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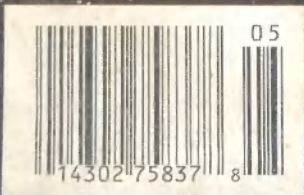
What I Did With The OTV Grissom
By Wil McCarthy

Vegetable Vision
By Robert A. Metzger

The Gateway Concordance, Part III
By Frederik Pohl
Art by Frank Kelly Freas

And Stories By:
PATRICIA ANTHONY
RICHARD BOWKER
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Coyote on Mars

By Patricia Anthony

Art by Carol Heyer

I was standing out by the drill, just sort of looking towards the horizon, when Lubenov came riding up in his creeper. I could tell he was real: first, the creeper threw a lot of dust into my faceplate; and second, I could touch him.

When I grabbed him by the arm, you know, just sort of checking out a little muscle and bone, he looked at me strange. "Bad weather coming," he said as he jerked away from me.

The Russian was a worn-looking sixty. Under the polarized glass of his helmet I could see blue, ill-shaven jowels sagging over his collar. The paunch at his waist nudged the belt of his fire engine-red uniform. Fat people shouldn't wear red.

"Yeah," I said.

"So are you going to cover up the machinery?"

"I guess," I said.

He helped me. Then he tied down his creeper and we went into the quarters. When we walked in, I took off my helmet. The lounge had a locker-room smell. Chee was sprawled drunk on the sofa. I poured some of the Indian's moonshine into two jars and handed one to Lubenov.

He pulled his helmet off, sipped at the jar and winced.

"Chee made it," I explained.

The Soviet's cheeks were chipmunked out like he was trying to decide whether to drink or just go ahead and spit it on the floor.

"Canned pineapple," I told him.

He swallowed, shivered and put the jar down on a table. Then he sort of looked around the room, eyeing the dead plants.

"Chee had the last cleaning detail," I told him. "He was supposed to water the ivy."

"Up yours, Dawson," Chee said from the sofa. He'd made a sort of blanket of dirty uniforms. It was cold in the quarters. The sun threw a miserly light against the smudged, flexible windows. On everything was a layer of red dust. When you breathed, you felt it in your nose. When you ate, you tasted the grit in your mouth. Chee called it "sucking Mars."

Lubenov had eyes like little ball bearings. They moved away from Chee and settled their oily gaze on me.

"You are both thin. Have you been ill?"

I shrugged.

"You are taking your food and making liquor with it. How many supplies have you left?"

I looked at Chee. Chee looked my way. We sort of laughed.

Lubenov walked over to the pantry cooler, opened the door and started to walk in. He didn't get very far. He spat something in Russian as he slammed the door shut. For a while he just stood there, his hand over his stomach, looking like he was going to upchuck. When he finally glanced at me his heavy face was pale. "It smells in there," he told me. "Haven't you noticed? It smells in there."

"Must be Standifer," I said.

"Standifer?" His thick eyebrows came together when he knotted his forehead.

"You remember Standifer," Chee said. He turned over on his side on the couch, letting a uniform slide off his shoulder onto the floor. "The gemologist. Short, fat black guy."

"I keep telling him to stay out of the pantry, but he won't listen to me," I told Lubenov.

Lubenov looked at me a while. "Standifer is dead," he said.

"I know. Maybe that's why he won't listen."

"He walked out without his insulated suit. He froze to death. You buried him."

"Yeah, I know," I told him.

"So he is not in the cooler. What smells in the cooler is spoiled food. There is container after container in there which has been half eaten and left open to rot."

I took a sip of the moonshine Chee had made and sat down on a chair. "I see Standifer in there all the time. Maybe he's hungry or something."

Lubenov looked around the room again. "Where is Martin?"

Chee and I glanced at each other.

"Is Martin in his room?"

When we didn't answer, Lubenov opened the door to the basement quarters and walked down the steps. He was gone a few minutes. When he came back his face was tight. "Martin is not down there. He is not in the quarters. Where is he?"

I shrugged.

Lubenov looked at Chee who shrugged, too.

"There are only three of you left. You have to know where is Martin," he said. His English was beginning to get a little worn around the edges. "You must know where each of you is at all times. Five of you Americans are dead already. Three of us Soviets. Life has gotten too precious. We have to find him."

"Gone on a walk to meet the Coyote," Chee laughed. "Everyone eventually goes to meet the Coyote when he calls. One day he'll call your name, Lubenov. Nik-o-lai Lu-u-u-benov, he'll say. And you'll come running."

Lubenov was quiet for a long time. When he spoke, his tone was a hoarse, angry whisper. "Are you crazy? There are no animals here."

Chee put on his best cryptic Indian expression, the one that made you forget that the closest he'd ever been to a reservation was the time he bought turquoise on the street in Taos. The expression seemed to do a job on Lubenov.

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A crazy alien

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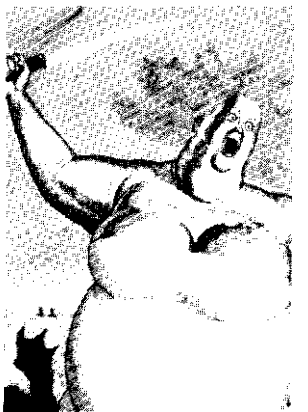
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BRIAN
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Self Similar

By Robert A. Metzger

Art by David Brian

Cruise control was a brick wedged against the gas pedal.

Twenty hours out of Chicago, and my ass was numb. A montage of red sandstone, roadkill frisbees, and high-voltage power poles streaked by at ninety miles per hour. Sighting along the dashed white line, and steering with my knees, I reached with both hands into the back seat. I dug beneath a promising pile of boxer shorts and hit cellophane.

Looking through the Nova's back window, I saw a cloud of dust and gravel explode upward, and felt the rear tires bite into the road's shoulder. I turned in my seat, jerked the wheel and fishtailed the car back onto the blacktop just microseconds before the Nova's front fender would have kissed the only tree I'd passed in the last fifty miles.

Ripping cellophane with my teeth, I practically inhaled the Twinkie in two rapid-fire snorts. That was the last of the supplies. It was time for a pit stop.

I was either still in western Utah, or had crossed over into Nevada. I wasn't sure. My travel plans were not all that sophisticated. From MIT, I had headed out in a random walk fashion, taking any road that pointed away from the Atlantic. Once I hit an ocean again, I'd hang a left or right depending on which direction San Francisco lay. The Lawrence Livermore Weapons Lab would be waiting for me somewhere in the hills above the Bay. The Feds claimed that my presence was required to insure the nation's security. I didn't take them seriously, at least not until the IRS started checking on my returns, and my MIT tenure was yanked. I got the message.

I gripped the slick steering wheel and stared down the heat-distorted road. On the horizon, a figure seemed to float above the road. It was still miles away, but my radar was infallible. I detected female in distress. I kicked aside the brick and stomped the gas pedal into the floorboard. The Chevy rattled through a series of harmonic oscillations, as if approaching some invisible speed barrier, then steadied itself, cruising at a smooth ninety-seven miles per hour.

The woman solidified. Her long blonde hair fluttered in the desert breeze.

I tapped the brake.

She seemed to rush forward, straddling the white line.

I stepped on the brake.

Her lipstick was Day-Glo orange, and her wraparound sunglasses sparkled in the bright sun.

I stood on the brake.

Wheels locked, tires smoked, and the Nova floated over the white line, drifted off the road, and chopped through tumbleweeds. The car stopped in a cloud of smoking rubber and flying dirt.

Kicking open the car door, I slid out. I moved around the car, squirming against the Nova's front fender to wake up my dead ass. "What the hell's wrong with you?" I asked.

"My transport is in need of repair."

All thoughts of my numb ass vanished. Her voice was colored with rich, raspy tones that were capable of causing you to fog your glasses, and even forget Maxwell's equations. She stood about ten feet away from me, still in the center of the road. Either she was stark naked, and her skin had been painted a bright green, or she was wearing some sort of monomer-thin, skin-tight material that I'd never seen before. Both possibilities marked her as originating from California. She probably spent large amounts of time at the beach, ate gallons of frozen yogurt, and talked to crystals.

She moved forward, but her bare feet didn't seem to quite touch the asphalt. Her hair continued to flutter around her head.

There was no breeze.

I dragged my ass back across the Nova's front fender and moved toward the door. This was getting just a little too weird.

"Greetings." She raised one arm, and held her hand, palm up, as if shielding her eyes from the sun. The dark shadow that her hand cast across her face suddenly flickered, and the palm of her hand glowed a dull red, turning nearly transparent.

Her hand had turned to glass.

It was painfully obvious that she was from somewhere far west of even California — at least several light years west. Her hand suddenly transformed back into well-tanned flesh, and she walked toward me. I still could not move. The same hand which only an instant before had been filtering the sun now reached out for the side of my face.

I couldn't even as much as flinch.

She rubbed the rough stubble on my cheek.

Miraculously, I didn't explode into a ball of greasy flame, or find myself transformed into fundamental organic goo, dribbling into the cracks of the asphalt road.

The scent of roses drifted from her.

"Why do you maintain this static dimensional mode?" she asked. She smiled, and her perfect, high-cheekbone, button-nosed face transformed itself into a set of flat angular planes. Her teeth had become square blocks of ice, and her long hair stood out, perpendicular to her head, as if charged with static electricity. She again scratched at the stubble on my chin, but with fingers that were now paper thin, resembling more a photographic projection than actual flesh and bone.

"Urmph," I managed to stammer.

She took several steps back, and, standing on the tips of the toes of her left foot, she pirouetted like a ballerina. She had full width, and height, but absolutely no depth. Every time she turned, she would briefly disappear. Her big toe dug a hole into the road, just as a turning drill bit

would. The scent of burning tar drifted over me.

She stopped, standing right on edge. If I closed one eye, she completely disappeared; only the shadow she cast showed she was even there.

Pop!

Air rushed across my face, and suddenly she was solid flesh and bone again.

"Why so static?" she asked, almost pouting. She put balled fists to her hips, and tapped her right foot against the road. "Most impolite."

The brain and nervous system can tolerate only so much strangeness and, eventually overloading, simply accept what they're being presented with. I finally reached that point, and felt myself sag against the car. If she was expecting me to transform myself into a picture postcard and dance the ballet, she was in for one hell of a long wait.

I waved a hand in front of myself. "This is it."

She took half a step back and her eyebrows arched. "You do not even unconsciously vary your dimensional self?" she asked.

"No." That was as insane as asking if I could fly by flapping my arms, or breathe through the soles of my feet.

She took another half step back. "This is all of you? You're a nonfractal sentient?" she asked.

This was so damn bizarre, and so totally insane, that there wasn't any room left inside of my head to be scared shitless. "Define fractal sentient," I said.

Her head jerked back as if I had slapped her. "To a nonfractal nonsentient?" she asked.

I felt *my* eyebrows arch. "I can hardly consider helping you with your transport problem unless I understand who or what I'm helping." I had serious doubts about being able to help something that could transform a hand into a block of glass, or itself into a living eight-by-ten glossy, but it was worth a shot. This was just too damn strange to pass by. Far too strange.

"Do you even understand the concept of fractal?" she asked.

"A self-similar shape," I answered. "A cloud would be a good example of that. If you took a small part of a cloud, then magnified it, it would be similar to the original."

Her lip curled into almost a sneer. "Minimal comprehension. You are familiar with noninteger dimensionality?" she asked.

I nodded. That was another property of fractals. I had just seen her change from a purely three-dimensional object, pass down to something almost two-dimensional, and then back again. If she truly was fractal in nature, was I supposed to believe that she was made up of a whole series of smaller and smaller blonde women, and that each could change her dimensionality?

"What does your fundamental fractal subunit look like?"

She smiled. "Perhaps some understanding is possible on your part." She waved her hands, and a snowflake appeared between us. Six-sided, and perhaps half an inch from adjacent tip to tip, it twirled, generating rainbow patterns as sunlight played through it. "A greatly magnified simulation, of course. It holds minimum sentience. It knows the rules for creation."

Sentient snowflakes?

"A demonstration will make this clear," she said.

Again she waved her hands, and instantly the air was

thick with snowflakes, all identical, all spinning and buzzing about. Like a swarm of bees, they flew off in a dense pack down the road, growing in number, until a column of shimmering light seemed to rise miles into the sky.

Reaching up to her head, she plucked out a single strand of hair. "This will suffice." She turned toward the tower of snowflakes and shook the piece of hair.

Bang!

Quicker than I could blink, a twisting, flowing column solidified out of the spinning snowflakes. Its base completely covered the width of the road, and its distant end disappeared somewhere far above in the blue sky. It was a single strand of blonde hair, magnified millions of times.

"That is the nature of a fractal being. Only the final boundary layer deviates from the internal fractal form."

Bang!

The mile-long strand of hair exploded into a near infinite number of snowflakes, which, in turn, all rotated perpendicular to my line of sight, and then simply disappeared.

Suddenly, with the impact of a two-by-four smacking me across the back of the head, I knew why none of this could be true — conservation of mass. When she had reduced herself down to paper thinness, where had the rest of those fractal subunits gone? They couldn't simply disappear. Weird physics I could handle, but I wasn't desperate enough to accept magic.

"This violates conservation of mass." I said hesitantly, almost not wanting to hear what her explanation would be.

Once again she shook her head. "That is where sentience enters. You are under the miscomprehension that you see all of me, but what you see is only the smallest of parts. The bulk of me exists elsewhere."

"Elsewhere?" I asked, looking stupidly around, and of course seeing nothing.

"I don't alter my dimensionality as a whole unit. A sentient has control of individual fractal subunits, and is capable of changing dimensionality individually from just above absolute zero up to the fourth. The bulk of my being resides in the fourth dimension."

I shook my head in a series of rapid-fire jerks and could feel my eyeballs rattle. "A fourth dimension?" I asked.

"Of course," she said. "Orthogonal to the lower three of height, width, and depth. You cannot sense the fourth, can you?" she asked. She sounded genuinely sympathetic, as if she were talking to a cripple. "It was believed that purely three-dimensional creatures had vanished billions of years ago. I was drawn here because of your primitive nature, but I didn't think *anything* this primitive could still exist."

The fourth dimension could be nothing more than a mathematical abstraction for me. My brain simply wasn't wired to perceive it.

"You are practically blind," she said. She reached out her arm, and her hand hung in free space, nothing visible supporting it. Her elbow was sliced through, but there were no blood and bones exposed at the break, just a nondescript whiteness. She had no blood or bones, just countless fractal subunits.

"I am a fractal sentient," she said, and the missing part of her arm rematerialized.

And by comparison, I felt like an amoeba wiggling in a

scum-filled pond.

"Will you help me with my transport?" she asked.

"Someone as primitive as myself?" I asked cynically. Asking me to try to fix her transport would be the equivalent of me asking that amoeba to replace the frayed fanbelt in my Nova.

"It's *because* you're primitive that you may be able to help," she said.

I didn't really understand what she meant by that, but I nodded anyway. I was only an amoeba, but I wasn't about to pass up a chance to look at what was probably a multi-dimensional, galactic-traveling equivalent to my Nova.

"Where is it?" I asked.

She pointed a finger first toward the horizon, then into the sky. The finger separated from her hand, and sped off across the desert, angling up over the horizon. "That way," she said, and, reaching forward with her other hand, grabbed me by the wrist.

My head imploded in a gush of blood and bone.

T"his way."

I opened my eyes. The sun was impossibly close, bloated red, and splattered with black flecks. It filled half the crimson sky. Ankle-deep in coarse, pink sand, I stood atop a dune. She hovered next to me, almost a foot above the sand, her skin and hair now blood red, and her sunglasses reflecting amber light. The air tasted metallic and stung the back of my throat.

"Where?" I managed to ask.

"Nothing to be concerned about, Dr. Robert Anderson," she said. "We're still within your Milky Way galaxy."

To realize I had been whisked to some planet revolving around a dying red giant sun should have been sufficient to freak me to the core. If that was all that had happened, I probably would have crumbled to the sand and started playing with my toes. But I didn't. She had called me by name. Somehow I knew that she hadn't discovered that by reading my driver's license. She could see inside my head. It was the ultimate violation.

