brilliant flash and afterglow in the inner system caught her eye. That must be it, she thought—the impact that would occur in the Lacaille 9352 system a dozen years from now. She replayed the last hours of the collision in real time and high magnification. A largish asteroid approached Martin, the Mars-sized world, slowly, gracefully taking a whole second to cover its own diameter to start with. One thousand one ... But the asteroid sped up as it approached the planet until over the last two or so planet radii, it was sucked into the Mars-like body in a flash. Liz stared intently as a great enveloping black cloud boiled out of the wound and spread around the whirling planet. She sighed at the great stroke of cosmic luck that would let her be present at such an extraordinary catastrophe.

“Elizabeth Avonford?”

But the luck wasn’t all good; it would happen just at the end of their BHP impactor’s acceleration. Debris splashed from the collision could easily interfere with the vast solar arrays and beam drivers needed to send their impactor on its way. She asked the computer to light the array’s position in vivid green, trailing and fading over several million virtual kilometers. The debris made a virtual cloud that spread from Martin inward and outward, and the edge of the cloud touched the ring of power stations that would power the Black Hole Project. Should they divert the asteroid for one revolution? Or change the time-mass-velocity profile to get the beam out before the impact?

“Elizabeth Avonford?”

The sound of her name penetrated, and dimly aware that it was the second time she’d been called, she groaned and opened her eyes, disoriented. Reality was calling her back from the virtual universe and it took a moment to adjust, like waking up from a dream.

Her eyes got into focus. The man who had spoken to her had a familiar

accent, but she couldn’t quite place him. “Yes?” she replied.

“David Levi.”

She touched the ship’s database and made the connection.

“Oh yes. You’re the young man...”

“...from Israel, who took your office.” He chuckled. “I quickly found out that was no place for anyone with an independent soul!”

They shared a rueful laugh.

“Your first time on a starship?” Liz asked.

David nodded. “I stayed awake; watched the Sun shrink to a point of light and redden. I didn’t realize how red it was going to get. The safety lights in the observation bubble gave me the clue—when our gamma hit two, it seemed almost as red as they were.”

At a gamma of two, the starship was moving at 86 percent of lightspeed—stretching the Sun’s yellow light to red. “That’s clever; I hadn’t thought of doing that.”

“We should get to see it again as we slow down approaching Campbell.”

Liz’s eyes widened. “Campbell?”

David smiled. “AKA Lacaille 9352.”

“We?” Liz asked. She liked him instantly.

“Judi Lalande, Su Ahng-Lo, and the Captain—those of us who have been awake the whole trip. Lalande is an astrophysicist doing research en route. I understudy Ahng-Lo with biosystems; I shall have my credential and experience by the time the voyage is over.”

“Looking to ship out again, then?”

“I must see the universe and it is good to have as many qualifications as one can acquire. As soon as I solve the mystery of that kuiperoid you found.”

Liz raised an eyebrow. “What mystery? Other than it’s clearly something the solar system picked up from somewhere else.”

David grinned, delighted to pique her curiosity.

Liz touched the net again; within the errors of measurement, her planetoid was the same age as the Lacaille 9352 system—make that the Campbell system—7.392 billion years, plus about 3.6 million or minus 2.2 million.

“That could be a coincidence,” she started.

David looked at her, a glint in his eye. “I think it is nearly a twin of the rock that’s going to crash into Martin, maybe even the other half.”

“The other half?”

“A rapidly rotating binary rock comes close to a giant planet, like Munro, and gets pulled apart. The slower half goes into a chaotic orbit around Campbell. The faster half gets ejected from the system entirely.”

“This happened recently? Campbell is moving very rapidly.”

David nodded. “But in a halo orbit about the galactic center that turns out to be commensurable with that of Sol. They come close every 560 million years. Three times around for us, two for it.”

“That’s still an incredible coincidence.”

He laughed. “Oh, I do not think it is so much. There are five hundred billion plus stars or near stars floating around that big black hole in Sagittarius. What are the odds that none of them come close to Sol periodically?”

Liz chuckled. “Well, if you put it that way...”

He nodded and his eyes blazed. “Now I go a little off the path that is beaten. About 560 million years ago, life on Earth got a good, uh, kick in the trousers.”

“The Cambrian explosion?” She began to roll her eyes. “That’s way too much of a coincidence.”

David shrugged. “That is why I’ve said nothing, officially, yet. But I think maybe I will find some biology around this red star we go to. And I wonder if it is biology we have already seen.”

The importance of what he said sank into Liz. An independent origin on Earth, or an import from elsewhere ... “Campbell is almost three billion years older than the Solar System...”

David’s eyes glowed. “Ah, you understand!”

Liz thought about her finding the kuiperoid, their chance meeting in the hall of the administration tower, and now heading together for Lacaille 9352, sharing the same passion to do something significant. Perhaps there was something to fate.

“Are you busy for dinner?” she asked.

“What about lunch?” he countered, delighted by her attention. “It is almost lunchtime now.”

She laughed. He was as eager as she was. But she had an engagement. “The

captain offered to show me his collection of ancient navigation equipment. He's going to establish a small museum at the Minot Space Colony around Campbell. I'll be in his quarters for lunch."

"Well, dinner then?"

Liz allowed herself a slight smile. She had to be a decade older than him, even subtracting the years she'd spent in cold sleep. Was he looking forward to more than just dinner? The prospect was not entirely unpleasant. "Okay," she smiled. "1900 in Sphere One."

Liz touched the net for a map. The *Singer'*s habitable parts consisted of six spheres spaced hexagonally, like beads on a stiff hoop, around the magnetic field generation cable. Between spheres, sections of a torus enclosed the wire and a passageway. The ship spun about the hoop axis for stability under thrust along that axis and for centrifugal gravity. The heavier lower half of each sphere rotated on the hoop to keep its floors level under any combination of acceleration and spin. The diagram showed the floors parallel to the spin axis, as they were now with no axial thrust. She was now in Sphere Three, with most of the other passengers. Sphere One, two spheres antispinward, was crew country.

"Captain's table, then?"

Liz nodded. Let him think he has competition.

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Liz looked forward to seeing the old hardware and was a little early to Captain DeRoot's quarters. On the way, she passed a woman who looked upset and gave Liz the strangest look imaginable, but said nothing and hurried down the access tube.

Judi Lalande, the AI identified.

Each sphere had four decks and a mess. By tradition, Room 131 on deck three of Sphere One was the captain's quarters in all ships of this design. In her voyage to Earth as a teenager, she'd never come close to Room 131; Captain Yuri Ivanov had been a serious, forbidding figure who smiled at girls maybe twice in a voyage. Remembering that sense of forbidden territory came back to her now. Liz had captained her own exploration craft in the Solar System, but here in this moment on the *Singer,* she was an excited child again.

The captain's door slid silently open as she approached. He was at his desk, seated with his back to the door. Overhead was a set of shelves holding various pieces of metal equipment with dials, buttons, brass tubes, and lenses that all looked strange to her. The room itself was no bigger than her own.

"Come in, come in," he said, almost as if irritated. Then he turned and smiled. "Peter DeRoot, and you are the redoubtable Elizabeth Avonford?"

She nodded.

Instead of rising to shake her hand, he pulled a brass tube from his desk and offered it to her. “It’s a telescope made five hundred years ago or so. A whaling ship captain out of Lisboa, Portugal, used it in the early eighteen hundreds. Go ahead, pull it out.”

She grabbed the end of the tube and pulled; it slid easily out to a length of about half a meter.

“Does it work?”

Captain DeRoot got up and motioned toward the side of his cabin. An ordinary man, he wore his hair relatively long so it flopped over his forehead in a careless, boyish way. In contrast, his bearing and reserve spoke of self-confidence and authority.

A door opened revealing a room with a polished wood-grain table surrounded by plush chairs. She walked in and gazed around; the walls, except for one, were hung with real framed pictures of sailing vessels and spaceships. She smelled real wood. The wall without pictures had a great box mounted on it with shiny brass fittings—hinges and a hook. The wood was varnished so deep and lustrous that it seemed still wet.

Captain DeRoot walked over to the box, lifted the hook, and swung its doors open, revealing a black shiny surface. “Lights,” he said softly.

The lights went out, and as her eyes adapted, Liz could see stars slowly spinning around, except for one bright one. A direct view window! “How...”

“The inner and outer windows line up during the coast phase,” Captain DeRoot said. “Go ahead, try the telescope.”

She put the tube to her eye. After a slight adjustment of the length of the tube, she brought the golden point of light into focus. “Oh! A bright violet star,” she said. “It seems impossibly small and intense. Is that Lacaille 9352?”

“That is its communications laser, blue shifted by our velocity. By the way, Roger Gunheim says Lacaille 9352 is called Campbell now, after an author who wrote a novel about using solar energy to power space flight about three hundred years ago. The planets were named after characters in it.”

She felt his hand find her waist in a gentle, if presumptuous way. Her heart pounded. Was this really happening? She moved his hand away.

“I thought that wasn’t official,” she said, going back to the telescope.

“We’re a long way from the Interplanetary Astronomical Union.”

She felt his hand again.

Captain DeRoot laughed. “And, I am in charge here.”

His hand moved up from her waist toward more intimate territory. It had been a very long time since a man had touched her that way, and she felt both fear and excitement. But her mind told her this was too soon, way too soon. Liz pulled one hand free of the telescope and gently removed the captain's hand.

She felt momentarily rattled. He clearly meant it in a friendly manner, she tried to convince herself. Then she flashed back to the look on Judi's face.

"You're going to Campbell to take charge of the impactor project," DeRoot said, "to see that it gets made and flung toward the implosion site."

"Yes."

"There are people on site already with much more experience who can do that."

"Zhau Tse Wen sent me."

Captain DeRoot quietly chuckled. "At the risk of paraphrasing myself, we're a long way from Dr. Zhau. The man in charge at Campbell is Roger Gunheim. He's a nice enough man as long as you do what he says." DeRoot's smile was genuine, but his eyes were penetrating.

Liz carefully kept her voice level. "He's got a whole colony to worry about. I just have the BHP operation."

"Roger is a good friend of mine. We've made the Sol-Centauri voyage twice together, without hibernation. There is much time to think between the stars, about how things are ... and how they should be. Now I could put in a good word for you...."

Or not, she realized. Chaos! There it was, bald and simple. She could give the bastard what he wanted, or maybe risk everything she'd come for—everything she'd promised Hilda she'd do.