She floated in front of me. Her entire body was almost translucent, the sunlight reflecting rainbow patterns from her skin, like oil would on water. "I apologize," she said. "I had not considered that probing would bother something as primitive as yourself."

"Well, it does!"

I pulled one of my feet out of the sand, almost losing my Nike in the process. "If you want my help, don't treat me like a lab rat that you can probe and poke at!"

Her face solidified to flesh. "Please forgive me. I have not had any experience dealing with nonfractal nonsentients."

If I could delude myself into believing that her expressions were those of a human, she looked genuinely surprised. It was only then that I realized that she might be as confused by me as I was by her. I took a quick look across the pink desert. An unbroken sea of sand flowed to the distant horizon.

"I thought you said that your transport was in need of repair. If that's so, how'd we get here?"

Again her face was filled with that shocked look of surprise. "I thought you understood about my fractal nature."

"I do," I said, although not being quite as certain as I

had been when I had been leaning against my Nova.

She waved a hand in front of herself. As her fingers moved, the sound of wind chimes floated across the red desert. "Did you believe that this form represented the highest level of complexity of my being?"

I nodded, all of a sudden feeling incredibly stupid. I had known what self-similarity meant, but I had made a ridiculous assumption. I had believed that she was the final form, not one of the intermediate ones.

"This," she said, again waving her hand across herself to the accompaniment of wind chimes, "is one of the lower levels of being." She suddenly snapped her fingers, and one of the snowflakes reappeared, twirling between us, shimmering in rainbow colors. "The fundamental shape," she said, and pointed at the flake. "This is the first level of being. Its actual size is roughly one millionth of a meter." The flake winked out. "Each level of being maintains self-similarity with all other levels, but is approximately ten times larger than the previous level. Do you understand?"

I looked at her. If every level of self-similarity represented a subunit that was ten times larger than the previous one, and she was almost two meters tall, that meant she was a million times larger than the fundamental shape, and that would put her at level six. "Is your level of being at six?"

She smiled and nodded. "I am basically six, but not pure. I've been subjected to a weak boundary condition in order to duplicate a form that you can relate to."

Again I looked across the pink desert, and up to the red giant sun. Suddenly I knew how she had gotten me here. It wasn't necessary for her to have moved me here. A part of her had already been here.

"How many levels of being do you consist of?" I asked.

"Twenty-seven," she said simply.

My eyes blinked, seeming to control themselves. If something the size of a human was only level six, then a level of twenty-seven would be of interstellar dimensions.

"You understand now," she said. "If the highest level of my being decided to exist in only the lower three dimensions, it would occupy a space that spans almost a thousand light-years."

The bulk of it hovered in a fourth dimension that I couldn't see, but it would probe three-dimensional space by lowering portions of itself down into my three-dimensional reality -- a portion like her.

"You took me up into the fourth dimension of one of the higher self-similar beings, then simply dropped back down to the third dimension in the space that this planet occupied."

"You understand completely."

A shiver ran down my back. If this fractal being was a thousand light-years in size, and if we had even moved at the speed of light within its body, relativity effects would have delivered us here instantly, but a thousand years would have passed on Earth. Everything I'd ever known was now either dust or displayed in some museum.

"How many years have passed since we left Earth?" I asked in almost a whisper.

"No time has passed. There is no limiting speed when moving through the highest levels of my being. That should be self-evident." She gave me a very satisfied-looking smile.

I understood absolutely nothing. How was I suppose to

fix the transport system of something that spanned a thousand light-years and could move within itself at speeds greater than that of light? "Where's the transport?" I asked, now wanting to get this farce over with as quickly as possible.

She waved a hand across the desert, and on an adjacent dune a snowflake materialized. It was at least a kilometer high. I had to squint, as the rainbow glare from its countless facets nearly blinded me.

"Transportation is a level nine function. Its outer form is purely level nine fractal, but it has been altered on sublevels to perform what is required for transportation."

"And what exactly is involved?" I asked, humoring her, knowing full well that there was no way I'd understand her explanation.

She rose higher from the sand, and moved toward me. "Transport is a level nine function, and beyond my ability to understand. You'll have to ask *it*."

I gritted my teeth. The anticipation of your head imploding is far worse than the actual event.

It was like being inside a hollowed-out chamber in a mountain of quartz. I was seated, all alone, surrounded by crystal panels that shimmered and melted, continually moving and translating themselves from points of bright light up through three-dimensional solidity, and then beyond.

"I am in need of repair," said a deep, echoing voice that filled the chamber.

"Even if I could repair you, which I seriously doubt," I said, "it won't do any good. If I correctly understand the nature of your fractal being, there would be so many level nine entities in existence that I could never repair them all."

"You are correct. The total number of level nine beings within us is ten followed by twenty-one zeros."

It was then silent, possibly even it being in awe of what that number represented. Even if I were immortal, and knew how to repair it, which I obviously didn't, the entire universe would be a dead and cold place, with every sun a burnt cinder, long before I could have repaired even the smallest fraction of them. "It would be impossible to repair them all," I said.

"Not true," it replied. "Function implies form. When you repair this level nine unit, and it functions as designed, the correction will be reflected in all the other units. Nothing less is possible. It is the nature of fractal reality."

I just shook my head. That went over about as well as if I had tried to explain the concept of differential equations to a cockroach.

"What's the problem?" I asked. The sooner it realized I would be of absolutely no help, the sooner, I hoped, it would let me return to Earth.

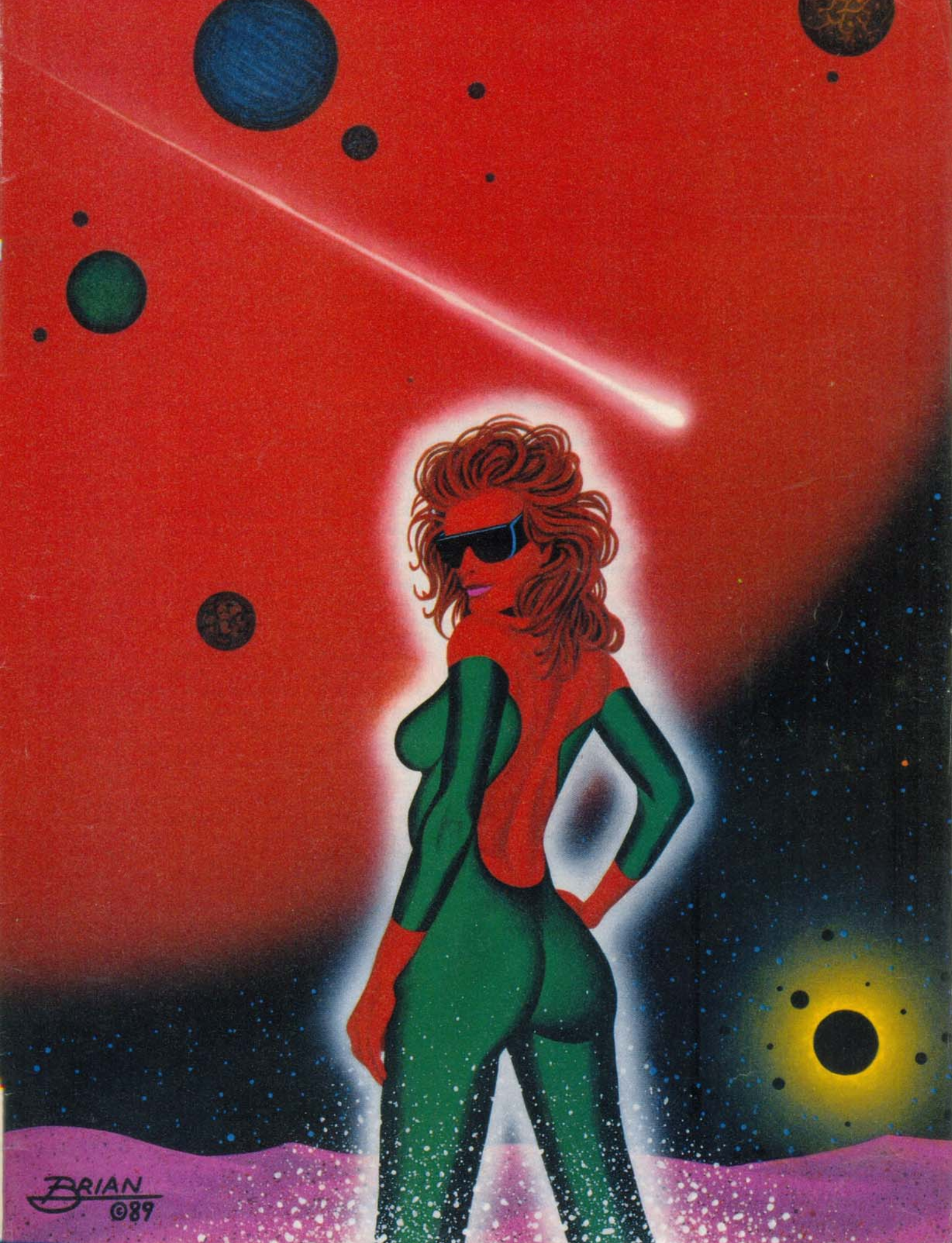
"If I knew, I would not require your help."

That was just perfect, a real *Through-the-Looking-Glass* type of answer.

"Can you show me spatially, in dimensions of three or less, where you think the problem is located?" If I talked a good game, it might not be so angry when I couldn't fix it.

There was silence for several seconds, then finally. "Yes."

To my left, a block of blue crystal, inscribed with what



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looked like a randomly generated set of etched lines, shimmered, then disintegrated.

"The fault lies within," said the voice.

Bending over the opening, I looked inside. It revealed a cavity about a foot in diameter, filled with a squirming mass of crystal snakes that pulsed in the primary colors of red, green, and blue. Each snake rhythmically transformed itself from a twisted, finger-thick shape down to a nearly straight line, and then back again. I was hesitant to put my hand inside, afraid that some nearly one-dimensional line that I couldn't quite see would materialize into a three-dimensional solid in the same space that my hand occupied. I couldn't even imagine what would happen if that occurred. All I was certain of was that it would be painful.

"Why does it pulse in the three primary colors?" I asked, color being possibly the only thing I could understand about what I was seeing.

"The colors are vestigial."

I sat back in the crystal seat. How could colors be vestigial? It's not as if I were looking at an appendix or hen's teeth.

"I don't understand. Give me some details."

Silence.

I bent back to look into the cavity. The snakes seemed to be dancing in some totally chaotic pattern, intersecting and cutting through one another — reds, greens, and blues — nothing else. As I looked closer, I saw that it was always three quartz snakes that intersected, and it was always with one red, one blue, and one green. The result of combining those three primary colors was a sparkling white light at each intersection.

"You still there?"

Silence.

I lowered my head slightly into the cavity, something at the edge of my vision having caught my attention. A yellow light twinkled where a red and green snake intersected.

"Vestigial from the Builders," said the voice.

Builders?

"Aren't you a living entity?" I asked.

"Yes," it answered.

That was the wrong way to ask the question. "How were you created?"

"Fractal subunits of levels one through twelve were constructed by the Builders. Self-awareness occurred during the fabrication of level thirteen, and from that point on we directed our own growth. Many components of the baser levels still reflect the thought processes of the Builders."

"What were the Builders?" Deep in my gut, I already knew the answer.

"Nonfractal, nonsentient beings," it said.

This was a constructed lifeform that had evolved into something the original Builders probably wouldn't even recognize. But its own complexity, and removal from its origins, had made it susceptible to breakdown. It was as if I had become sick due to some blood defect. I couldn't consciously control my blood chemistry any better than this thing could control the components of its level nine transport system. It depended on automatic systems for such basic functions, just as I did.

I looked back into the cavity at the pulsing primary colors. The Builders must have had eyes and seen much

like humans did. I looked down at that pulsing yellow light where the green and red snake intersected. All the other intersection points pulsed white. All that intersection would need to do the same would be the addition of a blue snake.

Could it be that simple?

Craning my neck, I lowered my head into the box.

There it was, wedged against the inside lip of the crystal panel — a quartz snake, attached to nothing, pulsing blue. Reaching in, with my fingers shaking, I grabbed it. It felt glass-smooth, and warm. It undulated, pressing against my fingertips as its dimensionality oscillated from one to three. I moved it toward the yellow winking light.

"I'm going to try to reattach this," I said.

Silence.

I waited for what must have been almost a minute. My hand was shaking from the tension. I moved the blue snake forward, until it hovered just over the yellow junction.

"I'm going to reattach it," I said once more.

Silence.

I pressed it in place.

The instant before my head imploded, I was bathed in white light.

Thank you, Dr. Robert Anderson."

My eyelids fluttered, and once again I was staring up at the red sun.

"Transport has been repaired," she said.

I looked over at the level nine fractal, again having to squint, the reflected light being almost blinding. As I watched, it grew flat, rotated, and then disappeared.

"How can we reward you?" she asked.

"Why was I chosen?" I asked.

"Because you wanted to be here," she said, waving her hand toward the blood-red sky. "We sought a being primitive enough to help, but not so primitive so as to not appreciate the beauty the universe can offer."

"You know the reward I want then," I said. The Department of Defense was in for one hell of a long wait.

She smiled, then nodded. "I know. Our first destination will be the world where the Builders once lived. You'll want to see their archives."

Rainbow light poured over us, and my head imploded.

I hoped I'd someday get used to that, but if I didn't, it would be a small price to pay. □

Is it Memorex?



Imagine it is two years from now and you have been chosen to sit on the jury in the trial of Washington, D.C., Mayor Marion Barry. The defense and prosecution have finished their closing arguments and you retire with the other jurors to reach a verdict.

One question (raised repeatedly by Barry's defense attorney) is foremost in your mind as you sit with the other jurors and discuss the evidence: Is it real? Or is it Memorex?

Those of you who have read the news about Barry's much publicized arrest in January or saw a newscast on television know that the FBI sting team says it videotaped the entire transaction where Barry allegedly asked for, and began to smoke, a pipe of crack — a particularly nasty form of cocaine.

But *did* it actually happen? How long has the technology available to television video crews been available to the government, and how has it been used?

Let me explain.

Nearly 17 years ago I watched as a Boston television "news" crew had the participants in a real news story re-enact something for the camera. The camera crew had arrived too late to film the actual events.

Once upon a time a print photographer would have been fired if he or she touched up a photo in the darkroom. TV doesn't think the same way. It needs sound bites and video bites ... if it bleeds, it leads ... and then some.

When the "news" clip ran that night there was no mention that the footage was not actual news, but a re-enactment.

On another occasion, while attending a meeting about several children who had died of childhood leukemia, I watched as a Boston TV anchor went through 20 minutes of maneuverings to make sure the camera angle was correct to catch his "good" side. He left

before the meeting was over. Appearances are more important in television news than substance.

As a professional journalist for nearly 20 years I know more than most that it is often difficult, if not impossible, to gather and present the objective facts of a news event without some taint of subjectivity. Anyone who tells you otherwise has no grasp of reality. The Heisenberg uncertainty principle of physics applies to news gathering probably even more than it does to subatomic particles.

There are many good print and television journalists who know this, and spend as much time cross-examining themselves before, during, and after a story as they do their subjects. Unfortunately there are as many bad apples in the profession of journalism as there are in any trade. And there are just as many lazy or opinionated journalists and columnists who accidentally or deliberately misconstrue the facts as there are lazy and opinionated people who misconstrue the facts in any walk of life.

This means that you should apply as much skepticism to the routine nightly news and the latest issue of the *Daily Blab* as you would to tabloid-like claims of little green men from Mars or cold fusion in a bottle. It might be nice if either were true, but let's wait a bit until it can be verified.

Why am I pointing all of this out?

Because advances in technology could mean things are probably going to get worse.

Every year, fewer and fewer people read. More and more get all their information from television. Many of the people who produce television shows don't read either — very much a case of the blind leading the blind. This matters because people tend to believe what they see on television if it's presented as "news."

And now they can make things up as they go along.

The Columbia Journalism Review

recently noted that high-tech advances in video imaging now let special effects wizards edit and change live and taped events on the fly — that is, as they *actually happen*, or later as they are broadcast. It's called the Harry, costs about \$100,000 and can change moving film at the rate of 30 frames a second.