Liz went through her internal arguments pro and con. She craved power and she didn't want to risk losing it. She wanted to be in charge and wanted it in the worst way. It meant never getting kicked out of your own office at the drop of a hat, never being humiliated like that again. She could pay the price. She could take a shower afterward.

She let the captain lead her back into his room.

* * * *

The dinner table was almost full when she and Captain DeRoot arrived; she felt as if every eye was upon her. What did her face look like? Did they know?

"How was your visit to 131?" David seemed cheery and oblivious.

But a dark knowingness in Judi's eyes screamed to Liz. Liz sent her a

message on the ship's net. *It's not what you think. He wanted something from me, I wanted something from him. Nothing emotional. Besides, I've had worse.*

"I got to see the brass telescope. We looked at Campbell and the comm laser," she said to David.

A nervous smile flickered across Judi's face. *What does he have on you?*

What does he have on you? Liz answered.

Judi frowned. *My kid. A custody judgment. He could take the kid to his father and leave me here.*

"Captain DeRoot has an interesting collection. Did he show you his working reproduction of that ancient Greek computer? He made it himself." David, of course, had replied to what she'd said aloud.

Liz touched the net for data on the device and recognized it; it had been on the top shelf in DeRoot's bedroom. She'd stared at it during his heaving climax.

"I saw it."

Come on, what's he got on you? Judi came back.

My job. She gave Judi the details.

"Uh, ladies, is something going on?" David asked.

It must have been transparent that they were exchanging net messages. Liz gave a quick glance toward Captain DeRoot, but he was explaining something to an entranced female passenger, one of the last to come out of hibernation.

Liz gently shook her head. *Later.* Aloud she bantered, "You wouldn't believe it. Well! Any luck with your panspermia studies?"

"Oh sure. Did you know that there are at least forty stars that made visits to the solar neighborhood? Five of them came through at roughly the same time as Lacaille 9352...."

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After dinner, David found himself walking back along the curve of the access tube with Elizabeth Avonford.

She seemed subdued, and he tried to think of something to say to cheer her up, but when he opened his mouth he shut it again. What was one supposed to call her? Dr. Avonford, Elizabeth, or Liz? He deferred to his more normal upbringing and compromised on Avonford. Okay, maybe Elizabeth Avonford, he thought.

She looked increasingly upset, so he risked seeming foolish. "What's wrong?"

She stopped in the passageway and looked into his eyes, her face hard and weary. “I shouldn’t say anything.”

David watched her sigh, knowing she needed to unload. He waited. Finally, she began to talk.

“The captain has certain connections at Campbell. Those connections can help or hurt me. He also has certain ... needs.”

David risked touching her shoulder. “There was a threat implied?”

She nodded, holding back a quiet anger.

“I understand this well. It is not the act that bothers you so much, but the feeling that you have no choice in the act, am I right?”

She nodded.

Why, David wondered, should the artificial intelligence that really oversaw this starship permit such a transparent abuse of its human master’s power? But he could answer his own question; ultimately people had insisted on a person being in control.

He spoke. “You have an interesting problem. For instance, if we were to present evidence to the second in command and demand that he take over, how would we know that the second in command is not either complicit or otherwise under the primary’s control?”

Avonford shook her head. “We don’t. What is the check on such people?”

“I think the threat of exposure would hold much weight with him,” David told her. “He could find himself with nowhere in settled space to go. But to fight this would not be without risk.”

“If it was just me,” she said, “I’d raise hell. But the whole human universe is counting on me to get this job done!”

This seemed a little much to David, who took a longer view of things, but her sincerity and enthusiasm were evident. He smiled and raised an eyebrow. “Is it that important to study relativity? Why?”

“Look, if the Anderson, Lu, and Yoseph paper is right, we can use one asteroid-sized black hole to make more.”

David shrugged. “And then what?”

Her eyes gleamed. “Look up Wheeler, Forward, Thornsen, and Zhau. With several black holes, we can make some of the gravitational machines that the relativity theorists predicted. For instance, imagine a gravitational catapult that would send us up near the speed of light without our feeling any acceleration at all! Imagine...”

David held up a hand. He had his own doubts about what people might do with the fruits of the project. But it was obviously so important to Elizabeth that she was willing to be used for it. He was moved to concern.

“Look, we live forever these days. If there is a setback, it can be overcome in time. Besides, who knows where the captain’s demands will stop? His behavior must be changed, or many more women will experience what you have. I think you must threaten to expose him. Then you will be in the driver’s seat.”

She raised her eyebrows. “It can’t be just my word against his, and we can’t count on the ship’s AI.”

David smiled. “I do biological nanotech. I have in my room all I need for bench-level fabrication. What we need to do is record an hour or so of conversation with something too small and diffuse to be detected by all the usual precautions, which I’m sure that he will take. So I make a distributed network of nanocells. I could hide it under your skin, or in your hair.”

Liz looked at him, worry in her face, but with anger and excitement, too. She nodded, not feeling powerless any longer.

* * * *

David met Liz again the following evening. They listened to the recording of Avonford’s noon encounter. DeRoot had walked right into it.

“What would Gunheim do for me if I did this?” Avonford had asked in a totally playful and innocent voice.

“Let you run your project, most likely,” DeRoot had said.

“And if not?” She’d asked laughingly, but David noticed a hint of strain.

“Well, the converse, I would suppose. Will you take off your clothes, now?”

“Enough,” David said. He had what he needed. She could have walked out right then, he told himself, and if she had not ... Well, he didn’t want to know.

* * * *

All locked in, Liz told herself. They had the recording, and the evidence was already on its way to both Earth and Campbell, encrypted, but in a way that would be released if the AIs involved did not get positive instructions from her to not release it. David had been very clever to come up with that insurance policy.

In the last twenty-four hours, she and David had developed a closeness she’d never felt before. No man had gone to bat for her like this, and she allowed the pure warm feeling to wash through her for a moment.

Still, she felt nervous as hell. David might not have anticipated everything. Judi had declined to be a part of it. She still had too much at stake. DeRoot could get

back at her without anyone being the wiser, she'd said. David had reluctantly agreed. Besides, they had enough without her, hopefully.

They walked into the Sphere One Commons. DeRoot, waiting for her, frowned a bit. Not expecting David, Liz thought.

The captain recovered quickly. "Ms. Avonford, good to see you. Mr. Levi?"

"Captain," David said, "I suggest that we sit down. We must discuss something with you. I suggest you tell the AI to not record what we have to say. I think you understand what this is about."

DeRoot frowned and pursed his lips, then he looked at her. The threat was silent, understood.

She looked back, just as cold. She hoped her refusal to back off was every bit as clear.

At length, DeRoot nodded.

Without any further word, David produced a comm card and played back the segment with the incriminating language. "We have taken the necessary and obvious precautions, and have supporting evidence of other kinds concerning other events, not involving anyone on this ship," he said afterward.

The last was a complete lie, Liz knew, but one that might give Judi some protection.

"You will understand the implications for both you and Mr. Gunheim," David said.

DeRoot stared coldly at her, ignoring David. "You goddamn whore." His voice rumbled in anger.

Liz stared, unable to help the start of a tear, but willing herself not to give an inch in this contest of wills.

No one spoke. Each looked at the other. DeRoot's face tinged pink. David watched in amazement. Liz valiantly worked on a poker face, wondering if this was the first time the captain's persona and behavior had been questioned to such a degree. He was a smart man; surely he would take this no further. Liz watched quietly. Only when she thought the steam had gone out of DeRoot did she glance at David.

"It's your show now," the younger man said.

She nodded. "Captain DeRoot, I want your assurance, and Mr. Gunheim's, that there will be no interference with my work in the Lacaille 9352 system in support of the Black Hole Project."

He snorted. “That’s beyond my power.”

“You had best hope not,” Liz countered.

“It may be in the best interest of the ship to have you two hibernating for the remainder of the journey.”

He might, Liz realized, be able to order the ship’s AI to do just that. Then, while they were totally out of touch, any sort of revenge might be orchestrated.

“Then,” David said calmly, “we would be unable to keep the encrypted data from being released where we have sent it.”

“A moment.” DeRoot turned away from them and stared at a wall screen that showed stars gliding by with the ship’s rotation. They waited.

Then he turned back and smiled. “Very well. I apologize. I’ll speak to Roger and Cyan, I’m sure there will be no problem.” He sighed. “Eternity is a long time, and if our paths cross again, perhaps I won’t make such a mess of it.”

“For the rest of this trip, don’t even think about it,” she replied.

DeRoot rolled his eyes up and nodded. “Well, enjoy the rest of the trip, Ms. Avonford, Mr. Levi. If you need anything from your Captain, don’t hesitate to ask.”

They were back on record, Liz surmised. She nodded and led David away. As soon as they were halfway around the tube and out of sight and sound of anything, she pulled him close and squeezed him with all her not inconsiderable strength.

* * * *

Chapter 3

At Minot, Lacaille 9352

(Campbell) System, 5 October 2272

David couldn’t help but gasp as their shuttle exited the access tunnel into Minot, the main Campbell system residential habitat. He, Liz, and Judi had flown in from the south pole, where the landing docks were, into what looked like a huge Chinese lantern, its insides filled with fields, forests, and streams. Beside them was a snow-covered alpine terrain in the shadow of a huge dark disk that floated ahead of them.

“That’s the back end of the secondary reflector,” their guide shouted over the hum of the shuttle’s fans.

David nodded and smiled; they’d retracted the shuttle canopy and were sitting in the crisp open air, feeling and smelling very much like a bright, late winter day in St. Petersburg. The scale still overwhelmed him.

Liz Avonford grinned at him as the crisp breeze of their flight streamed her hair behind her. His heart beat faster, anticipating. She had long since succeeded in convincing him that she wasn't just being grateful for helping her, but was deeply into the erotic arts. She initiated everything—instructed, taught, and occasionally used him to achieve her own erotic nirvana. He worried a bit about being so totally dominated, about just being along for the ride. But what a ride!

They nosed down and began scudding over the sculpted, snow-covered crags of polar Minot.

"Ten minutes to Lenore," their guide announced.

They crossed the sun line. Rock and gravel gave way to terraces of meadow, and soon the first trees shot by beneath them. The vastness of the habitat spread out around him, and he thought about Moses on the mountain, viewing the Promised Land. That reminded him of the New Israel space colony, orbiting Proxima, and Ben Shalom, the messianic anti-Moses who had led so many of the orthodox to the stars. The debates about that had filled the coffee houses of Ashqelon in David's childhood. It had been the first of what were now over a thousand exclusive ethnic or religious settlements among the nearby stars, and not everyone was happy about it. Children raised in such places faced the same kinds of survival challenges as youngsters in cults faced on Earth.

Liz touched him and pointed.

He looked in that direction and saw a small rustic cabin by a stream between waterfalls—the first sign of human habitation he'd seen.

"Getting warmer," Liz shouted. Their weight increased as they moved farther from Minot's rotational axis, and the shuttle's fans got louder as they revved up to carry the load.

David smelled the pine forest—now yielding to the more deciduous trees. "It looks a lot less settled than the space colonies around Sol," he shouted over the fan noise.

Liz smiled and pointed to her head.

David opened his address.

Only about five thousand people so far, Liz sent. *L-5 Grissom has fifty-seven million, and its area is a little smaller.*

The land lay mostly flat below them now, a calico patchwork of forests and fields, some tended by cultivating robots.

A herd of kangaroos! Liz noted.

Roger Gunheim is Australian, David sent. *A town is coming up.* A broad,

winding river circled the inside of the habitat at its widest part. A large clearing with wide, low, modernistic architecture lay ahead of them on a thumb of land.

That's Lenore, Judi sent. *Named forLenore Lebois. She was the first system exec, and she died mysteriously. I guess you have to die to get something named for you.*

Judi, what do you think happened? Liz asked.

Gunheim had his way with her all the way out. They'd just finished the colony when his buddy, DeRoot, arrived with another thousand passengers. That was forty years ago. The two of them got a council formed that made Gunheim the executive. Lenore objected and she was found dead in the river near the town, not three weeks after it started flowing.

Suicide? David asked.

Ruled an accident. But her personnel files disappeared.

This isn't all on the net.

That's right, Judi said. Then she leaned forward in her seat so he could hear her voice over the buzz of the shuttle's fans. "DeRoot told me. Trying to scare me, I think. It worked."

David shivered.

The shuttle passed over a town that would not have appeared out of place in Australia four centuries ago, and settled onto a well-manicured grass field. A group of horseback riders came out to meet them with spare mounts. DeRoot, who'd come in earlier, and Gunheim were among them along with a Eurasian woman.

"G'day and welcome to Lenore," Gunheim shouted, all ebullience and smiles. "Mount up! It's Suits-off Day; thirty-nine years since we moved in here. There's roo on the barbie for you."

The smell of roast meat, well seasoned and basted, wafted in a gentle breeze from the barbecue pits along the river. Liz looked around at the fortieth celebration of Suits-off Day. What a difference a year made! She knew most of the people; everyone connected with something outside Minot itself along with their friends and relatives, maybe a couple of hundred people all together.

Liz sat at a wooden table with her deputy, Cyan Mutori, Judi Lalande, and her son Oscar—and David. The last looked incredibly primitive as he chewed on an emu rib.

Roger Gunheim strode up a small hill near the tables in full outback regalia—safari shirt, walking shorts, and a wide-brim hat with one brim buttoned to its crown. He lifted a ridiculously large Bavarian-style mug of local brew and

shouted, “To the success of all our projects!” Then he flipped the cap back and chugged.

Liz laughed, lifted her much smaller glass of Lenore stout, and took a sip. The reflection of Campbell, as much a heat lamp as a light, warmed her skin.

As BHP director, her project for the last year had been to supervise some twenty people scattered around various asteroids and to make key architecture decisions for their busy but not-all-that-creative robot laborers. The fabrication of the impactor was ahead of schedule, and the combined power/beam modules were on a schedule that had at least some margin. They’d become like a family—all dedicated to accomplishing the greatest human project since terraforming Mars.

With one exception.

“Gotta lid on Terry Peal?”Judi asked.

Liz laughed. That particular exception was more interested in setting robot armies one against the other than in mining. He’d also been spouting anti-project propaganda to anyone who’d listen. “He’s been eased aside, and others have taken up the slack. We’re on schedule.”

Here comes da boss, Judi warned.

“G’day, mind if I join you?”

Liz looked up at Gunheim. “You shot this?” gesturing at her roast kangaroo.

“With a cross bow. A fair shot and it was near the end of its natural life span,” Gunheim told her.

Oscar looked confused and moved closer to his mother.

David tossed his head. “When deer become old and feeble, they hurt a lot. That is where hunters come in and end suffering. It is either hunters or wolves, I think.”

“Oh,” Oscar said, with a furtive glance at Gunheim.

“You have wolves here?” Liz asked.

Judi looked at Liz. *With Gunheim’s kind around, you don’t need wolves.*

Liz frowned. As far as she could see, Gunheim was all glad-handing and bluster; a little shallow, but harmless.

“Dingoes, it would be. But we haven’t introduced large predators yet, mate, and may not for a while. The grass contains a weak contraceptive, so the herds grow more slowly,” Gunheim said. “Well, I didn’t come over here to talk about hunting. Liz, we’re a kind of family around here.”

“Great to be part of it,” Liz said, feeling all warm and relaxed with the stout. A splash from the shore caught her attention; shorts and halters littered the riverbank beach and shouts of laughter and splashes beckoned her. She’d worn a red towel kilt and matching halter and was beginning to feel overdressed.

Gunheim nodded and beamed, but his eyes were sharp. “Well, in families one shares, and, well, the council and I think it’s time to share a little of your workload, let some others get some more of the action.”

Liz couldn’t believe what she’d just heard. The warm fuzzy feeling evaporated almost instantly, replaced with a cold knot in her stomach. She smiled weakly and tried to hide her feelings. “I’m not exactly overworked.”

Gunheim shrugged. “Well, maybe it’s just that some other very capable people have been under worked. At any rate, there’s been some friction, and whenever anything like that happens, those of us who are in charge have to make some response, tweak the organization, do something of that nature, just to let people know we’re on the job.”

Liz suddenly felt naked and cold.

The table fell silent, everyone looking at Gunheim.

“Now don’t take this too personally. I don’t think anyone can really fault you for doing something about Terry Peal and his bloody robot wars, but you’re pretty young yet, and sometimes it takes a little more subtlety to keep everyone happy.”

“Chaos, how subtle did I have to be! I just let Ivan Marenkov take over the stuff Peal wasn’t doing anyway.”

Gunheim shook his head. “And you left him off the production achievement list.”

“But he wasn’t producing.”

“You could have lowered the threshold instead of bloody humiliating him.” Gunheim’s last few words had a bit of snap in them. “But then,” he went back to his avuncular style, “these are things some experience brings. You’re doing fair on the impactor fabrication now so we thought we might let you concentrate on that and let Mutori take over the people management chores.”

“You don’t understand, Mr. Gunheim,” Liz said, trying to keep a mixture of anger and fear out of her voice. “My sister, Dr. Zhau Tse Wen, and the whole project expect me to see that the efforts in this system are completed on schedule. When you come down to it, the BHP is why this colony exists at all. I *can’t* just walk away from that!”

“And you aren’t. The decision has been taken out of your hands, so you aren’t breaking any promises. No worries.”

Liz shot a look at Cyan Mutori, who smiled sympathetically, but said nothing. Judi left the table with her son so quietly that Liz didn't realize she was gone. David sat openmouthed. He was running the biosurvey on the asteroid that would soon impact Martin and was, she knew, very vulnerable to what had just occurred to her.

Payback time, Judi sent. *He just needed an excuse.*

* * * *

A wave of rain clouds spiraling down from the south pole darkened the sky over Liz's dome, transparent when not in use as a display screen. Under it was her one-room office, kitchen, bedroom, and entertainment center; a small, high-tech outhouse hid behind some shrubbery. In actuality, the shrubbery formed the walls of her abode; in the tropical climate of the low latitudes of Minot, an occasional splash of warm rain was an easily acceptable trade for the feeling of openness and freedom this style of living gave her.

But not today. Noon and still in bed, Liz lay under the sheets, head in the pillow, reliving every moment of her life from when she decided to go down to that rogue kuiperoid in the Solar System, to losing her office, to staring at DeRoot's ancient Greek computer while he used her body. At least that had been partly voluntary; a choice, a trade. This time she had been truly raped without a stitch of clothing touched—utterly humiliated in front of her friends in a format so public and genteel that she couldn't even have thought of screaming.

Well, she could scream now! Out in the woods over a kilometer from the nearest other home, she spun in her bed, flung her arms out, and screamed a nameless, primal scream until her throat hurt.

"Liz?"

She caught her breath and screamed again.

"Liz, are you okay?"

It was David. Chaos, she was no mood to be social.

"Are you okay?"

"Does it sound like it?" she snapped, and regretted it. Suddenly, she didn't want to be alone. "Oh, come on in."

He came through the short entrance maze and walked under the dome rim just as large gray raindrops began to splash all over it, drumming in a way that made it sound like more of a storm than it was. She got up to meet him and collapsed on him, sobbing.

He held her until she collected herself.

Finally, when her face had dried and she'd started thinking again, he

disengaged slightly and put a hand on her chin. “Liz, it has been three days. Have you eaten anything?”

Three days? She could still taste the emu in her mouth.

“We are all concerned,” David said, “but we are being very circumspect. Mutori wants you to know she had no idea this would happen. Judi is terrified.”

“I haven’t had a message from her since...”

David nodded. “We think Gunheim is monitoring bioradio. One wrong move and Oscar is in cold sleep on the next starship to his father. Look, I’m uncomfortable.” He waved his hands around him and smiled wryly. “What do you do about bugs in here?”

“All the insects here are genetically engineered to avoid human pheromones so I don’t need...” Liz thought about the other kind of bugs, then shrugged her shoulders. “Oh. You want to take a walk in the rain?”

David smiled and nodded. The rain was warm and the forest was full of wonderful, wet fragrances. About a hundred meters along the path to the river, he turned to her.

“Okay,” she said, to herself as much as to David. “What are my options?”

“Your options? For what?”

“To get back in charge of the project. To put Gunheim in his place. To get my life back.”

“Brainstorm?”

“Yeah. Let’s have some ideas. Everything on the table. I could kill the bastard. Don’t look at me that way; we’ll deselect later. Maybe we could just kidnap him, put him on ice until after the impactor flies.”

David shrugged but didn’t look very encouraging.

“Okay. Am I good in bed? Good enough so that someone as experienced as Gunheim would do stuff for me?”

“Liz, you are not serious...”