The camera crew didn't arrive in time to catch the suicide leap off the bridge? ... so what, Harry will do it in the lab. Without careful self-restraint, television news — which depends on popularity ratings just as much as the entertainment broadcasts — could begin making its nightly presentation livelier ... and less truthful.

As I mentioned above, that same technology is also available to the government — any government.

If the President wants justification to send troops into Cuba or Mexico or China ... all the CIA has to do is create a videotape of a border incident showing the brutal loss of American life.

Will you be able to go to the scene and verify the "facts"?

Suppose you have a political enemy.

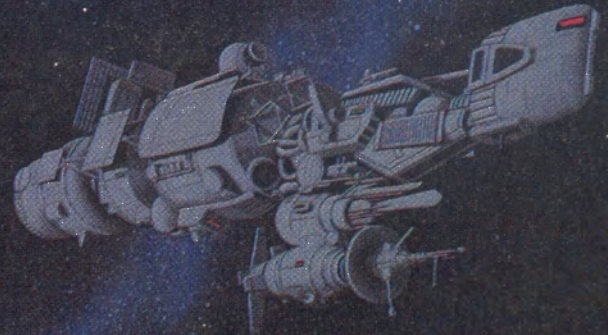
Simple. Set him or her up like the FBI set up Mayor Barry. (The FBI flew in a female friend of Barry's and her three children from California and had her invite him to her hotel room — all at taxpayers' expense.) Only doctor the tape a little and you can make your enemy any type of criminal you choose. Who could dispute it? You'll have a film showing all the details in full color.

Twenty years ago, a number of people in foreign countries questioned whether the Apollo Moon landings ever took place. "It was all done in Hollywood," they claimed.

A year or two from now, they may be right.

And when you switch on the nightly news from now on, remember to ask yourself: Is it real? Or is it Memorex?

□



What I Did with the OTV *Grissom*

By Wil McCarthy

Art by David Brian

Where there is no vision, the people perish.
— Proverbs, XXIX: 18.

O“TS-three-niner, you may commence fuel transfer.”

Nelson’s precise voice echoed loudly in my helmet, clear and crisp as though he were standing right behind me.

“Roger, Capcom,” I told him, locking the hose down and opening the valves. “Pumping now. ETF about three minutes.”

Nelson cleared his throat. “Ah, Mike ... We’re getting a negative pressure reading in your forward pump valve. Can you confirm?”

The words came out one at a time, spaced out just a little too much. The r’s and s’s were overlong, the vowel sounds throaty. Hard consonants were clipped as if in anger. This was an annoying dialect of English thankfully reserved for air-traffic controllers and NASA’s near-fossilized Capcom. Nelson had given up spaceship piloting only a few years after I was born, in preference to the ground-based banter of the expert backseat driver.

I turned around, checked my spin, and read a number aloud off the pump’s LCD. “Looks fine to me, Houston.”

“Negative, ah, negative that, OTS-three-niner. I read negative pressure both forward and aft pump valves.” Nelson’s perpetual tone of mild concern broke for a moment. “You pumping that fuel the wrong way, Mike?”

I couldn’t help but grin at that, since that was exactly what I was doing. Feeding out from the pump I’d attached to the Intelsat VII satellite I was supposedly servicing, the fuel line snaked back to the OTV *Grissom* to pump hydrazine into my own LEO rockets. I was using one of those acoustic pumps that runs like wildfire off a pair of

watch batteries, and, well, I’d sort of hooked it up backwards.

“Negative that, ground,” I said, managing to hold my voice even. “I get affirmative contact both ends, positive HZ flow. I do not, repeat do not, see any plume or evidence of leakage.”

“Roger, OTS,” Nelson’s voice came back. “Ground will check telemetry.”

“Roger.”

Excellent. A telemetry check should hold them for two or three minutes, long enough to let me finish.

I looked down. Far, far, below, it was nighttime in America. A bit to the north of me, the BosYorkington Met glowed like a warm hearth, a splash of liquid fire running down the coast. To the west, Detroigo and Colorado and Dalworthiston shimmered, gentle pools of yellow-orange light webbed by faint connect-the-dots lines. The edge of the Earth concealed California from me, but some of the light leaked around, an argent glow on the rim of the world.

Well, it was probably monoxide clouds I was seeing, backlit by the lights of L.A., but it had an eerie, almost preternatural beauty to it. From geosynchronous orbit, our planet appears small, fragile, and heartbreakingly lovely.

You get used to the LEO, the low-Earth orbits, pretty quickly. The ground rolls by at six or seven kilos a second, but it’s very big, it still looks like the ground. Not much different from an airplane ride, really. From up here, though, the world is more like a beachball, and sometimes

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it's eerie having so little beneath your feet

I grabbed the fuel line to steady myself against the momentary vertigo (to which even space veterans are not immune). The unease passed quickly, and I smiled a bit at the feel of the hose, humming faintly as it topped off my hydrazine tanks.

Ever seen an OTV? It's a spaceship designed for orbital transfer from LEO to GEO, powered by a plutonium reactor which heats up hydrogen gas and kicks it out the back. The big tank, you know, the one with all the trusswork around it, is for the hydrogen. But you can't fire the main engines to unmoor and pull away from the space station without making some people very unhappy. Particularly the families of the station crew.

So the reactor is damped with control rods until the hydrazine rockets (that's those two nacelles projecting out just behind the crew module) raise the orbit up a few clicks. And since the OTV ends its mission minus most of its heavy fuel and cargo, it doesn't take much hydrazine to push it back into port. So the lion's share of the HZ is used up right at the start, and my tanks were nearly empty. But to get where I was going, I needed them full.

Conveniently, my cargo for this run was a metric ton of hydrazine for the Intelsat's attitude control system. I'd already run an unauthorized line from the cargo tank to the rockets. According to ground, the satellite held another 560 kilograms in its reserve tank. Altogether, it's enough to fill both port and starboard tanks and leave a little in cargo just in case.

The green light on the pump's display went off and the hose's vibration ceased. Good, good.

"Fuel transfer complete," I informed the ground. "I'm going back inside."

Nelson's voice responded reproachfully: "Negative, OTS. Wait for T check results and then proceed with maintenance operations. Are you in some kind of hurry?"

"No hurry, ground," I assured him. "Will comply."

I reached down to my chest panel, thinned my oxygen mix all the way down, and climbed the fuel line hand-over-hand back to the OTV. Once there I closed off the end and detached it, then crawled over to open the airlock.

"OTS-three-niner, I read outer door crew module, negative contact, repeat negative contact!" Nelson's voice was genuinely concerned now. "Mike, look behind you, what's wrong with the airlock?"

I took a deep breath. "Relax, ground. I left some tools behind, I'm going back to get them. Outer door is opening now."

I hoped ground could not hear the lie in my voice. It sure sounded obvious to me.

"Roger, OTS-three-niner," Nelson replied, still worried. Then: "Ah, OTS, we've got a problem. Telemetry has been confirmed on valve pressure readings, and we've got anomalous data on your reactor systems. I read chamber zero pressure, temperature high and climbing."

Damn. That was it, I was caught now. Standard Operating Procedure called for me to flood the reactor with liquid hydrogen after shutdown, both to cool it off and to shield me from its radiation when I went EVA. The crew module was shielded by the entire fuel tank assembly and by a lead Compton lens to scatter the gamma rays. Extra-vehicular there's little protection, however. I figured I'd picked up about eighty rads, a quarter-lethal dose, in my little foray outside. No help for it, though; I

could not spare the hydrogen. I was going to need all the reaction mass I could get.

"That sounds like trouble," I said, trying to sound worried. "I'd better get inside and check the panel."

"Roger, OTS."

The airlock seemed to take a long time to cycle, but the lights finally came on and I heaved open the inner door, floated inside, and shut it behind me. I unbolted my space helmet, twisted it off, and let it drift away. Then I grabbed the back of the pilot's chair and hauled myself around and into it.

"OTS, do you copy?" Nelson's impatient voice rattled out of the control room as I bucked in.

I flipped a switch. "Affirmative, ground, I'm back in the saddle. Checking reactor pressure now."

"Roger."

The reactor pressure was in fact zero. Surprise, surprise. I primed the reactor and pulled the control rods to let it go critical. The temperature went through the roof almost immediately.

"OTS-three-niner, I get critical temperature in your main reactor, seven hundred and climbing."

"Copy that," I said easily, and loaded my program into the drive computer. I cleared my throat. "Ground, Nelson, everybody, you are witnesses to the world's first act of space piracy. I hereby abort mission OTS-39 and claim absolute control of the Orbital Transfer Vehicle *Gus Grissom*."

I let the reactor temperature cross eight hundred degrees Celsius before I hit the execute button. In general, it's very bad practice to let it go that high. In gravity, the plutonium would have deformed and flowed like candle wax, the meltdown condition that slagged Chernobyl. But when weightless reactors melt they typically re-solidify back into their original shapes when you turn on the coolant. Or, in the case of space drives, the propellant. But there would be cracks, and bubbles

The ship began to vibrate faintly as hydrogen molecules hit the hot reactor and fired out backward at twenty clicks per second. An invisible hand pressed me back into my seat as the *Grissom* took off. The breath whooshed out of me.

That was psychological, of course. At only 0.69 g, the force was less than I'd feel lying in bed back on Earth, less even than the burn from LEO to GEO. But the magnitude of my act weighed me down at least as much as the acceleration, and for a moment it seemed I would be crushed.

"OTS-three-niner!" Nelson howled, his ancient voice taking on frantic tones. "I read main engine burn at six-seven kN thrust! My god, Mike, you're accelerating! Apogee is up five hundred kilometers! Six hundred! Inclination is point six degrees and increasing! Mike!"

I sucked a breath, panted for a few moments. Then, suddenly, the breath came easy once again. Reaching "upward" against the unfamiliar weight of my arm, I placed my finger on the com switch.

"Relax, Nelson," I said. "I'm all right. I am aware of the acceleration, it's deliberate. The burn will end in four minutes, twenty-three seconds."

"Mike! What are you doing! Emergency condition, repeat emergency condition. I am engaging ground override."

"Do what you have to."

The red override light lit up on the control panel, but the engine continued firing. I smiled a little. Anyone smart enough to pilot an OTV is smart enough to snip a couple of wires.

"Override negative!" Nelson wailed. "Mike, abandon ship! Separate the crew module, we'll come up and rescue!"

"No. You don't seem to get it, ground. This is a mutiny. This is the last voyage of the OTV *Grissom*."

Wow, that sounded nice, didn't it?

The controller paused several seconds before speaking again: "Mike. My god. If you want to commit suicide there are better ways than this. That's a ten-billion-dollar spaceship you're flying."

Suicide? The thought surprised me. I'm not the suicide type. "I'm not the suicide type," I told him. "I'm going to the Moon."

There. I'd said it, they'd heard it, there was nothing left to talk about. I let my finger's weight haul the switch backward, cutting off communications with the ground.

It's true, by the way. It *was* a ten-billion-dollar spaceship I was flying, the last spaceship the United States would ever build.

To Uncle Sam, outer space was always a gimmick, a way of showing off to the world. But you can't show off by doing something routine, so U.S. space funding became inversely proportional to the funding in other countries. The space station got built, just barely. When the Russians built their three OTV's, the American DoD insisted on building two of their own for security reasons. A few interplanetary probes were launched.

And that was it. The funding was drying up, the space program working only in terms of maintenance and retrofit. No American would visit the Moon ever again.

The Russians would, of course. They already had a permanently populated base on Nearside and were busily at work on the Gagarin linear accelerator. That was a magnetic railgun that could fire bundles of metal and rock back into Earth orbit. You know the kind I mean, I'm sure. For peaceful purposes only.

Of course, those bundles could just as easily be aimed at the Earth itself or even at specific cities ... The idea dates back as far as the middle of the last century, but it doesn't suffer for its age. A bundle of rock impacting the ground at orbital velocity would hit as hard as a hydrogen bomb, and be a whole lot harder to stop. Even the threat of it would be enough to ruin economies.

And of course, while the Russians infested the Moon the Japanese pharmaceutical labs and West German alloy factories were working toward economic self-sufficiency in their high-Earth orbits. The Chinese were towing asteroid Eros to the L4 Lagrange point, ETA sometime next year. Within a decade these nations would be swapping billion-dollar contracts like baseball cards while America looked up and wondered what was going on.

I got to thinking.

It takes a lot of delta-vee to reach a geosynchronous orbit. A little less than half as much as it takes to reach the Moon, in fact. This means that an OTV with fuel enough for a LEO-GEO round trip could almost, but not quite, land safely on the Moon.

The difference turned out to be small enough that the

slack could be taken up by the hydrazine LEO rockets. If it were somehow possible to refill the hydrazine tanks during the mission ...

Maybe Americans would land on the Moon again, if somebody could just prove to them that the frontier was still accessible. Lord knows why, but I still believed in my country. I realized I couldn't sit idly by and watch it give up. Besides, I always wanted to go to the Moon. Jesus, didn't you?

The engine shut down at the designated time, the reactor's control rods automatically sliding back into place. The force on my body eased and then went away altogether. Quiet filled the air.

It was done.

Still strapped to the pilot's chair, I flipped a few toggles and rattled a command off on the flight computer's keyboard. The post-burn check sequence ran through. Was the cabin on fire? Negative. Pressure breach? Negative. Fuel leak? Negative. Et cetera.

Everything checked out fine except the main power cell and the yaw and pitch attitude controls, all of which were running on backups. There was nothing alarming about that, of course. *Grissom* was seventeen years old, a patchwork of duct tape and bailing wire and silicone caulk. It was surprising it'd held up so well, actually.

I tested all the backup systems just to be sure. They were fine. Not that I'd be able to do much if they weren't.

A few typed commands to one of my unauthorized programs revealed that my fuel hose was still firmly attached to both cargo and propellant storage tanks, and that the pressure differential was sufficient to pump nine-tenths of the hydrazine through. Excellent.

The power test switches on the control panel worked, all except ground override, and most of the lights came on properly. I engaged the momentum wheels and keyed in instructions that yawed the ship a quarter turn to port, an orientation that would be useful later on, though I was now flying sideways. This was fine, of course, since I was no longer under thrust, no longer obligated to point in any particular direction. And this angle would, if nothing else, keep the sun out of my eyes for the next five days.

I disengaged the momentum wheels again and set the ACS to my present orientation. Little beeps went off here and there as star scanners found and locked on their targets.

Finally, drudge work out of the way, I loosened up my straps a few notches and leaned over to get a good view of Luna through the port side window. It hung there, motionless, looking unreasonably small.

But it was sharp! Without the blurring effect of atmosphere, our planet's natural satellite might have been a round piece of typing paper; that is, the maria and mountain chains of the old man's face were starkly visible, the huge rayed crater of Copernicus a bright blemish on his cheek.

I should mention that the Moon was, at present, more than ninety degrees off to port, only barely above the limb of the Earth, which is why I had to lean over to see it.

Understand, going to the Moon is not a simple matter of point-and-shoot. A spaceship orbiting partway up the gravity well is like a marble rolling around on the inside of a funnel. If you push on it, you only change the shape of its path. Push hard enough and it will roll straight up

out of the well, but on a curved trajectory. My own curved trajectory happened to intersect with the Moon's.

Not that simple, though. Luna had its own well for me to roll down, hopefully in such a way as to deposit me on the ground in one piece. Furthermore, the Moon moves around the Earth at a pretty good clip, in an orbit inclined 18.5 degrees to the planet's equator. The orbit is not circular, but mildly elliptical. The Moon is not round, but egg-shaped, making its gravity distribution non-uniform. You get the idea.

Let me say, my bootleg software had taken a lot of work to assemble. This was no idle whim.

So anyway, there I was, pointing up the well at the point where both the Moon and I would arrive simultaneously. I hoped. The transfer ellipse that would bring me to this point was a long one, 230,000 kilometers or thereabouts. It would take me five days to reach apogee.

Now, NASA was a cheapskate. Not by choice, certainly, but a cheapskate nonetheless. The OTV had full recycle on oxygen, and about thirty percent recycle on water, but it was designed for the day-long LEO-GEO roundtrip and carried only two foil packets of freeze-dried food. Meager rations for a five-day trip.