“It’s on the table.”

“I am not experienced enough to know. You are only my third lover and it is hard for me to tell.”

“Well, it’s on the table, anyway.”

“As a last measure, I hope.”

Liz laughed. “If that. Now, could I invoke authority?”

“Earth is a long way away.”

“But life is a lot longer these days. Twenty-five years, back and forth, can go just like that. Does he really want to have the most powerful people in the Galaxy pissed off at him forever?”

David shook his head. “If he were rational, I would think not. Okay, on the table.” He grinned at her.

“That’s the spirit.” How was it that she was now cheering him up?

“We could try blackmail again. It worked once.”

They looked at each other.

“For a while,” they said almost simultaneously, and laughed.

“Back to the authority option,” David said. “Gunheim is not an absolute authority here. He must answer to a council.”

Liz shook her head. “Which has been very compliant, it seems.”

“We could at least argue the case. Show his relationship to DeRoot and their history. We put all the facts before them. They are people.”

“They are Gunheim’s people.”

David shrugged. “That does not mean that their brains have ceased to work. Anyway, they are the ultimate authority here.”

Liz shook her head. They were not the ultimate authority. “David, they are elected. He doesn’t have to control ten people, he has to control ten thousand! If I can get an election called, the AI will recognize the electorate as the ultimate human authority. He won’t be able to fix it.”

David frowned. “Perhaps. But are you suggesting a frontal public assault? That burns any hope of making any of the other options work. It would be a gamble.”

“But a clean, open gamble. We can expose him and DeRoot.”

“Liz, he is a good politician. Somehow, I think, you will end up looking like a dirty whore. And many people who agree with you will not be able to say so publicly. Judi and myself, for instance.”

“You won’t back me?”

“I can’t. I would lose my project. I am taking great risks even talking to you about it.”

“But you are talking.”

He nodded. “There are people here he can’t threaten so easily, and people who remember Lenore....”

* * * *

Three weeks later, in Liz’s now certified bug-free home environment, David glanced at the latest projections, displayed in various graphs on her dome. The good news was that in plastering the truth about DeRoot and Gunheim’s escapades all over the colony, Liz had gotten two council members to support her and enough signatures on an election petition to start a campaign. Out of a hundred and fifty supporters, she found enough candidates for a reform slate that, if elected, would control the Campbell system governing council. That had gotten the AI to override DeRoot on monitoring political activity. The bad news was that Liz had, at best, maybe twenty percent support. Forty-six percent of the electorate either thought she was a troublemaker or didn’t believe the charges at all, and thirty-four percent didn’t know what to think, or weren’t saying.

“Liz?” Cyan Mutori’s voice rang out from outside the hedge. That she was using voice instead of net was interesting, David mused.

Liz nodded to him. He got up and slipped quietly into the nearby woods. Cyan Mutori was probably the last person who should know he was actively helping Liz in her campaign. Gunheim had made it very clear to him that while he recognized, with a wink, David’s personal relationship to Liz, any public attacks from David would, in Gunheim’s words, “be a mite disruptive to your research program, mate.”

“Hello, Cyan. Come on in,” Liz said when he was safely out of sight. Her voice carried clearly in the still evening. “How’s the project going?”

David felt for Liz. Gunheim’s next move, of course, had been to remove Liz from her remaining role as impactor fabrication specialist.

“I would like David to hear what I have to say,” Cyan said. “I understand the precautions you take. I am not offended.”

David was startled. Had she seen him? Or did she just reason he would be here? There was much more to Cyan Mutori than one realized.

“Come on back, David,” Liz said.

He reappeared from the woods.

Cyan nodded to him, with no hint of a smile or a frown. She wore a green sarong with white flowers and a white orchid in her long, jet-black hair—South Pacific, squared. She’d even browned her skin somehow; lamps, probably, David thought. Campbell didn’t put out enough ultraviolet light to make a tan.

“Physically, the project is a little behind schedule, but okay,” Cyan began.

“Behind?” he asked.

“Deliberate delays, I think. If I counter them completely, I may be removed because these delays represent the will of someone powerful.” Cyan shut her eyes for a moment, then opened them. “But if I let them become too great, the project will be in jeopardy, and I will be the scapegoat. It is a very delicate situation.”

David shook his head. “You are risking a lot. Look, as I understand it, the worst thing that can happen is that if we don’t launch, the other impactors get diverted, and thirty years later we all try again. It’s not worth a whole lot of suffering. Pun not intended.”

Liz shook her head. “David, I don’t know that human politics will allow another chance. The project takes too much discipline and it’s too visible. Every one of the launch sites has to be able to push the project through at the same time, without any more coordination than a quarter-century round trip communications delay. We have to do it here if we possibly can.”

“Liz, you’re fixated,” David countered.

Cyan shook her head. “Liz, David. Gunheim is not trying to stop the project. He has, I think, something worse in mind, and that is why I am here.”

Liz turned to her and stared. “What could be worse?”

“He came to me yesterday with a question. ‘Now,’ he asks, ‘if one impactor hits a little less hard than the other three impactors, there would be a little momentum bias in the final product, wouldn’t there be?’” Mutori shook her head. “He does not understand several things.”

Liz said nothing, but stared at Mutori, shock all over her face.

“What?” David said, uncertainly. “He has done simulations, of course.”

Liz looked at him, whitefaced. “You can’t just ‘do’ simulations. You have to know when approximations are good enough and when you need another couple of days of number crunching. And,” she paused, “there is still too much we don’t know about how matter behaves at such energies and densities. It’s hard enough to do a symmetrical zero-biased simulation. Chaos only can tell what would happen if something was even as much as a nanosecond off.”

Mutori shook her head. “He is talking momentum, Liz. Hitting at the right time but with just a little less momentum. A slight amount of momentum bias would send the hole back this way, where he could gain control over it. He would then have, I think, very great power.”

David gave her a blank look, consulted the net, frowned grimly, and said, “Oh.”

“Power, literally and figuratively,” Liz said. “David, this isn’t just about me and my job anymore. The reason Hilda sent me out here was because I’d be absolutely loyal to her and ensure that everything be done exactly right. I don’t mean to insult you, Cyan. You’re a good person. But the project needed that certainty. Humanity needed that certainty.”

Cyan looked down. “I took entirely too local a view of things. I compromised. I am sorry.”

David tried to digest what he heard. “Gunheim. In charge of a black hole!”

Liz snorted. “That’s hardly the worst case. One other thing that might happen is that the hole comes jetting this way. If it doesn’t have enough mass, it might be ready to explode in a final burst of Hawking radiation, converting millions of tons of mass into hard radiation in a fraction of a second. Perhaps right in our faces.”

“It sounds like a good argument for not trying this at all. What if someone else has the same idea? Maybe we *should* shut it down.”

“David!” Liz sounded horrified.

He gave her a lopsided grin. “Just thinking out loud. Okay, I’ll give up my project and support your reform slate publicly. Do we have any more options?”

“Black hole formation is not all that Gunheim does not understand. I think he thinks I will want to share his power with him—that I will be his compliant partner in exploiting the black hole and ... in other ways.”

David looked at her expressionless face. Why am I surprised, he thought.

“I came to make an apology,” Cyan said. “I shall make my apology in this way. I am local, a first colonist. Some think that by watching much, and saying little, I have leadership qualities. So like David, I will sacrifice my position, and I shall run for the council on your reform slate as its leader. That may change the political dynamics in some small way. If I am so lucky as to be chosen by our people and the council as System Executive, I shall give the project back to you, Liz. Will you accept such an offering?”

“Cyan!”

David watched the two women embrace—his eyes riveted to the beauty of it. Much later David realized what he’d been witness to. That demure, self-effacing, shy speech by the achingly beautiful, vulnerable Cyan Mutori might prove to be one of the most devastatingly effective power grabs in the history of any democracy.

* * * *

Chapter 4

At Minot, 15 March 2274

Liz stared at the poll numbers floating in the air. Cyan's slate was still marginally ahead, but...

"The undecided have the real lead," David remarked.

"People don't want to contribute to a bandwagon effect, whoever they support," Judi said, while throwing a Frisbee to her son, Oscar.

"A bandwagon would be fine with me," Liz said.

Liz, this is Cyan.

Liz pointed to her head, letting the others know she was getting a transmission. *Go ahead*.

We have a problem out on Canning. Terry Peal went off the deep end.

Liz registered the name with a start. *The robot wars guy? What's he done?*

He kidnapped a dozen people in a construction shack. He has decided the Black Hole Project is a bad idea and should be shut down. There may be some political pressure to do that if people's lives are at risk.

Crap, Liz replied. *Are the people really in danger?*

Our psychometric filter has Peal at eight out of ten on the Kaczynski-McVeigh scale. He could think those who do not agree with him, or simply work on the project, are morally complicit or can be sacrificed. We must do something immediately. Unfortunately, I think I will need to stay here because of the politics. Would it be possible for you to go to Canning and deal with this as my emissary?

Liz touched the net quickly—the KM scale had been around since the twenty-first century and measured a propensity for rationalized violence. Peal sounded like a problem that needed fixing, but...

Cyan, I'm not, officially, part of the mining operation anymore.

You are now. This is an emergency. You know Peal.

Gunheim will unappoint me fast, and maybe you, too!

I do not think he would do anything so arbitrary during the campaign. He would, however, make me pay for it if I am not successful. You are the most logical choice because you have the greatest commitment. Also, having you involved may make Roger angry, and angry men sometimes act unwisely, to the profit of their opponents.

Now or never, Liz thought. *I'm on my way. Liz out.*

"What was that?" David asked.

Liz pursed her lips. How much should she say now? “Terry Peal again. David, have you ever heard of a couple of psychiatrists named Kaczynski and McVeigh? There’s a scale relating to antisocial conflict...”

David’s eyes went wide. “Liz, Kaczynski and McVeigh were not psychiatrists.”

Liz felt another chill.

“Twentieth century American political killers,” Judi said. “Liz, what gives?”

She told them. “David, can you arrange a shuttle to Canning for me?”

He nodded. “What do you have in mind?”

“Making a hero out of myself.”

“How?”

“Don’t know yet, but I’ll have to do it there. I’ll need to get on my way before Gunheim figures it out.” She gave him a brief embrace and started trotting for the Lenore Landing Field.

It took her forty precious minutes to get a fan car, then another twenty for it to glide its way to the north pole port facility. When her fan car arrived at the port facility, the human attendant was grinning ear to ear.

Her heart jumped. The man worked for Gunheim. Was she already too late?

“I get a nice break today, it seems. You’ve got the last shuttle.”

“Really,” Liz said, wondering how close they’d come to disaster.

“Dr. Lalande’s people just reserved all the others for various astronomical missions. Something about getting a wide baseline for a predicted supernova in a Fornax dwarf galaxy.”

All right, Judi! Liz quickly wiped off her smile, nodded smartly, and climbed into the spacecraft.

* * * *

Liz catnapped and watched the Canning news feed on her thirty-hour journey.

Gunheim’s handpicked team was at least twelve hours behind her—Cyan had managed to hold things back for almost two hours, and it had taken another nine hours to get an interplanetary shuttle.

Liz followed the news for a while. The politics had gone as predicted with Gunheim criticizing Cyan for mismanagement and Cyan patiently explaining how things had developed—making sure the media ‘uncovered’ how Peal had used Gunheim’s influence to amass a lot of robotic parts with little oversight. Gunheim

had started talking about project fanaticism on the part of some people and how human life had to come first and how everything had to be on the table as long as people's lives were at stake. Cyan had quietly asked just how much people were willing to be governed by terrorists.

* * * *

It was late at night when Canning Base spaceport passenger-access-tube snaked its way to Liz's shuttle. The only one to meet her at the inner door was Todd "Mac" MacGregor, a nervous, sandy-haired young medic whose wife was one of the hostages.

"Why," he asked, "is this impactor schedule so damn important?"

Liz bit her lip and answered carefully. "The impactor your people are making," Liz explained, "has to match perfectly the other impactors in density and dimension as well as velocity to produce the necessary symmetry at the impact point. It's slow work, even for robots, and once our margin is used up, no way to make up the time. Peal has cut off the flow of iron to its assemblers, so we've already lost most of the margin. Further delay could ruin the efforts of thousands of people over the last four decades."

"My wife..."

Liz shook her head. "If he gets away with this, it will just be something else next time. We have to deal with it now."

"How? Peal's a master of robot technology."

Her mind suddenly clicked. "That's it! Mac..."

"What?"

"Technology. He'd look for a technological assault, not a physical one! I could offer to exchange myself for as many hostages as he's willing to let go. Once I'm in ... he's low-gee soft and maybe thirty kilos overweight. I train to one gee. I could take him out with my bare hands."

The young medic looked aghast. "And maybe you'll get yourself killed! He has robots and the ability to get around the laws of robotics."

Liz nodded, almost surprised at herself. "He's got the project by the throat, and I promised I'd get it done. It's worth taking the chance." Liz stared at him a moment and made a decision. "Mac, can you give me an edge?" There was a drug, she knew, that would give a person "hysterical" strength, enough to lift beams off people crushed in a structure collapse, or pull open a locked door to safety.

"A gamma stimulant? They're illegal..."

"They're for emergencies. This is an emergency."

He tightened his lips, then said, “Okay, it’s worth a try. You getting killed wouldn’t put my wife in any more danger, and might get her out right away.” He paused and nodded, apparently making up his mind. “Wait a moment. I need to get the drug myself instead of ordering it the usual way. Peal has probably compromised the system, and we don’t want to make him suspicious.”

The moment turned into several minutes—precious minutes in which either Peal or Gunheim might do something to make what she planned impossible. Finally, Mac returned. He held out a small blue capsule to her, and she took it in her hand. It stuck to her.

“Geckro surface. You can hide it in your mouth and it will stay put. Bite it hard when you need it. You’d better get going.”

Liz nodded in acknowledgement. “Don’t tell Cyan until I’m in.” She turned and headed for the Canning base airlock.

* * * *

Three hours later, Liz came through an airlock and faced Peal. She’d gotten seven hostages freed in exchange for herself—not as many as she’d hoped—before she went in. The remaining hostages were in the back of the lounge module Peal had occupied, normally a place for crews to take a break from vacuum work. It was essentially a spacecraft with everything but a propulsion system. The chunky, beady-eyed man stared back at her, his mouth set, looking for all the world like a rebellious teenager. A dull-finished utilitarian humanoid robot, anatomically correct in one important feature, stood quietly beside him. Peal’s sick sense of humor, she thought. The hostages were in plain view sitting on a couch and chairs in the room behind him. The hostages weren’t bound, but Peal had erected a transparent barrier between their part of the lounge and his. There were handcuffs on the table in front of them.

A hummingbird-sized robot hovered about her on nearly silent fans, undoubtedly probing for anything technological down to the size limit of autonomous robotics. Steady, girl, Liz told herself as she let herself be inspected.

“Okay, you pass,” Peal finally said. “So here we have one of these would-be gods that want to play with universes! Do you feel godlike now?”

He wanted to humiliate her! Maybe she could play that angle. “Let these people go, please. Then I’ll do whatever you want.”

Peal laughed. “Really? Wu and Markovitch, get your suits on and get out of here. Simmons and MacGregor, you stay for now.”

Mac’s wife was a petite brunette, her face a mask of determined calm.

“Everyone, Peal. Please.”

“No. I may want some more fun later. Are you going to keep your bargain?”

Liz bit her lip. She didn't want anyone else around but, she told herself, the gain was worth the risk. "Okay. What do you want?"

He leered at her. "Take your shipsuit off. Put a set of handcuffs on and come in here."

Liz complied. The handcuffs clicked ever so softly as she shut them around her wrists. The material felt like basalt fiber composite—the standard 3D lithography material. It was strong enough, but brittle, she thought.

When she got the cuffs on, a section of the barrier slid aside.

"Come in," Peal said with a grin. As she reached the opening in the barrier, the humanoid robot began to move toward her. "A modification of the virtual reality glove. What it feels, I feel. Now turn around. Do you know what 'black hole' means in Russian?"

Now or never, Liz thought. She bit down on the capsule as she complied with Peal's order, moving back against the barrier as she did so. She shivered to elevate her heart rate and hyperventilated. Strength flowed into her. Steady, she told herself, thirty seconds for maximum effect. She felt her muscles quiver in preparation.

"So you think you're going to play with the universe, do you?"

This wasn't going to be easy. Okay, she thought. She'd never get to Peal before the robot got to her, take the robot first. She allowed it to close the distance. Then, with a scream, she snapped her arms outward as hard as she could and fell back against the barrier. The handcuffs cracked open and the line holding them together pulled out of the right one. The pain was blinding but somehow detached from her. The robot snapped toward her almost faster than could be seen, but her right leg was already up to meet it. Her heel hit right in its mechanical pelvis, and she felt searing pain as something snapped in her leg. Damn, Hilda, I tried. I really tried, she thought.

But in a second she realized she wasn't done yet. The robot had rebounded from the collision and was sailing across the room in the low gravity. Before it could bounce and get back, she launched herself at the startled Peal, ignoring the pain in her leg.

No time for fancy stuff. Her balled fist caught him squarely in the jaw, going through it as if it were balsa. Her momentum crashed them both into the mini galley at the end of the room, a coffee pot bouncing away, spewing hot liquid all over. The impact knocked the breath out of her. Already she was beginning to feel lightheaded and tired; but the robot would be back for her. She whirled Peal's limp body around to put him between her and the robot.

The machine crashed into them and bounced away, inanimate.

Dead man switch? A look at what was left of Peal's head told the story. There

was gray matter on her fist. She shook it off automatically, revulsed.

Boost and adrenaline spent, the pain from a broken leg and broken wrist hit her hard. She felt nauseated, and fainted. The last thing she remembered was the smell of spilled coffee.

* * * *

When Liz regained consciousness a week later, her wounds were healed, she was a hero and Cyan Mutori was the new chief executive of the Campbell system. Roger Gunheim had left the Campbell system with DeRoot and some of their cronies, bound for the BHP vertex to see the implosion, and then onto a new colony at Stein 2051, twenty-five light years distant.

* * * *

Chapter 5

In Space, at the Impactor Launch Site, 26 October 2275

The impactor looked like a long thin filament that seemed to run out to infinity. At high magnification, David could see a slight texture to it; individually controlled superconducting solenoid rings were placed every few meters to stretch the wire taut to just the right tension, giving it some rigidity for maneuvers and providing a fine control on its density. Somewhere, out there toward the end of the rod, was the main magnetic reflector. Any time now, David thought.

Cyan's term as chief executive had begun well. The impactor launch was back on schedule, albeit with the smallest of windows. No more delays could be tolerated, but so far, so good. He, Judi, Cyan, and Liz took a shuttle out to the launch site, a point, high over the asteroid belt, where the impactor coasted, waiting for the main beam. While far from the revelry, they had all wanted to, well, be there.

David wondered when they would see it light up.

As if on queue, Liz announced, "About now."

At the far distant end of the impactor, a tiny blue star appeared and gradually grew to an iridescent flower, brighter and brighter with its far edges fading into a deep violet.

In the close-up optics, the impactor began to move across the field of view. Faster and faster it went. The view zoomed back.

It was bright enough now that David risked a look at Campbell and the ring of beam projectors around it. Only a few of them were active at this early stage, he knew, but already the power was a million times that used to launch a starship. And it would grow by many orders of magnitude over the next nine months. By that time, he would be deeply into analyzing the results of the planetoid's impending impact on Martin.

He felt Liz's arms around him and smiled. Time enough for work later. Her face was glowing—he kissed her. Cyan Mutori glanced at them and looked away.

They watched for an hour or so, until the violet flower had faded into the interstellar depths. Then their shuttle turned back for Minot.

Once home, David put his full energies into his own projects. To the victors went the spoils, David thought. His work, which he'd worried about losing altogether, was now getting high priority; such was his reward for backing the winners.

An urgent message awaited him—results from his Prospector Probes deep in the icy mantle of Martin. They'd struck water. No question about it; 11.36 kilometers under the ice surface was a huge lake, filling the bed of an ancient caldera. No, he thought, not all that ancient. Martin must not be completely stone cold. There was some tidal stress from its eccentric orbit, and its radioactive ores still put out a fair amount of heat. It had to get out somewhere, and the readings pointed to several vents across the bottom of the lake. There could be life down there, he thought.

It hit him in the gut. Oh, God! If Martin had water and heat, then ... his imagination ran wild.

Far from being the agent of a temporary rebirth of this planet, the impending collision might mean the destruction of one of the perhaps six independently evolved biologies known.