Luckily, I'm a smart guy. I unzipped my right thigh pocket and withdrew a fist-sized black case. This was my pharmacopeia, containing its own special brand of bootleg software. I popped the case open and withdrew a hypodermic needle and an alcohol-soaked cottonball in a tiny Ziploc bag.

I dialed both cabin and suit temperatures down to five degrees Celsius, swabbed my neck, and shot up twenty milligrams of Japanese orbital-quality Hibernol. That's a hearty blend of sodium pentothal, tetrodotoxin, and beta-endorphin, guaranteed to keep you legally dead for as long as a month. Highly illegal stuff.

The world went flat and folded up on itself.

I felt like hell, of course, but coming out of a Hibernol low there's none of the disorientation associated with real sleep. I knew something was wrong even before I opened my eyes, and I knew it better when I did open them.

It was cold in the cabin. Sure, I'd set it cold, but I'm talking subfreezing and then some. If I hadn't been wearing the latest model Japanese environment suit, I would certainly now be dead. Thank you, Mitsubishi!

It was also dark. Not completely dark; Luna, in about three-quarter phase, completely filled the forward window and threw in a harsh, gray-white light that, despite the deep shadows it cast, was more than sufficient to see by. But the cabin lights, the lights on the control panel and over the airlock were dark, lifeless. The display screens of the flight and drive computers were blank. There was no white-noise hiss of air cycling through the vents.

This, my friends, was trouble.

Fumbling with fingers numbed even through spacesuit gloves, I cranked my suit temperature to thirty degrees Celsius and unbuckled from the pilot's chair.

The air was foul, stale with carbon dioxide and deathly still. Ordinarily sleep would have killed me as surely as the cold, as my own CO₂ built up in a tight cloud around my head with no convection currents to carry it away. Luckily, there's Hibernol, that magical breathe-once-

every-ten-minutes-whether-you-need-to-or-not elixir. I think it was close, though. I think if I'd bought the American brand I might have died anyway. Thanks again, big M.

The chill bit deeply into my cheeks as I fought for breath, and I could feel the blood pumping sluggishly through my brain, desperately carrying warmth from my suit-heated body. Stick your head in a dry ice freezer for a few days and you might get an idea how this felt. Where the hell was my helmet? I looked around, trying to pierce the shadows with dry, near-frozen eyes. There! It was wedged into an aft corner, its visor rimmed with frost.

I kicked off from the back of the chair and slammed into the corner, my numb arms buckling with the impact, sending my head directly into the wall. Ouch! The pain an annoying distraction as I bounced away, I grabbed at the helmet and, seizing it firmly, put it over my head and locked it down.

The OTV's cabin wheeled around me sickeningly as I stabbed at the chest controls to get my oxygen supply running. I was rewarded with a loud hiss, and a puff of warm air that seemed almost to caress my cheek. I breathed in deeply, exhaled, breathed in again.

Oxygen tastes wonderful, did you know that? Its sour, rich flavor contrasts sharply with the flat lifelessness of CO₂ and N₂. I savored it for several minutes, until the ice on my visor melted and I checked my spin against the inner hatch locking wheel.

I cast a long, hard look at the inert control panel. This was a problem that flipping switches and keying in orders would not solve; for some reason, *Grissom* was completely without power.

Turning on my helmet light, I hauled myself under the pilot's chair and stuck my head under the control panel to look for loose wires. I didn't see any. It didn't seem likely that the entire bank of fuses was burned out, but I checked it anyway. It wasn't. None of the emergency test lights came on, and I cursed heavily. All this could mean only one thing: the main power cell had finally gone down.

Mike Paxton, space pirate, was going to die. Instead of inspiring millions of people with the dream of space, I'd probably go down in history as a comical aside. Damn. Thank you, Mitsubishi; I could have gone in my sleep.

Well, I guessed I'd better at least check the thing before I wrote it off. Hauling myself back over to the airlock, I opened it up and cycled through.

The view was breathtaking outside. Aft, the Earth was a blue-white-brown baseball, its tiny oceans glittering in the sunlight. A bright star hovered unblinking nearby. One of the German Himmelplatzen? A Japanese drug refinery?

The sun was its proper size, but impossibly bright. Even from GEO it was not so bright. Why? I don't know. Maybe psychological. I dialed my visor all the way dark for a second, caught a glimpse of sunspots the size of worlds, of bright cracks longer than my transfer ellipse. Wow. What a sight, huh?

I could savor it like a condemned's final cigarette if it came to that, but for now I had work to do. I dialed the visor up light again and turned my eyes toward the three-quarter Moon, swollen to seven or eight times its normal size. I must have been somewhere around L1, the neutral point between Earth and Moon where the gravity vectors canceled out to zero. Nine-tenths on the lunar

side. It was dizzying, seeing our planet's natural satellite so close. The old man's face was gone now, lost in a sprawl of craters and mountains that got more and more detailed the closer I looked.

And there, just south of Copernicus crater in the Mare Cognitum (almost dead center on Nearside), was the site of the Russian base. I'd like to say I saw telltale glimmers down there, the sunlight reflecting off bright metal and mirrored glass. But it looked no different from any other lunar place, gray and lifeless as an old bone.

I turned my attention to the OTV. Just behind the crew module, in a nightmare cluster of boxes and hoses and tanks, was the main power cell. I snatched at rungs and climbed hand-over-hand around the curve of the module, keeping my profile low, keeping the Compton lens between me and the reactor.

I rounded the bulge and saw it. I saw why *Grissom* had lost power on me. I'm so goddamn stupid sometimes!

My little jury-rigged hose, feeding fuel from the cargo tanks to the hydrazine tanks, had torn free and lashed around, ripping off wires and hoses all over the place. I'd calculated the pressure the damn connector would have to withstand, and bought one from out of a catalog. But when I'd yawed the OTV to port after seeing the transfer ellipse, I'd placed that side of the cargo tank in full shade. Out here, of course, full shade was very, very cold, and the connector had shrunk enough to pop out of its socket. And the hose had whipped free, venting my precious fuel into outer space. Even if I got power back, I wouldn't have enough fuel to slow myself down once I got to the Moon. I might manage a high lunar orbit, far from hope of rescue. Hell, I could probably de-orbit and run into the ground at three or four kilometers per second.

I was, in other words, up the creek.

Unless ... Could I possibly detach the crew module and land it in lifeboat mode? It was equipped with a trio of solid rocket motors that could kick it down into Earth's atmosphere, where heat shields and parachutes would bring it safely to the ground. The Moon had no atmosphere, of course, but its gravity was a lot lighter ... Certainly the potential was there, at least!

I scuttled over and peered closely at the power bus. To my immense relief, it looked okay. The whipping fuel hose had plucked most of the wires and cables off, but none of the connectors had been damaged. It hadn't split open and dumped its load, or anything. I might still live through this venture if I kept my head.

I'd left most of my tools floating back at the Intelsat in GEO, to save weight for my long trip, but I did have a small pair of German folding pliers in my leg pocket (next to the pharmacopeia). Pulling these out, I began reattaching hoses and cables to their proper connectors and tightening them down. Less than twenty minutes later, I sighed with relief and good humor as the OTV's running lights came back on. I took another ten minutes to recheck all the connections, and another two to detach my bastard fuel line and cast it off into the void.

I hoped it would drift in eternal nothingness until the end of time.

Back inside, I took my helmet off as soon as the oxygen content of the air got above three percent. By then the cabin was blissfully warm as well, and I felt cozy and sleepy despite my five-day nap.

Sleep was out of the question, however. The Moon was growing now almost visibly, and I'd probably have to fire my orbit burn in the next three hours. I took out the pharmacopeia and popped back a couple of benzedrine, with a generous vitamin supplement for good measure.

According to my mental itinerary, it was nearly time to swing the antenna around and try to raise the Russians. But thanks to my little accident with the fuel line, I had some radical reprogramming to do first. I loaded in the orbital mechanics routines and fed in as much data as I could.

My major question, posed in circuitous computer lingo, was when I should separate the crew module and fire the three SRB's. My first try gave me an undefined, which meant either that I'd made a mistake, or that there was no correct time to ignite the rockets. My heart was doing exercises in my chest cavity as I set up another program. (Maybe that benzedrine wasn't such a good idea.)

Perhaps I didn't need to set the suckers off simultaneously. I tried it, but ten minutes later I had another UDF on the screen, and ten cc's of anxious sweat beading up weightlessly on my forehead. I doublechecked the code, found a sign error, and ran it through again. A flashing number replaced the UDF, and I let out a joyous whoop. I had done it! Michael Paxton, space pirate extraordinaire!

Tapping my fingers, tapping my toes, clicking my teeth in a jittery amphetamine symphony, I patched the solution into my control program and shoved it back into main memory. Then I tapped out a brief command on the keyboard, and the parabolic antenna eased around to face down at the Russian base in Mare Cognitum.

I flipped on the communications switch.

"Zdrastvutye," I intoned merrily. "Hello Tsiolkovsky Base. Zdrastvutye. Come in, Tsiolkovsky."

"... You are the American criminal," a staccato, thickly accented voice informed me after a moment. It sounded like it was coming through twelve feet of vacuum cleaner hose. "We have you on our radar. I am authorized to inform you that we have weapons capable to destroy your vehicle."

I smiled. "I'm sure you do, you Commie bastard. This is the OTV *Grissom* calling Mayday. I will land on the surface of Luna in —" I checked the chronometer — "just under four hours. I will require rescue at this time. I repeat I am calling Mayday, Mayday, this is a life-threatening emergency. I will require rescue."

The Russian started to say something in reply, but I hit the switch and cut him off. They knew my position, and further talk would be superfluous. And besides, it amused me to picture the poor guy gibbering furiously into a dead microphone. I swung the antenna back toward Earth and broadcast an automated Mayday signal for twenty minutes. Let the Russians try and shoot me down now.

I very much hoped they would not.

A quiet beep informed me that the main engine was about to fire under automatic control. I tightened down my straps and put my helmet on. The OTV was going to be doing some very unnatural things from now on, and it seldom paid to take chances.

There was a nearly inaudible whine as the control rods pulled back, and then the familiar rumble of hydrogen gas

expanding catastrophically as it touched the hot reactor. Once again, I was pressed back into my seat with a force that seemed tremendous.

I smiled, but my breath came in heaves, and droplets of sweat swelled on my skin. Were my calculations correct? Would the decrepit equipment stand up to my software's instructions? Would I make it? The three-minute burn seemed to last for hours, but at last the rumble died away. My worries did not ebb as the weight eased from my chest. I had another eighteen minutes before the hydrazine rockets fired the deorbit burn that would send me hurtling down at the lunar surface.

I counted buttons on the control panel. I took a few square roots in my head. I wondered whether I was going to die. As the eternity passed, I had plenty of time to think about that one. But the HZ motors finally kicked in with a soft whine, their almost imperceptible thrust pushing the direction of its orbit, forcing it slower and slower ... They were on for a little over twelve minutes. This gave me more quality time in which to fidget, and sweat, and worry, and decide that yes, the benzedrine had definitely been a bad idea.

The Moon was rushing up at me now, or rather I was hurtling down towards it. The OTV *Grissom* was pointed almost directly downward now, at a blotchy, cratered landscape that swelled in my view with alarming speed. Every second, new details were becoming visible, old details were becoming too large to notice. A tiny speck became a crater, then a circular mountain range surrounding a featureless plain, and then a ring of razor-sharp spikes, a hideous mouth about to swallow me down. It was not a planet I was looking down at, it was the ground, and I was high above it and falling!

I resisted the fear. According to the chronometer, the crew module would separate from the OTV in another minute. The rockets would fire, and land me feather-light in Mare Cognitum. I just had to have a little faith in my handiwork. That was all.

The separation occurred right on schedule, and lucky me, I wasn't watching the countdown just then. The explosive bolts holding the module to the OTV's structure all detonated, sending a bone-jarring ripple through me and everything around me. My head snapped back into the padded seat, snapped forward, snapped back again. The view from the windows was dizzying as the Moon's surface (the ground!) spun by, followed by the star-speckled velvet of space, the crippled OTV tumbling into the distance, the craters and dust of the Moon once again ...

Attitude control cut in, slamming the lifeboat into a skyward-facing orientation, slamming it again to make it stay there. Now the ground mass was rushing up beneath me, and I couldn't even see it. I could see the OTV, however, a maze of tanks and hoses and aluminum trusswork, glittering in the harsh vacuum sunlight as it fell back behind me, spinning into the void.

Well, actually it was going to crash into the Moon, but it sure looked like it was spinning off into the void.

An SRB lit up and kicked the lifeboat in the butt. It was mounted off-center, and the ACS and momentum wheels promptly sprang to life to cancel out the resulting torque. If they failed, of course, I'd come roaring down out of space, spinning like a Fourth-of-July pinwheel, and the lunar map would acquire a new crater with my name on it.

I reached down and fumbled at my chest controls, thickening the oxygen mix in my helmet to compensate for the terrified gasps that had replaced my breathing. The little lifeboat was shaking, probably a seven on the Richter scale, and here and there the sounds of groaning metal and cracking plastic called out for my attention.

There was a sudden noise, sharper and more exquisite than the general chaos I was listening to, something that sounded like an oil drum hitting the sidewalk after a nice long fall. There was a sudden turmoil in the atmosphere around me. There was a sudden, horrible feeling, as though my environment suit were inflating around me, as though my body were inflating inside of it. There was a flash of piercing green light that turned to dazzling sunbursts as white frost flashed across my faceplate, looking like the inside of somebody's freezer.

A sound was associated with all this, a roaring louder than that of the engines, or perhaps just as loud. The lifeboat was decompressing! The sound tapered away as the last of my air blasted its way outside.

The spacecraft leapt again as another crashing noise assaulted me. My body hurt, my head hurt, it felt as though I had been uniformly kicked in every spot, all at the same time. I reached out, clawing mindlessly at the control panel, blinded by the frost on my visor. Then the lifeboat crumpled and split around me and I screamed and went spinning into a darkness far deeper than that of space.

Pain assaulted me from all directions. What the hell was going on? With effort, I lifted my left eyelid. I saw white. I opened my right eyelid and still saw white.

I reached up painfully against the pull of gravity and wiped some of the frost off my visor. I saw the mangled insides of the OTV *Grissom*. I was alive!

I was also, I noticed, hanging upside down in my pilot's chair, a chair designed for zero-gravity use. Blood was pooling in my head and arms in a most painful way.

The next thing I noticed was that the lifeboat had split open like a watermelon dropped on the floor, or like a grape squeezed between two fingers. Its interior now resembled that of a small Italian sportscar with all the doors ripped off.

Next, I saw that outside the lifeboat's sundered walls was a cratered plain of gray dust, lifeless as an old bone. The Moon!

I grabbed my harness, fumbled with the emergency release until it let go, and fell out onto my head in laughable slow motion. I hit the ceiling of the OTV with all the force of a well-thrown pillow. I did laugh, then, an enterprise which caused me extreme discomfort.

With a little effort, I managed to roll over onto my hands and knees. Then I crawled outside through a wide split in the hull, being very careful not to snag my spacesuit on any sharp metal.

I crawled right out onto the dusty plain. The Moon! I had done it — I'd stolen a spaceship and actually landed on the Moon!

I hopped to my feet (an easy task in light gravity) and took a look around.

The view was uninspiring. Nothing but sand and rocks and the blackness of space for a sky. The horizon seemed close and somehow claustrophobic, despite the flatness of the terrain. I turned around, and the view became quite

a bit more interesting. Why, there was the Earth up high in the sky, a blue-white crescent of ocean and swirling cloud. Down closer to the horizon was the planet Jupiter, a yellow-pink star of piercing brightness. Just on the horizon stood a small cluster of domes and cylinders, undoubtedly the Russian Tsiolkovsky Moonbase.

And, why, just below that, surrounding the wreck of my lifeboat, was a group of grim, spacesuited figures carrying short aluminum bludgeons. The spacesuits had Russian flags on their shoulders, I saw. How nice.

The rescue party had arrived.

They took me into custody and locked me in a small storage closet inside the base. No medical attention, even, and I sure could have used some. But I found a laptop computer in here, one of the old Zenith-Moskova 2300's, and have been using it to record my story.