* * * *

Liz stared up at the sky in her dome with restless anticipation. She touched the net to check the countdown ... 1205013 seconds ... about two standard weeks ... the particle projectors would finish their job—and hers. Then what?

A beep on her comm sounded. A message from David in his new lab.

"Liz, come over, please. I need your help!"

She found him staring at a micrograph of a rock sample brought up from a deep borehole on the planetoid falling toward Martin. He hadn't noticed her coming in, but instead continued to stare at the dark rock. She found herself staring at it, too.

Liz saw a number of what looked like tiny microbes, squirming around. "From the planetoid?" she asked.

"Liz?" They kissed cheek to cheek, not on the mouth, Liz noted. He was all business.

"The center of the planetoid is now above the melting point of water. It would be boiling in a near vacuum; but here and there, the vapor can't get out fast enough, and the pressure rises to the point where liquid water exists. They thaw out once every hundred and eighty-three thousand years, and they're thriving, for the last

time.”

“In the wild anyway. What are they?” she asked.

“Archeae. Almost eighty percent identical to those in the Solar System and thirteen other star systems. Their cell membranes use left-handed glycerols, their DNA forms loops instead of the strings capped with telomeres that we use, plus some other things. They’re rugged; that’s why so many of them are extremophiles.”

Liz looked at him quizzically.

“For one thing, their DNA doesn’t wear out.”

“Wow! Neat.” She knew the whole astrobiology team was in a race to study every facet of the colliding worlds before the collision destroyed the planetoid and utterly transformed Martin as well.

“Expected. We find them on Martin, too, and on that planetoid you found back in the Solar System. But there is something else in some of the volcanically-warmed lakes on Martin: multicellular Archeae with knobby-loop DNA. See?”

Liz couldn’t tell if the stringy stuff she was looking at were loops or not, but they appeared to have knots in them.

“God knows how long these little critters have survived protected by that layer of ice, Liz. We’ll probably never know their earliest beginnings. What could they have shown us?”

Liz squeezed his hand. “I think they’ve shown us that life is everywhere.”

He squeezed her hand back. “I need your help badly, Liz.”

“How?”

“I know I was against changing the planetoid’s trajectory originally. But I did not know about the knobby DNA then. We have to stop the collision.”

“What? David? How? The BHP impactor needs the entire array output for the next ten days. And look at the simulations. Even if we were to turn the array on the planetoid now, without time for any preparation there’s no guarantee it would accomplish anything.”

“There must be a way! That is your field. Give us a chance to study Martin biology in situ!”

Liz shook her head. “I’m truly sorry, David.”

He looked at her, anguish written all over his face. “That is all I get? ‘I’m sorry?’”

Liz felt torn. “David, my job is to make sure the impactor gets exactly what it needs. There are three other impactors headed for the experiment site. If any one of them is off, a half century of work goes down the drain. I can’t think of anything we can do at this point that wouldn’t jeopardize that. But I’ll ask the staff. Anyway, the geometry is wrong; the planetoid’s trajectory is in the local ecliptic plane, so half the array is blocked by the other half. The gap is on the one side, and Martin blocks the other side. We won’t be able to get a significant push on the planetoid for another three days in any event. Maybe you’ll have enough samples by then.”

He abruptly got up. “I need a break.”

She took his hand and held it tightly.

“Make it enough time, Liz, please,” he said. “I am going out to the remote lab to do what I can.”

* * * *

Three weeks later, David greeted Liz at his remote lab deep inside the only natural satellite of Martin, and gave her a quick tour. The moon was a captured nickel-iron asteroid about seventy kilometers by fifty by thirty. Robots had hollowed out a 500-meter spherical cavity deep beneath the surface. They also built a rotating drum that was 200 meters in radius to provide enough gravity to keep the researchers’ bones solid and to settle the various fluids of life in and outside the isolation lab. Construction was still going on, and people were working out of cubicles. Plantings and roofs would come later, he explained.

She looked grim and troubled, he thought—and steeled himself for bad news. He showed her a seat in a bare cubicle he used as a staff conference room. Cyan Mutori was on screen, seated with a couple of council members and three or four people he thought might be project engineers. Cyan looked as poised as ever, with no hint as to the position she might take. He took a deep breath.

Cyan started. “David, for those of us who are not exobiologists, perhaps you could start this conversation with a little background.”

“Thank you, Cyan. We have found multicellular life on Martin. Worms actually, primitive, but with a pass-through tube for a gut and the beginnings of a primitive nervous system. We suspect there are more complicated life-forms.”

The lightspeed delay between the lab and Minot was almost a minute. It seemed more like an hour. Finally, the people on his screen reacted with a murmur, but it was not as loud as he’d hoped for.

He tried again. “You must understand the importance of this. We have found the first multicelled life-form that humanity has ever found off-Earth.”

Another minute, more murmur.

Cyan beamed at him. “David, this is great news, and your team is to be

congratulated for all their hard work. Wouldn't everyone agree?"

Louder murmuring and congratulations poured toward him. "Could we have some additional perspective of your discovery?"

Gehenna. What else could he tell them? He spread his arms. "Look, it's a given that all the life we know spawned from single cells. That's the beginning. What we have here are multicelled organisms. So the problem to investigate is: Where did they evolve? Near the thermal vents at the bottom of the lakes on Martin, or somewhere else? And if so, why were they able to survive on this particular planet?"

Liz leaned forward. "These life-forms may have come from someplace else?"

He had expected his good news would set everyone's enthusiasm on fire. Instead he was getting polite questions.

"They have loop DNA like terrestrial extremophiles, but with these knobby kinks in it, so we aren't sure whether they are descended from Archeae. We could have another, entirely different architecture of life floating around the galaxy. But the gene trace diagrams indicate a recent origin, pointing toward a development unique to Martin. I'm betting that life for these worms started right on this planet."

Another wait, then someone else asked, "Have you looked into the geologic history of this planet enough to be able to substantiate this thesis?"

He shook his head. "We do not have data enough to decide one way or the other. We need more bore holes, more lakes, and more samples. We need an intact planet on which to do this."

"But we don't have the time," Liz said simply.

He shot her a look, then looked back to Mutori. "That's where you all come in. We have to divert the incoming planetoid. It would be nice if this could be done without affecting the Black Hole Project, but this has to take priority.

"Look, I've studied the project plans and there is some margin built in. The impactors lock into beacons as they approach the impact point and start exchanging vectors. They can all decelerate a little to recover synchronicity if one is a little off. We can make up the total momentum after diverting the planetoid and let the impactor control system get things back in sync again. But even if that doesn't work, would it really matter if it takes another century to make a black hole? This is something that may never come our way again."

Liz shook her head. "I can't endorse that approach. What if we aren't the only ones with some kind of problem? Yes, there is some margin, but not enough to cover things if all four impactors make changes as big as we are contemplating here. We can't just grab all the margin of error for ourselves. We have to put that impactor on exactly the prescribed profile if we humanly can."

After the lightspeed delay, a project engineer shook his head. “It would be better to destroy the impactor and start over again than to be slightly off. A great many things could happen with an asymmetric impact, some of them very dangerous indeed, and to people other than ourselves.”

Cyan Mutori nodded gravely.

David’s heart sank. They just couldn’t see how important it was! Of course not, he thought. They were mostly physical scientists and engineers. They had different values. Against all logic, he searched Cyan’s face for a hopeful sign, but her face, of course, gave nothing away.

There were more questions and answers, but in reality everyone was well informed. This was not a question of facts, but one of value and perspective. His, he realized, were not theirs.

One of the council members made a motion to adjourn without acting on the diversion proposal. They voted silently.

Finally, Cyan looked at him. “The consensus of the Council is to continue with the original mission plan. We’ll put all available resources into getting as large a physical sample of pre-collision Martin as we can, right up to the last minute. I am sorry, David, but it is the best we can do for you. I know human team members will want to stay until the last minute, so we need to be fairly firm about getting them off. Please inform everyone that all human team members should plan to be off of Martin within twenty-four hours of impact, for safety.”

David nodded dumbly and sighed. “I understand. Thank you for considering this. Since there is so little time, I should get back to work.”

* * * *

Liz went jogging. The track circled the small habitat—if you ran spinward you were heavier. She ran spinward—punishing her body helped with the frustration. They had enough power to divert the planetoid now, but no way to couple that power efficiently to the planetoid. It would require engineering a new reflector to couple the beam’s momentum to the planetoid. But if they waited until they could get one installed, it would take so much power that the project would be compromised. The dilemma seemed to have no solution.

David, of course, would never understand that. Liz continued going in circles, mentally and physically. Finally exhausted, she stopped at the locker room, showered, dressed, and headed back to David’s quarters.

David wasn’t there.

* * * *

David stowed his Martin suit and a big duffel bag behind a bulkhead, then geckroed his feet by the airlock as the last shuttle from Martin’s surface docked. His

course was settled, but he wanted to make sure no one else would be harmed. He waved to them as they came out of the access tube and pulled themselves down the corridor, accompanied by robots pulling bags of samples and gear. They all smelled of dust from the surface.

"Is everyone off the planet now?" David asked the last one off, a stocky man named Ned Oh.

He nodded. "Everyone's here and accounted for."

"Very good. I will try to get back before departure for Minot, but if not, go ahead without me; I may be some time, and can take this shuttle back."

Ned looked at David oddly, then smiled. "You? Late?"

David forced a smile. "The collision apparently will *not* be late, and there is still much to do."

Ned patted him on the shoulder; the lack of an effort to divert the planetoid had been a downer for all of them. They shook hands, and Ned followed his group down the corridor.

David boarded the shuttle and stowed his gear. Settling at the controls, he contacted the busy port manager. "I need to make a fast trip down to the surface. There is a last minute discovery at a new ice lake."

The man, tall and light haired with a bushy mustache and an easygoing manner, squinted and smiled. "Well, now, someone might think you just wanted to be the last one off the planet."

David smiled back nervously and didn't say anything. Let him believe what he wanted.

The man shrugged. "Okay, it's fueled and ready. No other traffic, so you're cleared."

The trip down to the planet took four hours. The ice lake actually existed; he landed on its shore. If nothing else, he would find out one or two more things about this world. He pulled one of two boxes out of the duffel bag and replaced it with a survival tent and a couple of days' worth of rations. He carried the box down the ladder and set it down outside the shuttle's airlock. Then he went back up, opened the panel to the ship's main processor, and disconnected it. That should set some alarms going, he thought.