It was quite a while before I found out what happened.

See, the Russians actually had shot me down, as per their threat.

The American press had been hyping me up as some kind of terrorist, a James Bond supervillain come to life. This made the Soviets understandably nervous. Still, they hadn't planned on shooting me, until they saw the OTV separate into two pieces, one distinctly smaller than the other. All of them military stock, the Russian astronauts had screamed "BOMB!" and opened up on me with their best. A ground-based laser punched four holes through the lifeboat before they figured out what was going on.

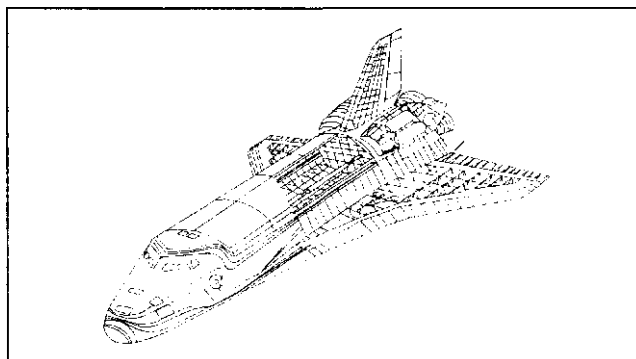
Well, I must be a lucky son of a bitch, because none of the laser blasts hit me, and the lifeboat managed to hit dirt at a velocity no faster than the average car crash.

And as for their trying to kill me, well, I guess I got even. The OTV, once separated from the lifeboat, fell into the Moon at a very good clip. And somehow, it landed directly on top of the Gagarin linear accelerator, blasting away a quarter-mile section of it and salting the wreckage with the drive motor's lethal radioactives. A million-to-one shot, right? Well, lucky me.

They might not have been so pissed at me for just landing near their base, but that Gagarin thing has them foaming at their collective mouth. It's a toss-up whether they'd rather ship me down to Russia to face trial as a spy and saboteur, or simply put me out the airlock here at Tsiolkovsky minus my environment suit.

I was kind of worried for a while, until I found out that the Russian moon-shuttles use the same kind of controls as their OTV's. I had studied that panel as part of my astronaut training, and knew it like the back of my best friend's hand.

I'll be flying one of them out tomorrow morning. □



The Gateway Concordance

By Frederik Pohl

Art by Frank Kelly Freas

Part III

Heechee Treasures

Planets were nice, pictures of stars were nice, but what everyone really wanted was some more samples of Heechee technology. There wasn't any doubt that there was some to be found — somewhere. The ships proved that. The little morsels picked up in the tunnels of Venus had proved it even earlier. But they just whetted the human appetite for more of these wonders.

Fourteen months after the program officially started, a mission got lucky.

Their ship was what was generally called a Five, but the system had not yet begun to operate in a standardized way. This time only four volunteers went along. They were officially chosen by the four Earth powers that had established the Gateway Corporation (the Martians took an interest later), and so they were an American, a Chinese, a Soviet, and a Brazilian. They had learned from the experience of Colonel Kaplan and others who had gone before. They brought along enough food, water, and oxygen to last them for six months; they were taking no chances this time.

As it happened, they didn't need them all. Their ship brought them back in 49 days, and they didn't come back empty-handed.

Their destination had turned out to be an orbit around a planet about the size of the Earth. It was obvious just from looking at the Heechee ships (plus what Sylvester Macklin's notes had told them) that the detachable pod at the base of every Heechee ship was a lander. They had managed to make it work, and three of them had actually used it to set foot on the surface of the planet.

For the first time in human history, humans walked on the surface of a heavenly body that was not part of the Sun's entourage.

First impressions were a bit disappointing. The four-power party discovered quickly enough that the planet had had some bad times. Its surface was seared, as though by great heat, and parts of it made their radiation detectors squeal. They knew they could not stay there long. But a mile or less from the lander, down a barren slope from the mountain-top mesa where they had landed, they found some rock and metal formations that looked artificial, and poking around them they dug up three items they thought worth bringing home.

One was a flat tile with a triangular design still visible on its glazed surface. The second was a ceramic object about the size of a cigar, with thread markings — a bolt? The third was a yard-long metal cylinder, made of chromium, pierced with a couple of holes; it could have been a musical instrument, or part of a machine — even a Hilsch tube.

Whatever they were, they were artifacts.

When the four-power crew proudly displayed their trophies back on the Gateway asteroid, they created an immense stir. None of the three looked like a major technological breakthrough. Nevertheless, if such things could be found, then there were certainly others — and no doubt things that would be of a lot more practical value.

That was when the interstellar gold rush began.

It was a long time before anyone got that lucky again. Overall, the statistics on missions out of the Gateway asteroid showed that four out of five trips came back with nothing to show but some pictures and instrument readings.

Fifteen per cent never came back at all. It was only one ship out of twenty that brought back anything tangible of Heechee technology, and most of those things were only curiosities ... but the very few that were more than curiosities were treasures beyond price.

They were few and far between, to be sure. The exploration of Venus had shown that was probable, for in all the hundreds of miles of Heechee tunnels under the surface of the planet Venus only half a dozen small gadgets had been found.

To be sure, some of those meant big profits for those who learned to copy them. The anisokinetic punch was a marvel. Hammer it on one end, and the force of the blow came out at the side. What was even more marvelous was that scientists managed to figure out how it worked, and its principle had applications in every area of construction, manufacture, and even home repair.

The fire pearls were a mystery. So were the so-called prayer fans.

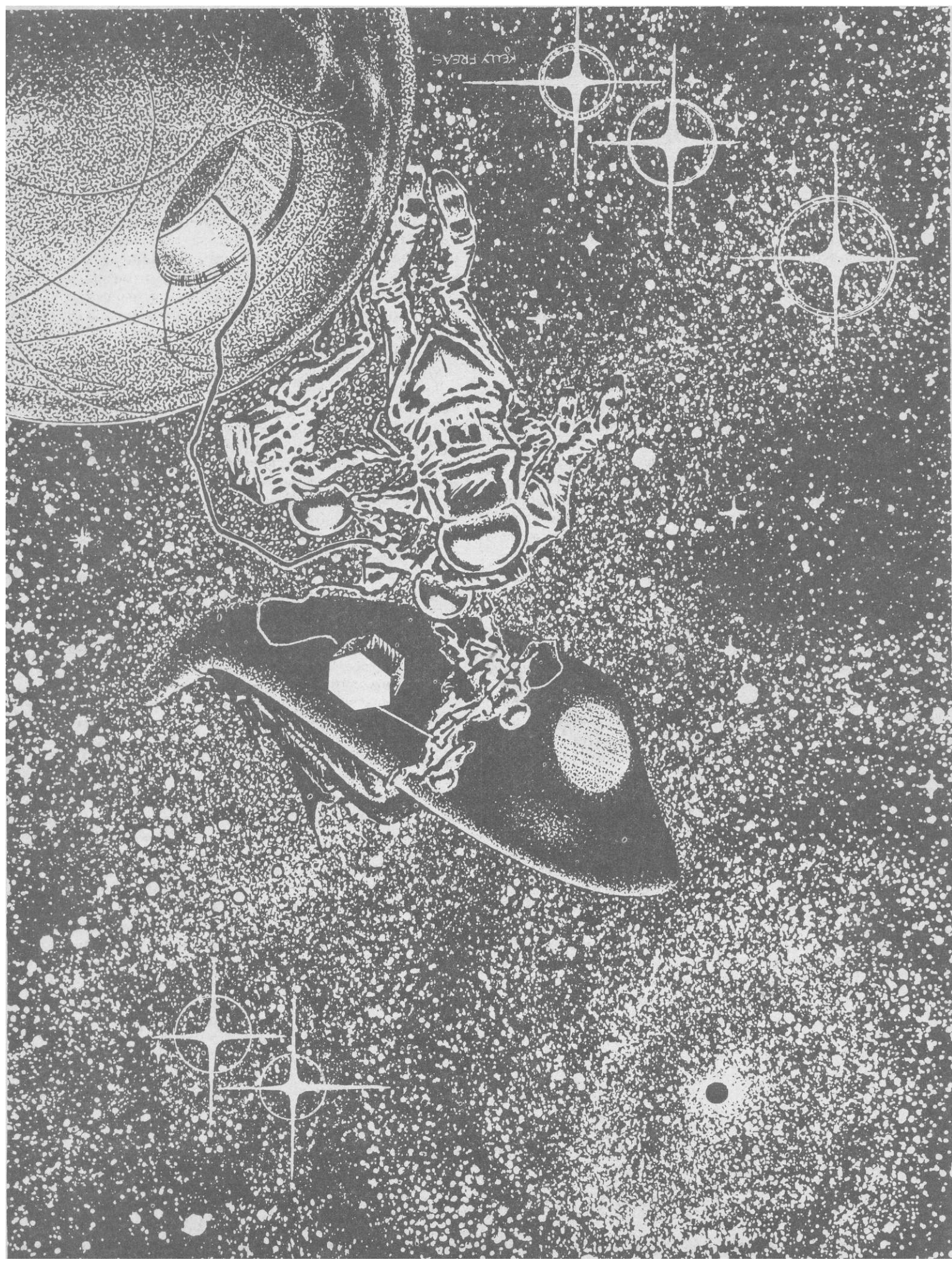
Then, of course, humans reached the Gateway asteroid, and that fleet of ships was the biggest treasure trove of all. But all there was was the ships. They were empty of anything but their operating gear; the whole asteroid was empty, almost surgically clean ... as though the Heechee had deliberately left the ships, but removed everything else that could be of value.

Over a period of twenty years and more the Gateway explorers went out to seek whatever could be found. They came back with pictures and stories, and kinds of living things, and minerals; but of Heechee artifacts they found very few.

That was why so many Gateway prospectors died poor — or just died.

Mission TOOLBOX

Some also died rich, without knowing they had become rich. That was the case in one of the biggest finds. Unfor-



KAY FREAS

tunately, it did three of its five discoverers little good, because they did not survive the trip.

The mission started with three Austrians, two brothers and an uncle, using the last of an inheritance to pay their way to Gateway. They were determined on an armored ship. As the only such vessel available was a *Five*, at the last minute they recruited a South American, Manuel de los Fintas, and an American, Sheri Loffat, to go with them.

They reached a planet; they landed on the planet; they found nothing much there. But their instruments showed Heechee metal somewhere around, and they tracked it down.

It was a lander. It had been abandoned there, heaven knew when.

But it was not empty.

The biggest thing they found in the lander was a stack of Heechee metal hexagonal boxes, not more than half a meter across and less than half that tall, weight 23 kg. They were tools. Some of the items were familiar, and so far useless: almost a dozen little prayer fans of the kind that littered so many Heechee tunnels and artifacts. But there were also things like screwdrivers, but with flexible shafts; things like socket wrenches, but made out of some soft material; things that resembled electrical test probes, but turned out to be spare parts for other Heechee machines.

It was a grand success. They wound up millionaires — or, at least, the survivors did.

That find was lying right on the surface of the planet. But before long the Gateway prospectors learned that planet surfaces were not the most likely places to look for examples of Heechee treasures. Under the surface was much, much richer.

One thing was clear early on about the vanished Heechee: they liked tunnels. The Heechee tunnels that honeycombed parts of the planet Venus weren't unique. As explorations retraced the old interstellar trails they found examples of them everywhere the Heechee had gone. The inside of the Gateway asteroid was a maze of tunnels; so were the "other Gateways" that turned up as the explorations progressed. Nearly every planet the Heechee had left any signs on at all had tunnels dug into it, lined with Heechee metal. Where the surface conditions were unpleasant (as on Venus), the tunnels were extensive and complex.

But even so fair a world as *Peggy's Planet* had a few of them. The anthropologically trained scientists called Heecheeologists, trying passionately to figure out what these vanished people were like, supposed that they came from a burrowing race, like gophers, rather than an arboreal one, like people. The Heecheeologists turned out to be right ... but it was a long time before any of them were sure of it.

All the tunnels looked pretty much alike. They were lined with a dense, hard, metallic substance that glowed in the dark: it was called Heechee metal. In the first tunnels humans encountered, on Venus and on the Gateway asteroid itself, the glow was a pale blue. Blue was by far the commonest of Heechee-metal colors, but inside the Heechee ships there were some parts that were made of a golden Heechee metal, and later on the explorers found Heechee metal that glowed red or green.

Of course, no one really knew why Heechee metal came

in different colors. The Heecheeologists were not much help. All they could tell about the occasional variation in the color of Heechee metal was that it seemed clear that the tunnels of bluish metal were generally the ones poorest in Heechee artifacts: gold, red and green almost always had more treasures to be found by the explorers.

Of course, until men and women began to learn how to explore the galaxy in the Heechee ships, they were limited to the blue-glowing tunnels of Gateway and Venus. And in them the treasures to be found were sparse, though, of course, sometimes of great value. In the tunnels found on the most productive planets, the tunnels started out blue, and then became another color just where the largest collections of useful tools were located. No one knew why ... but then, no one knew much about the Heechee at all, just then.

Mission HEATER

Wu Fengtse had chosen to ship out in a *One*. That had its advantages, and its faults. The biggest advantage was that if there was nothing to land on, and the only reward would be some kind of science bonus for observations, he could keep it all himself.

It didn't happen that way, though. When he came out of FTL drive, he found himself in orbit around an Earth-type planet.

So Wu had to face the problem of every single prospector: If he took his lander down to the surface of the planet, no one would be left in the ship. If anything happened to him on the surface, no one would be there to rescue him. He was completely on his own.

His other problem was that "Earth-type" was only a very approximate description of the world he had to explore. "Earth-type" meant that the planet was about the right size, and that it had an atmosphere and a temperature range that permitted water vapor in the air, liquid water in its shallow seas and frozen water on its colder parts. It wasn't heaven, though. Its colder parts included nearly all of the planet. Its best zone was around the equator, and that was not much unlike Labrador.

If there ever had been anything on any other part of its surface, it was now covered with thousands of feet of ice. There was no point in landing on a glacier. Wu found a bare outcropping of rock and landed there. He wasn't very optimistic. The environment did not look promising — but his instruments gave him better news than he had expected.

There was a tunnel.

Wu had practiced tunnel entry. He even had the necessary equipment.

Sweating the big power drills into place and erecting the bubble shelter that would protect it from the outside air took all of his strength, and enough time to use up the bulk of his supplies. But he got in.

It was a blue-lined tunnel.

That was discouraging, but as he moved along it he caught glimpses of other colors. When he got to a red segment he found a huge machine — later on, experts decided from his description that it had been a tunnel digger — but he didn't have the strength to lift it, or the equipment (or the courage, for that matter) to try to hack pieces off it.

In the green part of the tunnel were bolts of what Wu first took to be cloth, but turned out to be the crystalline

sheeting the "prayer fans" were made of. In the gold was — the gold.

There were stacks and stacks of little hexagonal Heechee-metal boxes, all sealed. All heavy.

Wu couldn't carry them all, and his energy was running out. He managed to get two of them back to the lander, and then took off, with every intention of coming back in a Five.

Unfortunately, when he was safely back on Gateway it turned out that no Five would accept the program that had brought him there. There was an obvious alternative, of course. That didn't work, either. Before he could requisition it and ship out again someone else had taken his One — on a one-way trip.

All he had was the two little boxes, but it was their contents that bought him a home in Shensi province. One contained heater coils — not operating, but close enough to working condition so that human scientists managed to tinker them going. (Later on better and bigger ones were found on Peggy's Planet, but Wu's were still the first.) The other contained a set of gauges for measuring microwave flux.

Scientists puzzled over the gauges very diligently, but they asked the wrong questions. What they labored to ascertain was how they worked. It did not occur to any of them, just then, to wonder why the Heechee were so curious about millimeter microwave flux. If it had it might have saved a lot of people a lot of unnecessary confusion.

It was in a tunnel on an otherwise unprepossessing planet that one prospector found the first specimen of the Heechee tunneling machine. It was in a tunnel on the Luna-like satellite of a distant gas giant planet that another found the "camera" that the so-called "fire pearls" served as "film." And it was in a tunnel that Vitaly Klemenkov found the little device that sparked a whole new industry — and earned him only a pittance.

K k i kin l e t y.
found was what human scientists came to call a "piezophone." Its main operating part was a diaphragm made out of the same material as the "blood diamonds" that had littered the tunnels of Venus and many others. The material was piezoelectric: when squeezed it produced an electric current, and vice versa. Of course, there were plenty of blood diamonds around, though no one had known before Klemenkov that they were basically raw material for piezoelectric devices. Klemenkov had visions of untold riches. Unfortunately, the main communications laboratories on Earth, subsidiaries of the cable and telephone and satellite corporations, developed the Heechee model into something they could manufacture themselves. Klemenkov took it to court, naturally — but who could fight the lawyers of the biggest corporations in the world? So he settled for a small royalty — hardly more, in fact, than an average emperor's income.

There was one other splendidly productive variety of place to find Heechee treasures. But no one knew that at first, although if they had thought of the example of Gateway itself they might have deduced it, and certainly no one knew that these rich lodes were, actually, traps. A woman named Patricia Bover was the first Gateway prospector to report finding one — and, as was so often the case, it did her little good.

Mission FOOD FACTORY

Patricia Bover set out in a One. She had no idea where she was going. She was pleased that it was a relatively short trip — turnaround in seven days, destination in fourteen — and astonished when her instruments told her that the tiny, distant star that was the nearest to her was actually the old familiar Sun.

She was in the Oort cloud of comets, far beyond the orbit of Pluto, and she was docking on what was clearly a Heechee artifact. A big one: it was eight hundred feet long, she estimated, and it was like nothing anyone had ever before reported seeing.

When Bover got into the thing and looked around, she realized she was rich. It was absolutely stuffed with machines. She had no idea what they did, but there were so many of them that she had no doubt at all that some of them, maybe many of them, would be as valuable as any heater or tunneler or anisokinetic punch.

The bubble burst when she found out she couldn't get back to Gateway. Her ship wouldn't move. No matter what she did to the controls it remained inert.

It not only would not automatically return her to her port of origin, it wouldn't go anywhere at all.

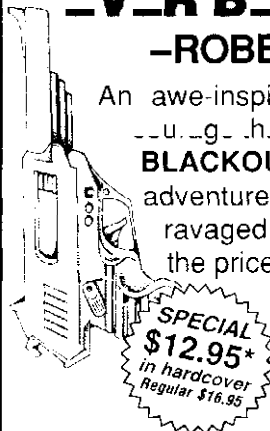
Patricia Bover was stuck, some billions of miles from Earth.

As it turned out, the artifact was still operating; in a part of it Pat Bover never saw it was actually still producing food, half a million years after it was left there by the Heechee, out of the raw materials of the comets them-

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selves — carbon, hydrogen, oxygen, and nitrogen, the basic elements that make up most of human diet and body. If Pat had known that — if she had forced herself to investigate the thing — she might have lived quite a long while there.

Though not long enough for anyone to get there to rescue her, of course.

She didn't know that, though. What she knew was that she was in serious trouble. What she did was send a long radio message to Earth, twenty-five light days away, explaining where she was and what had happened. Then she got into her lander and launched it in the general direction of the Sun. She took a knockout pill and crawled into the freezer ... and died there.

She knew the odds were against her. She wasn't properly frozen for any hope of revival, and anyway the chances were small that anyone would ever find her frozen body and try to revive it. And, as a matter of fact, no one ever did.

The Food Factory wasn't the only Heechee artifact in space which doubled as a trap for the unwary. There were altogether 29 of these large objects — they were called "collection traps" — somewhere in the galaxy.

It was more than fifty years between the time the first Gateway prospector landed on one and the time the last of them was discovered. As many as eight separate missions might converge on one of them. When they did, they couldn't return. Most had food factories, either built in or supplied with shipments of food by automatic spacecraft from an independent factory nearby, so the castaways didn't starve, nor did they lack for water or air. A few did not have these amenities — not in working condition any more, at least. In those cases all that was found was the abandoned Heechee ships and a few desiccated corpses.

Heecheeologists grew to believe that these "collection traps" served some purpose — maybe several purposes, though they could not be really sure what any of them were. None was accessible to planet dwellers; there were no tunnels on inhabited planets, nor were there any treasures where they could be reached without the use of spacecraft.

It seemed to be a sort of intelligence test posed by these vanished aliens. It was almost as though the Heechee, when they went to wherever they had gone, had deliberately left clues to themselves. But even the clues were hard to find. No intelligent race could find one until it had first mastered at least primitive interplanetary travel on its own.

And the greatest prizes were even more thoroughly concealed.

As a matter of record, it wasn't exactly a Gateway prospector who made the first round-trip expedition to the Food Factory. (Pat Bover's was only one way.)

The expedition that made it possible for the Heechee Carbon-Hydrogen-Oxygen-Nitrogen (or "CHON") food to do something to help out hunger on Earth arrived there in an Earthly chemical rocket, spiraling out into the outer reaches of the solar system.

And they did more than that, because it was through the Food Factory that the second big discovery came along. It was called Heechee Heaven. It was the largest Heechee-made artifact ever discovered, more than half a mile long, twice the size of an ocean liner. It was shaped like a spindle (a familiar Heechee design), and it was not

uninhabited. It held the descendants of the breeding group of Australopithecines the Heechee had captured on Earth's surface, half a million years before; it held one living human, the son of a pair of prospectors who had reached Heechee Heaven in their Gateway ship — and been trapped there.

And it contained the stored minds (poorly stored, but the machines that did the job had never been designed for human beings; humans had not yet evolved when those machines were built) of more than twenty Gateway prospectors who had come there on a one-way trip.

All that was wonderful ...

It was more than wonderful, though. For the first time, Heechee technology was not only on hand but accessible. At last some of it could be understood ... and copied ... and even improved! Those treasures were not just satisfying scratches for the scientists' itch of curiosity, or wealth for a few lucky discoverers. They meant a better life for everyone.

And Heechee Heaven was not simply a space station. It was a ship. A vast one. A ship big enough to transport human colonists in quantities sizeable enough to begin to make a dent in human misery, 3800 emigrants at a time, anywhere they chose to go, and to keep on doing it, once a month, indefinitely.

And the colonization of the galaxy by the human race was possible at last.

Looking for Company

The biggest "science" bonus the Gateway Corporation ever offered its prospectors wasn't really scientific. It was emotional, for even the Gateway Corporation had some human feelings. The money was waiting there for any explorer who discovered a living, breathing Heechee, and it came to fifty million dollars.

It was the kind of bonus any desperate Gateway explorer could dream about, but hardly any of them ever expected to claim it. Maybe the corporate masters didn't expect ever to pay it out, either. They well knew that every sign of the Heechee anyone had ever found was hundreds of thousands of years old. They also suspected, very likely, that there might not be much chance that anyone who did discover a live Heechee would be allowed to come back and tell the human world what he had found.

But there were other bonuses, lesser but still very worthwhile. There was a standing ten million dollar offer for the discovery of any intelligent race of aliens. After a while, that was reduced to finding any living aliens at all who showed the faintest signs of smarts. Or even for dead ones. There was a flat million posted for the discoverer of the first non-Heechee artifact found, and half a million or so for the discovery of any one of a variety of "signatures" — that is to say, of unmistakable signs of intelligence, like a clearly coded radio transmission, or the detection of synthetic gases in some planetary atmosphere somewhere.

It stood to reason, Gateway prospectors told each other as they bought each other drinks in Gateway's Blue Hell, that it was just about certain that somebody would find some of that kind of stuff somewhere, some time. They had to. Everyone knew that there ought to be other intelligent races around. As far back as the middle Twentieth Century scientists had been listening for signals from other civilizations in space and trying to calculate

the probability of ever hearing one. A fellow named Stephen Dole had calculated that there ought to be some 63,000,000 life-sustaining planets in the galaxy; later scientists, on tougher assumptions, cut the expected number down much lower — but hardly any of them were willing to put it at zero. Almost everybody agreed there ought to be some — and, in fact, Gateway prospectors did turn up planets where things did live. And if there was life of any kind, it seemed a reasonable bet that sooner or later some of that life would evolve toward intelligence

But where were they?

Then a couple of lucky breaks did begin to turn up a few such interesting discoveries, though they were very sparse and slow in coming.

The first definite signs of an alien intelligence (not counting the Heechee themselves, of course) were detected by a crew of five from Pasadena, California, Earth. They came out of faster-than-light drive in orbit around a promising-looking sun (it was identified as a G-4, pretty close to Earth's own primary in type and suitability), and discovered quickly that there was a good-sized planet right in the middle of the habitability zone.

The trouble was, the planet was a mess. Most of one hemisphere was a patchwork of bare rock plains, punctuated with volcanoes, and the thing was hot.

It didn't have much in the way of oceans. It didn't even

have anything like as much of an atmosphere as its mass and constitution would have predicted.

However, what it did have was a dam.

The dam was on the less ruined side of the planet, and it was not at all in good shape. It wasn't a very high-tech dam, for that matter — half a kilometer of rock piled across a valley (it had once been a river valley, no doubt, but there was nothing left of the river at all). There wasn't much left of the dam, for that matter. But what there was could not have been natural.

Someone had piled those rocks in that place for a definite purpose.

Martin Scranton and his two sisters tried to land on the planet. They made a landing, all right, but the heat sensors in their lander began to squawk warnings as soon as they touched down; the surface even around the dam was hotter than the boiling point of water. They did, they thought, see traces of what might have been stone structures on a few mountain tops, but nothing in recognizable shape.

Back on the Gateway asteroid, the scientists decided that that planet had had some bad luck — bad enough to be struck by some wandering body, probably something the size of Callisto; the impact had boiled off the seas, buried much of the planet under molten rock, driven the atmosphere into space — and, oh, yes, certainly, killed

A Long Time Ago

Before taking charge at *Aboriginal Science Fiction*, our editor, Charles C. Ryan, was the editor of *Galileo*, a science fiction magazine published in the mid-1970s. During his tenure there, he helped discover a number of new writers who have since gone on to win Nebula and-or Hugo awards, writers such as Connie Willis, John Kessel, Lewis Shiner and more.

•We think he did a fine job at *Galileo*, and, in fact, it was on the strength of that performance that we picked him to help turn *Aboriginal Science Fiction* into the first successful SF magazine in a decade.

Now, on his behalf, we'd like to give you an opportunity to see some of the best stories he collected a decade ago.

For a limited time, while copies last, you can purchase a first-edition hardcover copy of *Starry Messenger: The Best of Galileo* for \$10, plus \$1 postage and handling. If you would like your copy autographed by the editor, please indicate how you would like the note to read.

Starry Messenger: The Best of Galileo (St. Martin's Press, 1979) features 12 stories by the following authors:

Harlan Ellison
Brian Aldiss
Alan Dean Foster
Connie Willis
John Kessel
Kevin O'Donnell Jr.
D.C. Poyer
M. Lucie Chin
Joe L. Hensley
and Gene DeWeese
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Gregor Hartmann
and Eugene Potter

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Queen of the Atzu



every organic thing that had ever inhabited it.

So Scranton hadn't found intelligent life. He did claim that he had at least found a place where intelligent life had once been. The Gateway Corporation couldn't call it a success, in terms of the discovery bonus offered. They took a long time to think it over, then paid half the bonus for a good try.

The first living non-human intelligent race the human explorers found didn't count. They weren't all that non-human, and they weren't all that intelligent, either. (For that matter, they weren't even discovered by a Gateway ship; the people who found them were moping around the extremes of Earth's own solar system in a primitive Earth-designed rocket ship.) What these particular "aliens" were were the remote descendants of a tribe of Earthly Australopithecines, and the place they were found was on the big Heechee ship (or artifact), orbiting out in Sol's Oort cloud of comets, called "Heechee Heaven."

Of course, those old Australopithecines hadn't got there by themselves.

The Heechee had taken them away for breeding stock, in that long-ago visit to pre-human Earth. Then they had left them to the care of machine nursemaids — for half a million years and more.

The second race of aliens was better. It took a long time before they were found, but they were clearly the real thing at last. They were definitely intelligent — they proved it by traveling through interstellar space on their own! But they were a bit of a disappointment, all the same.

They certainly weren't much fun to talk to.

They weren't exactly found by a Gateway prospector, either — the whole Gateway Corporation was history by the time these folks got discovered. It still existed, of course. But Gateway no longer was where the action was, for by then human beings had learned to copy a lot of Heechee technology and were venturing into new areas of the galaxy on their own.

At that point, one interstellar ship, on what had become a fairly routine cruise, detected an unfamiliar vessel. It turned out to be a photon-sail ship, slowly chugging along between stars on a voyage of centuries.

That certainly was not Heechee technology! Nor was it human, not even Australopithecines: the long-awaited truly alien race had at last been located!

But actually they had been discovered quite a while earlier, it turned out — by the Heechee themselves, in fact. The sailboat people were the descendants of what the Heechee had called the "Slow Swimmers" and human beings came to know as the "Sluggards." They were definitely alien, and definitely not Heechee, and definitely intelligent.

That was all they had to recommend them, though. The Sluggards were sludge dwellers. They lived in wandering arcologies in a semi-frozen mush of methane and other gases, and, although they had really and truly managed to launch those photon-sail spaceships, they didn't have many other attractive qualities. The worst thing was that they were terribly slow. Their metabolisms ran at the pace of free-radical reactions in the icy slush they lived in, and so did their thoughts, and their speech.

It took a long time before any human beings were able to establish any sort of useful communication with the snail's-pace Sluggards ... and by then, as it turned out, it

didn't really matter.

Two other parties of Gateway explorers did, in fact, collect their ten million apiece. They found what the Corporation, with some charity, agreed to call "intelligent aliens."

Everyone admitted that the Corporation was stretching a point here. Even the lucky explorers did, though that didn't keep them from taking the money.

The "Voodoo Pigs" looked like blue-skinned anteaters and wallowed in filth, like domesticated Earthly pigs. What made them "intelligent" was that they had developed an art form: they made little statuettes, nibbling them into shape with their teeth (well, the things they used for teeth), and that was more than any Earthly animal had ever done. So the Corporation philosophically paid off.

Then there were the "Quancies." They lived in the sea of a remote planet.

They had tiny flippers, but no real hands; they weren't any good at manufacturing things for that reason, and so no one considered them technological. What they did have was a definite, and even a more or less translatable, language. They were definitely smarter than, say, dolphins or whales or anything else on Earth but Man himself — and there, too, the Corporation paid its bonus. (By then it was getting so rich that it was actually becoming generous, anyway.)

Those were all the live ones.

There were, to be sure, traces of other "civilizations" that were gone. A planet here and there had refined metal structures, not yet completely rusted away; others showed that somebody, some time, had gone so far as to pollute its environment with certainly artificial radionuclides.

That was it.

And the more they found, the more the wonder grew. Where were the old civilizations? The ones that had reached Earth's stage of culture a million or a billion years before? Why hadn't they survived?

It was as though the first explorers into, say, the Amazon jungle had found huts, farms, villages, but instead of living denizens only corpses. The explorers would certainly wonder what had killed all the people off.

So wondered the Gateway prospectors. They could have accepted it if they had found no traces of any other intelligence (always, of course, not counting the Heechee themselves.) Those members of the human race who cared about such things had been braced for that all along: the SETI searches and the cosmological estimates had prepared them for a lonely universe. But there had been other creatures that appeared to have been capable of as much technology and as much wisdom as the human race. They had existed, and now they were gone.

What had happened?

It was a long time before the human race found out the answer to that, and then they didn't like it at all.

The Age of Gold

While human beings were beginning to thread their way across the immensity of the galaxy, the world they had left behind them was beginning to change. It took a long time, but at last the Heechee wonders the Gateway prospectors had brought home were beginning to make a real change for the better in the condition of the peoples of the Earth — even the poorest ones.

One key discovery unlocked all the rest. That was finding out at last that the long-mysterious "prayer fans" were actually Heechee "books." Once that was known, the rest was up to linguists. It wasn't all that hard. It certainly was no harder, say, than the long-ago decipherment of "Linear B," and it was made easier by the fact that there were places, on "Heechee Heaven" and elsewhere, where parallel texts were in both languages.