On his way out, he touched the box and hesitated, going over everything again. No, he had to do it this way. There could be only one way to get him off the planet alive, and that would be to divert the planetoid. He took a breath, threw the switch on the timer, climbed down the ladder, picked up his gear, and headed for the lakeshore.

Ten minutes later, the blast severed his only way off the planet.

They had not really listened before; perhaps they would listen now.

Later, on a small rise, he looked out over the lake. At early evening by local time, the scenery here, in one of the few places on Martin's surface not covered with ice, was breathtaking. The steep sides of the caldera were a study in deep red and black, with glints here and there of volcanic glass. The ground was cracked and brittle—he would have to watch his step; getting himself killed too soon would defeat the whole purpose of this mad exercise.

Would Liz or Mutori pull out the stops and divert the planetoid? Or would they let him be blown to smithereens along with the planet? He looked at the still lake, reflecting the glowing crags of the caldera's rim. Was it really still, he thought, or was it, too, teaming with life, every bit as deserving of saving as the damned, all too important, Black Hole Project?

* * * *

Liz was deep in concentration on an idea that just might work. Array construction robots in orbit about Canning were hurriedly fabricating a huge net, a thousand kilometers in radius. A large magsail, meant for a starship, would be attached to the net, along with several million tons of ballast weighted around the rim of the net. If everything went right, the whole assembly could be pushed with planetary transport beams to intercept the planetoid about a hundred planetary radii from collision with enough momentum to cause it to graze Martin's atmosphere instead of colliding directly. But it would be very, very close.

Something was trying to get her attention. Amongst the numbers and trajectories, a signal light was flashing.

"Yes?"

"It's Ned. I'm at the door. I thought I should deliver this news in person."

That didn't sound good. "Come in."

One look at his face confirmed that he was the bearer of bad news.

"Liz, have you heard about David?"

She shook her head.

"He's gone to the surface of Martin, making a human shield out of himself."

"Oh ... crap! I'm sorry, I should have seen this coming. He's never ... he..."

"I didn't see it coming either."

"I'll need to talk to Cyan."

Ned nodded. “Let me know if there’s anything I can do.”

As he left, Liz touched the net. *Cyan, emergency, Cyan, we have a problem,* she sent. The lightspeed delay was maddening.

What, Liz? What is the matter?

David has gone human shield on us.

Wait.

Human shield?

He’s gone down to Martin in hopes that we’ll divert the beam projector to save his life.

Wait.

You know him better than any of us, Liz. Can you talk him out of it?

I’ll do what I can. I’ll get absolutely nowhere talking on the radio. I’ll have to do this in person.

Wait.

The momentum exchange mesh—the big net—is almost ready, Cyan said. *Hopefully we can spread the push over the entire area and hold the major pieces together . If we use BHP projectors, we can load less ballast and launch it now, then give it a major push.*

No! Keep the project projectors on the impactor. We can’t risk screwing with that. I’ll go down to Martin myself and try to bring David back.

Wait.

Liz, do you think that is wise? Much could go wrong.

Liz remembered how David had helped her stand up to DeRoot, how he’d been at her side when things had seemed darkest, and all the wonderful, sweet moments of lovemaking they’d shared.

Cyan, I owe him too much. I have to try. I’d never forgive myself if I didn’t.

Wait.

I understand. You will take several robots, of course, armed with tranquilizer darts; I will authorize the exception to the Asimovian rules. I know you will try to get his voluntary cooperation first, but time is short. And Liz, we’ve been over David’s recent communications. Voice stress analysis, word patterns, and other things. He doesn’t seem to be well.

Chaos! What?

People still occasionally got brain tumors, Liz knew. They were quickly cured when detected, but they had to be detected first. Then there was the stuff he was working with; the quarantine was very good, and the human immune system should be totally lethal to anything that hadn't evolved ways to counter it. But there was still a chance. Deep in thought, Liz barely noticed the lightspeed delay.

We don't know without doing a scan and taking samples—it could be strictly psychological, stress induced. But I think it's important to know if he's been affected by anything in the environment because a layer of that environment will be plastered all over this planetary system in a few years as a result of impact debris. At any rate, there may be some pathology involved; he's not acting rationally. Also, whatever he does, you should not blame him, or yourself. I know this is hard when it happens to someone you love, but tragedies happen. If the worst happens, remember him as he was. Finally, and I am very sorry to say this, but he may strike out irrationally. Remember that if he does, it's not him. But still, be very careful. And remember that it is not always possible to fix everything. If it gets too late, come back.

I will, Cyan. Thank you.

Could she hunt down David as if he were a zoo animal out of his cage? Could she leave him to die? Did she have any choice?

* * * *

David found that he was off the net. The relays might have been removed or someone might have thought that denying him access would give them an advantage. That meant they were going to try to resolve this by force instead of negotiation. His heart sank; that would cost several hours. No, he thought, they might work the problem in parallel; even now some way to divert the planetoid might be in the works, something that could be turned on or off at the last moment.

Night fell. The planetoid was less than a day away, near the ecliptic plane, coming posigrade. He looked to the west and found it easily—it had a huge coma of gas, like a comet. The nucleus was already a small disk. It would stay there, fixed among the stars. That was how one could tell if something was going to hit you—the angles stay the same.

Very well. If they were going to try to force him off, they would come with robots, sensors—the whole nine yards. They would succeed, unless he could somehow anticipate them and strike first. He had dealt with terrorists back in the Israeli defense force; he was on the other side now, but he knew the territory. Maybe they would not anticipate that.

To get a surprise, he would have to make them think he was here but actually be there. He took a reflective blanket and some line, then climbed up a small lava dome until he could see the landing site. He built a couple of small towers with flat

volcanic rocks and anchored the top of the reflective blanket to them. Then he anchored the bottom of it at about forty-five degrees so it formed a kind of lean-to. He went back down and moved his campsite until he could see the distorted reflection of the still-glowing wreck of his shuttle in this jerrybuilt mirror. The radio in the emergency stores had both infrared and radio frequency bands, as did the suit. He set it up in sight of the mirror. If this worked, he'd be able to speak on infrared from his suit, the infrared would reflect off the mirror to the emergency comm pack, and his voice would come out on the radio from the campsite.

He took a second box from the duffel bag and headed for the landing site.

Halfway there he keyed the infrared channel in his helmet. "Hello, everyone. Liz, Cyan. You know I am very sorry to cause you so much trouble. You must also know that this is more important than your inconvenience, or even my life, if it comes to that. You must do what you can to prevent the impact. I must do everything I can to make you do that. I have no choice in this. I hope you understand this. I am sorry."

He heard his little speech on the radio as he said it; a distracting echo, but it proved his system worked. Unless they had managed to deploy a very sophisticated surveillance system on very short notice, they should think he was at the camp site on the shore of the lake; he'd left a heater on there, and the radio would be coming from there.

"David, this is Liz. I'm coming to get you. We've figured out a way to divert the planetoid; a huge mesh net is on its way from Canning. It will probably work, but if the planetoid breaks up in the net, some of it may get through. It's too dangerous to stay on the surface of Martin."

David's heart beat rapidly. There was hope. Then he thought again. What proof did he have that anything was actually being done? They'd cut him off the net. She could be lying. Why not? She would do anything to save her damn project.

"Liz," he said. "That sounds very hopeful. Thank you for making the effort, if it is true. But I must take the risk that it is not true or I give up all my leverage. Please go back and get me after the impact is diverted."

"David, you might be dead!"

"I know this. I have thought this through very carefully. It is my choice."

"David, I am coming to get you. That is my choice."

He could think of nothing to say to that. He quickly covered the distance to the landing site and hid himself in a broken lava tube near the wreck. None too soon; just as he settled in, he heard the sonic boom of the approaching shuttle, and soon the glow of its engines lit up the landscape. He watched the bullet-shaped vehicle's landing gear extend as it set smoothly down, the hatch side turned mostly toward

him.

David agonized. But he would have to do what he had to do; he had come too far to waver now. If Liz was lying to him, she had sealed her own fate as well.

As soon as the shuttle landed and Liz had popped the hatch, he opened his comm line. “Liz, my camp is on the shore of the lake, about ten minutes walk from here, uh, I mean from where your shuttle is coming down.”

“I see it, David. Please come meet me at the landing site. We’re doing everything we can.”

He shook his head automatically, even though she couldn’t see him. “I cannot take that chance. I am sorry. If you want to talk, come to the camp. We still have several hours.”

Liz didn’t answer him. The hatch swung open and she descended, followed by three black circular robots hovering on their fans. He could barely see them, but this close he could hear them.

She strode off toward the camp, her path lit by a helmet light. The robots, presumably invisible now, followed. He patted a device in his pocket; he had an answer for those, but now was not the time to reveal it.

David judged the distance to the shuttle. He didn’t dare use the infrared to talk now; Liz would pick that up in her helmet and immediately know what he was doing. Would she suspect? Had she left a guard? The best strategy would be to approach the shuttle normally. His box with the bomb was a standard sample box and should be recognized as such.

He waited until she was halfway to the camp, then got up and walked as calmly as he could to the shuttle. He opened the standard infrared channel for robotic interface and positioned his body so the beam would not carry to Liz or his own radio relay setup, he hoped.

“Hello. I’m David Levi. I have some samples to go to the lab.”

“Mr. Levi. Please do not enter the shuttle; you are not authorized. I have notified Captain Avonford of your presence.”

“David!” Liz screamed. “I thought you were at the camp. What are you doing at the shuttle?”

“I changed my mind,” he said, using the radio channel from his suit. He took two more steps closer to the shuttle, reaching the right landing gear. “I really wanted to see you again, Liz.”

He turned away from the shuttle, triggered the switch and set the sample case down as carefully as he could. He started running toward Liz, not daring to look

back. Five ... four ... three ... two ... one...

The blast wave almost knocked him over. Now he looked back and watched the shuttle topple to the ground. Back to square one, he thought. He turned back toward Liz and stood motionless, trying to figure out what to say. She would probably be upset.

A sudden sting in his arm told him just how upset.

* * * *

Liz had skimmed along the regolith toward David, wanting to believe him, wanting to get him and get out of here. But she'd been deceived. Should have had the robots tranquilize him earlier, she thought. But she'd held back. Maybe there was an explanation that made sense. Once he was in her arms again, surely he would listen to reason. He had run toward her; she could see the light on his helmet bob up and down with each long stride. Surely they could still sort things out.