When the prayer fans were interpreted, some of the most intractable Heechee secrets were learned. Not the least of them was how to reproduce the Heechee faster-than-light drive. The great ship that had been called "Heechee Heaven" was the first to be used, because it was already there. It ferried thousands of poverty-stricken emigrants at a time to new homes on places like Peggy's Planet, and that was only the beginning. Within five years that ship was joined by others, now human-made — just as fast; even bigger.

And on the home planet itself

It was the CHON-food factories that made the first big difference.

Simply put, what they did was end human starvation forever. The Heechee's own CHON-food factories orbited in cometary space — that was the reason for the long-baffling Heechee fascination with Oort clouds, answered at last. The human copies could be sited anywhere. That is, anywhere there was a supply of the basic four elements — C for carbon, H for hydrogen, O for oxygen, N for

nitrogen; that spells "CHON." For those are the elements that make up the greatest part of any organic matter. The only other necessity was enough of a salting of impurities to fill out the dietary needs.

So soon the CHON-food factories sat on the shores of the Great Lakes in North America and Lake Victoria in Africa and everywhere else where water and the four elements were present and people wanted to eat. They were along the beaches of every sea. No one starved any more. No one died before his time — it was almost true that no one died at all. For a long time human beings had known how to substitute transplants for any worn-out organ. Now the replacement parts didn't have to be butchered out of cadavers any more. The same system that made CHON-food, considerably refined, made human organs to implant into people in need. (A whole wicked industry of assassinations for the marketplace collapsed overnight.) And if, in spite of everything, a person did finally die, he didn't have to die completely.

At least, there was another Heechee invention — it had been first found on the ship called "Heechee Heaven" — that robbed death of some of its sting. The Heechee's techniques for capturing a dead person's mind in machine storage produced the "Dead Men" on Heechee Heaven. Later, on Earth, it produced the enterprise called "Here After, Inc.," the worldwide chain of operators that would take your deceased mother or spouse or friend, put his memory into computer space, and permit you to converse

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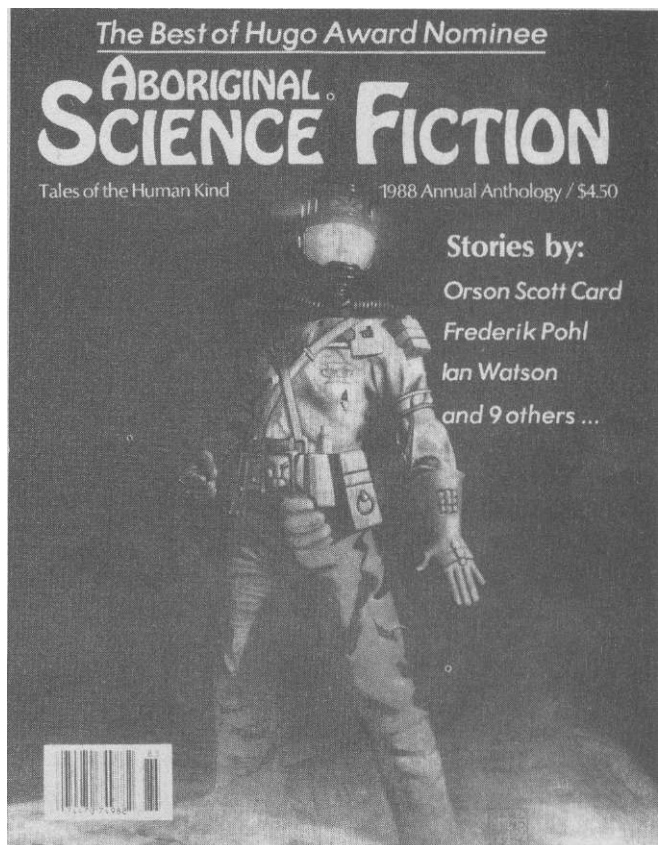
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with him whenever you liked — forever. Or as long as someone paid the storage charges.

At first, that certainly wasn't quite the same as being really alive. But it was a whole lot better than being irrecoverably dead.

(There was a small fringe benefit from all this, too. It put an end to capital punishment. Those least corrigible of terrorists and violent criminals who might otherwise have faced a hangman or an electric chair were now machine-stored. They were still alive then — after a fashion, anyway — but they were rendered harmless. From that sort of prison no one ever was paroled, and no one could ever manage to escape.)

Of course, as the technology matured (and it matured very fast), machine storage of human intelligence got easier and a great deal better.

When it got really good it began to raise some unexpected problems.

Surprisingly, the problems were theological. The promises of Earthly religions were being fulfilled in a way the religious leaders had never planned, for indeed it seemed now to be true that "life" was only a sort of overture, and that "death" was in fact nothing more than the stepping stone to "eternal bliss in Heaven."

The dying man who then woke up to find himself no more than a collection of bits in the datafile of the immense computer networks might well wonder why he had clung to life in his organic body so long, for the machine afterlife had everything going for it. He had lost nothing through death. He still could "feel." He could "eat" and "drink" — it did not matter that the "food" he ate was only symbolically represented by bits of data, because so was he. He could not tell the difference. He was deprived of none of the pleasures of the flesh.

He could even make love with his dearest, provided only that she had stored herself in the same net — or with any number of dearests, real and imaginary, if that was how his tastes went. If he wanted the society of the still-living friends he had left behind, there was nothing to stop him representing himself to them (as a machine-generated hologram) in order to have a conversation, or a friendly game of cards.

That part wasn't always easy, though. For at the speed of the gigabit space the "ghost" now occupied, human speech and thought were almost intolerably slow. Dead people in machine storage lost patience with the flesh-bound, but of course the "ghosts" knew the advantage was all theirs. And their style of life

Yes, that was Heaven indeed. The dead person's style of life was exactly what he wanted it to be. He didn't have to worry about what he could "afford" or what was "bad for him." The only limit was his own desire. If he wished to be cruising in the Aegean or sipping cold rum drinks on a tropical beach, he only had to order it. Then the data-stores would summon up any surround he liked, as detailed as any reality could be, and just as rewarding. It was almost like living in a perfect video game. The operative word is "perfect," for the simulations were not just as good as the reality, they were better: Tahiti without mosquitoes, French cuisine without gaining weight, the pleasure in the risks of mountain-climbing without the penalty of being killed in an accident.

The corpse could ski, swim, feast, indulge in any pleasure ... and he never had a hangover.

And if the mere pursuit of pleasure began to pall, after a (subjective) millennium or two, he could work. Some of the greatest music of the period was composed by "ghosts," and from them came some of the greatest advances in scientific theory.

It was really surprising that, nevertheless, so many people still preferred to cling to their organic lives.

All it required in order to make all these things happen, given the knowledge of the devices themselves, was energy.

There too the Heechee came through. The secret of Heechee power generation came out of study of the core of the Food Factory; and it was cold fusion. It was the same compression of two atoms of hydrogen into one of helium that went on in the core of any star, but not at those same temperatures.

The output heat of the reaction came at about 900 Celsius — a nearly ideal temperature for generating electricity — and the process was safe.

So the power was there. It was cheap. And it put ten thousand fuel-burning power plants out of business, so that the carbon-dioxide greenhouse warmup of the Earth came to a halt, and the pollution of Earth's air stopped overnight. Small vehicles burned hydrogen or ran by flywheel kinetic-energy storage. Everything else took its power off the grids.

Things were really getting to be very nice on Earth, because human technology hadn't stopped, either.

Quantum-effect devices had long since replaced the clumsy doped silicon microchips, and so computers had become orders of magnitude faster and better.

No one had to tap out a program on a keypad any more. He told the computer what he wanted done, and the computer did it. If the instructions were inadequate, the computer asked the right questions to clear it up — it was face-to-face communication, a machine-generated hologram speaking to its flesh and blood master.

Heechee food and Heechee power ... human computers ... Heechee biochemistry allied to human medicine ...

The human world at last allowed true humanity to every person who lived on it. And if, even so, any human wanted more, there was a whole galaxy waiting for him that was now within his reach.

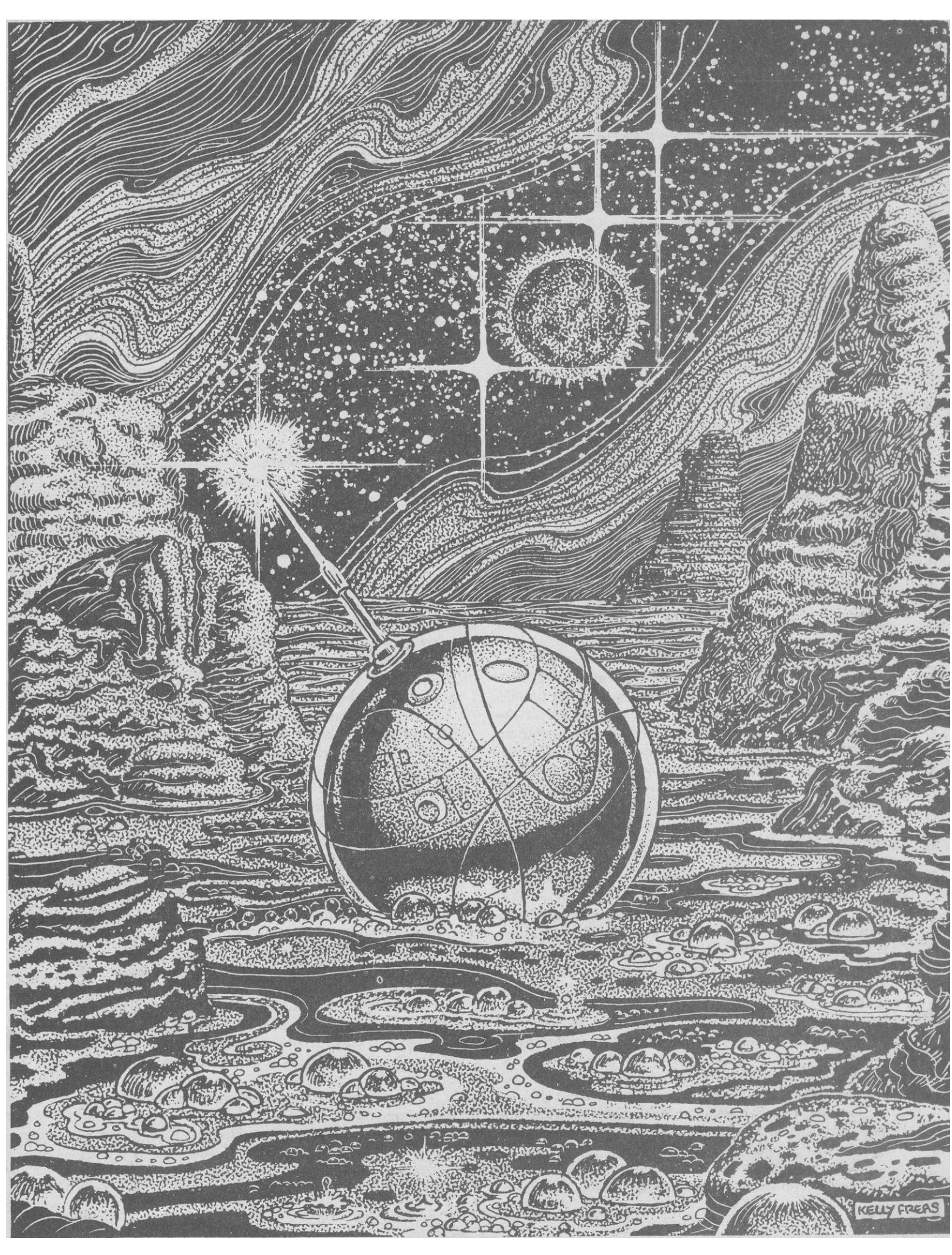
What remained was the burning, never stilled question of the Heechee themselves.

They were elusive. Their works were everywhere, but no one had ever seen a living Heechee, though every last Gateway explorer had wanted to look, and almost every human on Earth dreamed (or had nightmares) of what they would be like when found.

Arguments raged. Answers were scarce. The prevailing theory was that somehow, in some tragic way, the Heechee had died off. Perhaps they had killed themselves in a catastrophic war. Perhaps they had, for reasons not known, emigrated to a distant galaxy. Perhaps they had suffered a universal plague — or reverted to barbarism — or simply forgotten how to travel through interstellar space.

What everyone agreed on, at last, was that the Heechee were gone.

And that was just where everyone was very wrong.



In the Core

It was not true that the Heechee had died. Certainly not as a race, and, funnily enough, in an astonishing number of cases they hadn't even died as individuals.

The Heechee were very much alive and well. The reason they were not found was simply that they didn't want to be. For good and sufficient reasons of their own, they had decided to conceal themselves from any unwelcome attention for a few hundred thousand years.

The place where the Heechee hid was in the core of the Galaxy, within an immense black hole — a black hole so enormous that it contained thousands of stars and planets and satellites and asteroids, all orbiting together in a space so small that their combined mass had pulled space in around them. The Heechee were all there — several billion of them, living on some 350 roofed-over planets inside their Core.

To create their immense hidey-hole, the Heechee had tugged together 9,733 individual stars, together with their appurtenant planets and other orbiting objects. That gave them, among other things, some really spectacular nighttime skies. From the surface of the Earth, human beings can see at most maybe four thousand stars with the naked eye, ranging from fiery blue-white Sirius all the way down to the sixth-magnitude ones that lie on the squinting border of visibility.

The Heechee had more than twice that many to look at, and they were a whole hell of a lot closer — blue ones far brighter than that familiar Sirius, ruby ones almost as bright as Earth's Moon, asterisms of a hundred stars in a bunch and all wondrously bright.

Of course, that same stellar population density kept the Heechee from having much in the way of nights. Except when the clouds were thick they just weren't used to much darkness, because in their Core planets there was seldom a time when the collective stellar effulgence didn't give them light enough at least to read by.

With all those stars, they had plenty of planets to live on. They only occupied a fraction of the available planets, but they had made the ones they chose to live on very homey. Naturally, a very high proportion of those planets were temperately warm, benign in atmosphere, right-sized for the kind of surface gravity the Heechee enjoyed (not all that different from Earth's, as it happened). That wasn't any accident. They had naturally chosen the cream of the crop to shift into their Core colony so they could inhabit them. There they built their cities and their factories, and laid out their farms and cultivated their oceans — none of those things looked exactly like the human equivalents, but they all worked just as well. Generally a lot better. All of it was so thriftily done that they avoided pollution and everything unsightly. They were snug as bugs in a rug. The crystal spheres that surrounded every planet kept out the more dangerous radiation from all those nearby stars. The Schwarzschild radius of their immense black hole kept out something they feared even more.

That was why they had retreated the way they had. Now they were waiting.

It was a while before any human being knew exactly what a Heechee looked like, but they are easy enough to describe.

A male Heechee is about five feet tall, on average. His head is the Aryan ideal Nordic squared-off block, only a

little more so, though his skin color isn't Nordic at all. If he is male it is probably a sort of oak-bark brown; if female, she is generally somewhat paler. The Heechee skin looks as though it were carved out of shiny plastic. A dense, fine growth of hair covers his scalp, or would if he didn't keep it cropped very short. He smells ammoniacal to human beings — the Heechee themselves don't notice it. There is no iris to his eyes. There isn't really even a pupil, just a vaguely X-shaped dark blotch in the middle of a pinkish eyeball. His tongue is forked. And his general build — well, what you would think of a Heechee's bodily build would depend on whether you were looking at him from the front or from the side.

If a human being were squeezed flat, he would come out of it looking about like a Heechee. Viewed from the front, your Heechee would look formidable; from the side (except for a rather potbellied, globular abdomen), quite frail. What he would most look like (though not so exaggerated) would be the cardboard-cutout skeletons children decorate their schoolrooms with at Halloween. This was especially true around the hip and leg joints, because the Heechee pelvis was structurally rather different from the human. The legs attached directly to the ends of the pelvis, like a crocodile's, so there was a considerable space between the legs as a Heechee stood erect.