The blast took her totally by surprise, and she watched in horror as the shuttle toppled to the ground. There was no second explosion, and its navigation lights stayed on. The port light created a pool of red on the lava and showed the crumpled side of the vehicle in high relief.

Liz brought herself to a halt. *Take him down,* she sent to the hovering robots. Talk about closing the barn door after the horse escaped.

Liz, Ned. Are you okay?

I'm fine. He got the shuttle before I got him. Can you get another one down here?

We'll have to try, won't we? The port manager and I've got it in works, but it looks like an hour to fuel and check out and four hours—make that four point three—down to the surface where you are. That's collision time, I'm afraid.

Her heart skipped a beat and a knot suddenly tightened in her gut. *Chaos, try to shave ten minutes off that somewhere, will you?*

I'll try my best. Do you want me to tell Cyan?

So it's down to this, Liz thought. What would Cyan Mutori do? A word from her now, and the full power of the beam could be thrown against the planetoid, possibly breaking it up, possibly pushing it away. But that diversion would also throw the impactor off profile, perhaps irretrievably so. Damn Peal! There was no margin, none.

Not just yet. See where you get on the spare shuttle.

Are you sure, Liz?

It could mean the difference between probably living and probably dying, for

both her and David. But it could also be the difference between carrying out her mission with certainty and leaving humanity's greatest project to chance. She'd wanted to be the big fish in the small pond, to have the big decisions. Well, this was one that would echo through the rest of history.

Yes, I'm sure. Ned, if it doesn't work out ... It's not your fault. But get that damn shuttle here!

As soon as we can. Good luck. Ned out.

Liz looked up at the oncoming planetoid and its halo of gas, rising high over the eastern horizon. It would not, if she remembered the simulations correctly, quite reach the zenith from her location. In the last minutes, it would begin plunging back down to the horizon. Then a hypersonic detonation wave would jet out above her, and the blast wave would roll over the horizon at the local speed of sound, some twenty minutes later.

Human beings had voluntarily gone to their deaths before, for a big enough cause, but she had not ever quite thought of herself that way. She'd survived everything so far, on sheer strength of will. We were out here because of will, she thought. The shuttle would make it.

Liz, Cyan. What's going on down there?

Liz sighed. It hadn't taken her long to find out.

A small delay. He's tranked now. I'm going after him.

Wait.

You are stranded!

Maybe. Cyan, am I still in charge? Is it my call? You know what is at stake. This situation is my responsibility, and I have chosen to keep the project on profile. On our friendship, please honor that choice.

Wait—this time much longer than required for just the lightspeed delay.

I understand what is at stake. If it were my responsibility, I would, I hope, have the courage to choose as you have. But we will do everything we can short of affecting the project to get you out of there. The net has been launched; it should arrive three hours before impact. The planetoid will still be half as far away as the moon is from Earth. If everything holds, it should get enough delta-v to just graze Martin's atmosphere. Roche forces will pull it apart, but the net may hold it together for a while. We can't tell whether it will be captured or not—too many uncertainties.

You're giving me some hope, anyway. Between that and the relief shuttle, I'm going to assume I'll make it.

Liz had kept walking as she talked. David's helmet light glowed softly, nearer and nearer.

When she got there, that was all there was—the helmet light.

Where's David? she asked the robots.

The one designated "Alpha" answered. *We have a command authority conflict.*

"Chaos!" Liz struggled to regain her temper.

Cyan, could you reset the command authority override on my robots? David has pulled another fast one on me.

Wait, agonizingly long.

Done. Use the prefix "Sunbeam" if you have any more problems.

Thanks.

To the robots*: Sunbeam. Where's David?*

Mr. Levi is proceeding on foot to the lake. He apparently has a trank antidote.

No kidding! Keep him in sight. I'm following.

Liz, Cyan. We can still boost the net a little more.

Chaos, Liz thought. Why couldn't they just let the decision stand?

No, Cyan. Thank you but no. The whole thing's chancy and the last thing I'd want is to screw up the project, and *get killed, too.*

Wait.

Liz! Judi Lalande broke the quiet. *In one hour, we can no longer accelerate the net. Martin's moon is getting in the way.*

Yes, Judi, Liz here. I understand. I may end up seeing this explosion first-hand. You know what? I'm not scared. It's like letting go. Liberating in a way. What will happen will happen. I accept that. Just get that shuttle here!

Silence. It gave her a momentary chill. Would they respect her wishes? She tried to contemplate her humiliation if they did not and the project got screwed up. She smiled to herself. Risky behavior was nothing new to her, and here it was, the ultimate. Triumph or die. Or triumph and die. Either way, glory.

As if floating on air, Liz started running toward David. There was still time to grab him and at least get away from Martin.

She stopped bouncing and opened a radio channel to David.

“David. What’s going to happen is going to happen. There’s nothing more that anyone can physically do. The net is on its way; we should be able to see the intercept. It may work. Meanwhile there’s a crewless shuttle on its way to take us off. It may get here in time even if the net doesn’t work. There’s no point in running from me anymore.”

“I cannot believe you.”

Liz looked up into the sky and asked for a reticular circle where the net was. It floated in front of her eyes at infinity, a faint red circle. There, in its center, was a tiny spider web.

“David, believe your own eyes then. Look up, in Ursa Major, a little left of Mizar and Alcor, there’s a faint, tiny web.”

It grew even as she watched. Liz touched the net. Forty minutes until impact. Even without additional boost from the project projectors, the device was traveling at a hundred and thirty kilometers a second.

Maybe too fast, she realized. She looked at the projections; ninety percent of the net cords were predicted to fail on impact. Would the remaining ten percent be enough? Things would stretch, of course.

David materialized from the dark into the glow of her helmet light. “You planned it this way, didn’t you! You all did.”

Liz didn’t bother to answer that. He was here; that was all that counted. “You’re not thinking clearly. Let’s get to the shuttle rendezvous.”

David caught up to her and they both turned toward the dark sky standing side by side. “When?”

“Thirty minutes for the net impact, about three hours for the main event and the shuttle landing.”

Wordlessly, they headed for the landing field, about three kilometers away.

The net zoomed by overhead, moving at the apparent rate of a high altitude aircraft or a satellite; but it was much farther away and moving much faster. As it approached the planetoid, its angular rate grew less and less; a trick of perspective, Liz realized. The net now moved almost directly away from them. It would have been better, she thought, if it could have hit the planetoid from the side, but this would be almost as good. It only had to slow it a little, just enough for Martin to move a little farther from under it.

The net vanished, invisible against the glowing gas surrounding the planetoid.

It happened slowly. The planetoid slowly split into two, then three, then five

pieces. Some of them seemed to be drifting off to the right, others not at all.

Liz, Cyan...

I saw, Cyan. It looks like part of it is still going to hit.

Wait.

Yes. There was a small delay on the shuttle trajectory to let the net go by. It will be very close. Be ready to run for it. In the meantime, perhaps you would wish to settle whatever you need to settle. I've opened the net back up to David.

She didn't think they would make it. *Thank you, very much, Cyan, for everything. Thank you.*

Two hours, forty minutes. A message to Mom, of course. *To Captain Katherine Avonford on whatever starship she may be flying to wherever. Mom. You've probably heard what happened off the media. By the time you read this, I will have become so much interstellar gas flowing out of the Lacaille 9352 system. Perhaps we will run into each other. I'll say something general about how I feel about this—it's not really bad at all. I've let go. I'm accepting it, at peace with it, even in a strange way, looking forward to the experience. I always wanted to be important, to make a mark, to be remembered. But I'd rather have stayed around for the party. I forgot how so many of history's legends bought fame with their lives. Martyrdom isn't worth it. Tell everyone that. Martyrdom isn't worth it.*

And to Hilda. *I made a mess of it, Sis, but I got it done. Enjoy the physics.*

And to so many others.

She looked at David, silent, concentrating on his own good-byes.

They reached the edge of the landing field.

Five minutes. Death hurtled toward them. It was huge now, a constellation of comets with a single coma falling toward the horizon, visibly moving, passing what brightest stars still shone through its vapors. One by one, they slipped below the horizon.

Time to impact?

The first contact has occurred.

A sudden glow lit the horizon. Then a ghostly curtain began to spread from some point below it, like an aurora, but a thousand times brighter. Jets of debris and gasses tangent to the globe of Martin at the impact point moved at tens of kilometers per second.

Heart in her throat, she sent a last message to Cyan. *I guess this is it. Thanks for trying.*

Wait.

Hang in there, Liz. The shuttle's almost down and it will take several minutes for the blast wave to reach you. But be ready for five gees flat on your back in the airlock.

Shuttle on approach, be prepared to board.

She looked up and the deep blue of its jets lanced down from the sky. She reached over and grabbed David.

"Time to go."

"Go yourself. It's hopeless."

"Come on, we've got to try."

While David lingered in awe of its horrible beauty, Liz grabbed his arm and gave it a tug.

"Come on! Run for the shuttle!" It settled down fifty meters from them, its hot exhaust flapping their Martin suits.

She felt David pull her hand loose. "Go," he told her. You can't save this place, you can't save me." And he pushed her toward the shuttle. "Just go!"

It was futile, they both knew it. Regardless, Liz focused. She could not give up completely. How close could she come to getting away?

Prepare for immediate lift off as soon as I get in the hatch, she told the shuttle. Without David's weight, she reached the shuttle as the debris curtain spread overhead. The trick would be to get between that and the blast wave.

The ladder hung out of the hatch. David got up at last, and tried to run toward her.

"Hurry!" she screamed.

He tripped over a small rock and fell. He picked himself up. A second lost. "I'm going to be the martyr here, Liz. Get lost!"

A strange orange light flooded the horizon. She turned. Ah, yes. This was it. She sent what she saw streaming into the net. Roiling clouds zoomed toward the zenith as if in a time-lapse video of normal weather. It glowed. Everything glowed. She felt like she was in an oven.

Air slammed into her and sent her skyward, the shuttle and David tumbling nearby. She felt surreal.

Hot—very, very hot. Her visor melted, bowed in, a blowtorch played on her face. Everything went dark. She took a last breath, a breath of pure fire. She willed

herself to take it deep, so as not to prolong the pain. *So I pass into legend.* n

(EDITOR'S NOTE: Other parts of the Black Hole Project were described in "Kremer's Limit [July/August 2006] and "Imperfect Gods" [December 2006]. You can see additional information about the Project and the people involved in it on the "Science Behind the Story" section of the Analog *website [www.analogsf.com].)*