The Heechee didn't waste that space. It was the most convenient place for a Heechee to carry anything, so the sorts of loads human beings would be likely to lug in their arms or on their shoulders the Heechee carried slung between their legs. In fact, all civilized Heechee carried a large, tapering pouch there. In it they kept two main items — the microwave generators they needed for their comfort, and the storage facilities for the "Ancient Ancestors" whose minds they carried around with them, as a human being might carry a pocket calculator — as well as their equivalents of fountain pens and credit cards and photos of their near and dear. And when the Heechee sat down, what they sat on was the pouch.

(Thus at one blow ended a half century of speculation on what the Heechee crotch was like.)

Although hard and shiny, the Heechee integument was not thick. You could see the movement of the bones through it; you could even see the muscles and tendons working, especially when the Heechee was excited — it was a kind of body language, something like a human's grinding his teeth.

Their speech was somewhat hissy. Their gestures were not at all like those of Earthmen. They didn't shake their heads in negation; they flapped their wrists instead.

The Heechee, who had descended from a race of burrowers like prairie dogs rather than arboreal tree climbers moved to the plains, as people had, possessed several traits that their heredity had laid on them. No Heechee ever suffered from claustrophobia. They liked being in enclosed spaces. (That may have been why they enjoyed tunnels so much. It certainly was why they preferred to sleep in things like gunnysacks filled with wood shavings.)

Their family lives were not exactly like human; nor were their occupations; nor were their equivalents of politics, fashion, and religion. They had two sexes, like people, and sex was sometimes obsessive in their minds — as with people — but for long periods they hardly thought about the subject. (Not very like most people at

all.) Strangely, they had never evolved equivalents of such human institutions as a government bureaucracy (they hardly had a government) or a financial economy (they didn't even use money in any important sense.) Humans didn't understand how they could operate without these things, but the Heechee thought human ways pretty repulsive in those respects, too.

Since, by the time human beings got far enough out into space to have some chance of encountering Heechee, most employed persons were in these "white-collar" occupations, they were startled to find that most Heechee were, in their view, unemployed.

That was only one of the things that made them queer in each other's eyes.

All the same, the Heechee were certainly human enough to talk to — as soon as anyone got the chance.

Meanwhile, they lived in their crowded Core, contentedly enough.

Their lives within the Core were not entirely normal, however. There was one significant divergence from normality. The Heechee had been living there for some half a million years — since not long after they visited the early Earth and carried away a handful of Australopithecines to see what the stupid little beasts might develop into, given a chance — but it didn't seem that long to them.

Albert Einstein would have understood why that was immediately. In fact, he had predicted something like it. Because the Heechee were within a black hole they obeyed the cosmological rules of black holes, including the phenomenon of time dilation. Time that sped along in the outer galaxy passed with glacial slowness inside the Core; the ratio was something like 40,000 to 1. That was a very great difference — so great that many of the Heechee who had left their ships on Gateway were still alive inside the Core. Oh, they were older, yes.

Time hadn't stopped. But for them only a few decades had passed, not half a million years.

And when the Heechee ran away and hid they left sentinels behind them. They could not be certain that some other intelligent, space-faring race would evolve, and find the artifacts they had left, and use them ... but that was the way to bet it. They counted on it, in fact; and so the Heechee had set robot sentinels in concealed places in the galaxy to find these new races when they showed up.

When the human race began to make noise in the galaxy, the Heechee's watchmen heard it.

The Heechee had ways of getting in and out of black holes, even in and out of the immense one they lived in at the Core. Some of their ships had a twisted ebon rod that they called the Heechee equivalent of "can opener" that made it possible. They decided it was time to check their "collection traps" and see just what had begun to happen in the galaxy in the last few centuries (or, from their viewpoint, couple of days). In the normal course of events, the Heechee sent a routine scouting party out to investigate ...

But that is, really, quite another story. □

THE END

Leaving the Sea of Suns

By Jovanka Kink

Watching the last

*Colors fade I remember the Commander
Calling us to the bridge in the dead of ship's night,
We, stumbling from bed, almost reluctant
but urged by the promise of splendor,
Waking the little ones, wrapped in blankets,
bundled into the turbo-lift,
Emerging on the dark bridge just as
The forward viewscreen lit bright
with impossible sunbursts.*

*I remember our fleet of a thousand
gunships, insignificant as it
Plowed into the galaxy's core,
Solar sails unfurled and flung out
exuberantly in the light,
greedily drinking in power,
Radiation dancing off the shields
in violet arcs and reflecting
In our eyes, the whole bridge silent
And focused with one mind on the viewscreen --
Standing room only.*

*I remember the dense
Macrocosmic breeding-ground and grasping a once
In-a-lifetime chance to witness starbirth,
Stretched like a sunbather on observation decks,
Washed in iridescence that I never suspected
from stars, never this close, never this
Blinding saffron-and-scarlet, scorched sapphire,
orange-and-aqua, ultramaroon.
Barely leaving to eat and sleeping curled
by the windows these past two nights, I just now
Awaken and you say "Look, the solar sails
are coming in," like dreams
Pulled back and folded away, no longer useful
in the cold empty sanity of the void.
In desperation I plaster myself
Against the window, watching the last
explosions of color recede, and if vacuum
Carried sound I would hear the wind moan.* □



Uniqueness

In a lot of ways, the science fiction field has fallen on evil times. I'm not the only one to suggest this. Norman Spinrad has said as much in his *Asimov's* columns. John Shirley has said it as he's tried to draw attention to alternative and "underground" SF.

The *fantasy* field, which has virtually no one to speak for it — no critical magazines like *Foundation* or *Thrust*, not even a regular review column in any major publication — has largely taken the blame, deserved and otherwise. Again and again in the tirades of Hard SF writers who are feeling threatened, it becomes clear that, to put it bluntly, fantasy writers are the outcasts of fantastic literature. It was clearest of all in a recent interview with Brian Aldiss in *Publisher's Weekly*. The party line now is, if it's fantasy, it is utterly beneath consideration. Seems to me there was a time when mainstream critics felt that way about science fiction.

And the horror writers, too, dump on fantasy.

But they're all missing the disease for one of the more obvious symptoms. What is happening is that the science fiction/fantasy/horror area of publishing is just as subject to best-seller pressures as any other area of publishing. Particularly as publisher after publisher is merged into vast entertainment combines, editors must look solely to the profit margins if they want to keep their jobs. Gone

are the days when an editor can buy a book because he feels it really should be published. Now he frequently has to convince a whole board that this particular book is going to make money.

And the best way to make short-term money is to publish a book just like the last one that made money. Books become product. The writers who prosper are facile verbal technicians who can turn out that sort of product at an acceptable level, without any worrisome weirdness which might upset the demographics.

It's that very weirdness we are in danger of losing, the productions of eccentric writers like Avram Davidson or David Bunch or R.A. Lafferty; any sort of individual vision which stands out from the mass of *product*.

The most pernicious trend is called variously "sharecropping" or "franchise" publishing. A famous name writes an outline or a preface (though it would be theoretically possible for this to be ghosted, then to use a *dead* famous name), but little-known product-producers are hired to write the latest installment of Asimov's *Robot City* or *The Fleet* or Philip Jose Farmer's *Dungeon* or *Doctor Bones*. This is an open invitation to mediocrity, not merely because the writers hired are seldom the best, but because they're hardly going to do more than turn in acceptable copy, take the money, and run. In old-fashioned terms, the results will be uninspired.

There's a variant of this I'd call "pissing in a famous flowerpot," whereby someone is hired to write a sequel to a famous classic, then the two of them are published together as a book. Again, what we lose is any individual vision, and uniqueness, the very sort of uniqueness which made

the original story a classic in the first place.

I have a friend who thinks this is a fine idea, because there are too many books for him to keep up with anyway, and this gives him broad guidelines for skipping dozens, even hundreds of titles. But I think it's damaging in three ways:

1) It takes rack space away from real books.

2) It takes money away from real books. How many fewer worthy first novels are going to be bought because the publisher spent the money on some shared world/braided meganovel set in the universe of Robert Moore Williams?

3) It retards the artistic development of the neophyte writers involved. This is the most serious charge. If a Bright New Writer makes something of a name for himself in the magazines, then moves on, not to individual novels, but to a technician's job in prose television, how long will that BNW's first *authentic* novel be delayed? Might he become either economically trapped or just plain lazy writing for franchisers and packagers and never get around to it at all? Quite possibly, we're going to have a very barren field ten years from now. We could lose a whole generation of talent.

In the fantasy field, similarly, the trilogy/series/prose-TV syndrome has caused the good stuff to diminish almost to the vanishing point. I can't think of a single publisher with a reputation for serious, adult-level fantasy similar to, say, the Bantam Spectra Special Editions. The Ace Fantasy Specials were a good try, but I haven't seen any more of them in a while. So we are left with occasional

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Rating System

★★★★★	Outstanding
★★★★	Very Good
★★★	Good
★★	Fair
★	Poor

stray volumes (usually somehow associated with David Hartwell), books published in the mainstream as "magic realism," and the all-too-infrequent productions of big name, high quality writers like Gene Wolfe or Ursula K. Le Guin. Otherwise the cutting edge of fantasy is in the short story, and there isn't much of that. You can look in *Pulphouse*, *Fantasy Tales* (British), *Weird Tales*, and perhaps *Marion Zimmer Bradley's Fantasy Magazine* and *Weirdbook*, but that's about it. Think of it as the cutting pin-point of fantasy. Otherwise the fantasy/imaginary-scene story has failed to develop since introduced to the mass audience by Lin Carter's Ballantine Adult Fantasy Series in 1969.

So, sure enough, science fiction writers who are similarly feeling threatened, -and who don't read the fantasy books anyway, point the finger and say, "Look, with this invasion of fantasy, the whole field has gone to the kiddies."

No, I disagree. All areas of publishing are similarly endangered by the corporate mentality which would reduce all to evenly blended mush. We need to stick together rather than blame one another. Do we really want to see science fiction, and fantasy, and even horror (probably the healthiest of the three fantastic genres) go the way of mainstream "literary" fiction?

There's a Japanese proverb which says (I paraphrase) that the nail which sticks up above the rest will be hammered down. There is a lot of hammering going on just now. But we need to support those rogue nails which stick up, or sideways, or are just shaped differently.

Grumbles from the Grave

By Robert A. Heinlein,
 Edited by Virginia Heinlein
 Del Rey Books, 1989
 281 pp., \$19.95

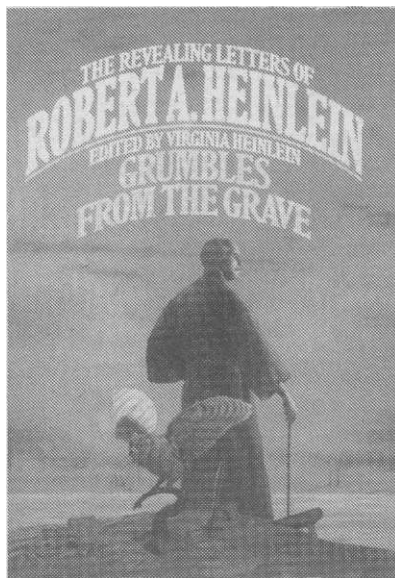
Robert Heinlein was certainly a unique writer, and one of the most influential the science fiction field has ever produced. We are still resonating to the notes he struck around 1941. Even the hard-core British ideologues who vociferously reject him have acknowledged his importance by reacting against it.

But Heinlein was also a private man, about whom personal details have not been forthcoming. The Queen of the Atzu

present volume may be all we are going to get, until some completely objective biographer comes in from the outside and has a look.

The title was once intended for an autobiography which Heinlein never wrote. Instead it is a collection of letters, mostly to his agent, Lurton Blasingsame, plus a few to John W. Campbell and miscellaneous correspondents, covering his life and career up to about 1973.

Considering the paucity of information available, *Grumbles from the Grave* provides revelation after revelation, but you won't come away with any sense of knowing the author, the way you will from Lovecraft's letters, for example. Whole areas of his life are left blank, such as his first marriage. I think Heinlein's interactions with science fiction fandom were a little more extensive than he admits



in the letter on page 272. He seems vague about having been guest of honor at the 1941 Worldcon.

We learn something of his writing methods, notably that virtually all his novels had clunky "working titles" which never would have done in print. Imagine *The Moon is a Harsh Mistress* as *The Brass Cannon*, or *Stranger in a Strange Land* as *The Man from Mars*. More surprisingly, Heinlein's relationship with Scribner's was increasingly difficult, and he caved in again and again on cuts and even ideological arguments, to the extent that he "vehemently" disapproved of the published version of *Red Planet*.

The Puppet Masters, it transpires, was rewritten by H.L. Gold in the *Galaxy* version and cut 25 percent (from Heinlein's manuscript, not Gold's version) in book form. And *Citizen of the Galaxy* was slanted to be *more adult* in the *Astounding* serial than in the book.

Eventually Heinlein got control of his adult publications, so that they were published as he wanted them (but not the older books; the uncut *Puppet Masters* has only appeared in the last month), and he walked away from Scribner's, whose editor, Alice Dalgliesh, seems to have been an ignorant, meddling snob. (Heinlein suggested Hubert Rogers to illustrate the juveniles, but Dalgliesh refused, since he was associated with "cheap" pulp magazines. To prove it, she sent him Rogers's *Astounding* illustrations for "Anson MacDonald's" story "By His Bootstraps." Had she known who MacDonald was, would the most successful series of SF juveniles in history have had to find another publisher?)

We learn the truth behind the often maliciously repeated rumor that *Stranger* somehow inspired Charles Manson. (Heinlein got a fan letter from a Manson cultist.)

In the early letters, there is a sense that Heinlein was perfectly aware that he was Number One in a field he had revolutionized overnight. It might have seemed like insufferable arrogance at the time, but looking back on it we can only agree that he was right. He is considerably less arrogant, contrary to his reputation, on political and philosophical matters. Late in life we find him refusing to lecture on such topics because he doubts the wisdom of his own opinions and wants everyone to think for themselves.

Overall there is some sense of Heinlein's values, his sometimes deplorable politics, and his ability — like Kipling's — to rise above his politics and become universal. But, while this is a historically important document of the first order, full of interesting tidbits, it doesn't provide much depth.

Rating: xKYiTY

Sindbad: The Thirteenth Voyage
 By R.A. Lafferty
 Broken Mirrors Press, 1989
 158 pp., \$9.95

Fifteen years ago this delightful novel would have been published by Ace Books and might well have been a Hugo finalist. It is more immediately accessible than *Past Master*, which *was* a Hugo finalist. But nowadays, Lafferty is, alas, the prime example of the individualistic writer pushed out by sharecroppers and generic trilogies. So his books are published by his fans in small editions. This is the first Broken Mirrors publication. Other major Lafferty publishers include Chris Drumm, who is serializing a previously unpublished novel in his booklet series, and New Mythologies Press of Canada, which, as I write, has just released a Lafferty novel, *The Elliptical Grave*, and is hinting at a reprint of the fabulously rare *The Fall of Rome*.

I think *Sindbad* is new work, as it did not appear on any previous listing of unpublished Lafferty novels I've seen. It is, as the title implies, Lafferty's version of *The Arabian Nights*, and at this point it is customary to remark, "Need I say more?"

Well, I will. Lafferty's *Sindbad* is an interplanetary sailor, whose adventures were sent to 8th-century Arabia by mistake. The Arabs knew good material when they saw it. Can we blame them if they changed a few things?

Sindbad returns to Earth to find the latest incarnation of Harun Al-Rashid, the caliph who is always a child, and who always reigns for a day before being overthrown by his virtuous son Al-Amin, who in turn reigns for a day before being deposed by the wicked Mamun. (Both sons are always older than their father.) Noted spies from numerous planets (including Astrobe, the planet of *Past Master*) converge on the "mirage" city of Baghdad for the occasion. One of them is actually a 16-year-old genius from Chicago who is trying to supplant *Sindbad*. One Scheherazade Carrillo y Krynski is also present, and eventually traps most of the cast in bottles. One of the Caliphs sends everybody on a voyage to the Earth's center, to make sure that the doors to Hell are securely locked. But, alas, fire-demons from the Earth's core have gotten into the dragons, which otherwise don't breathe fire ... all this in Lafferty's jaunty style, in the manner of a can-you-top-t/iiis/ tall tale. The thematic material is relatively straightforward. The characteriza-

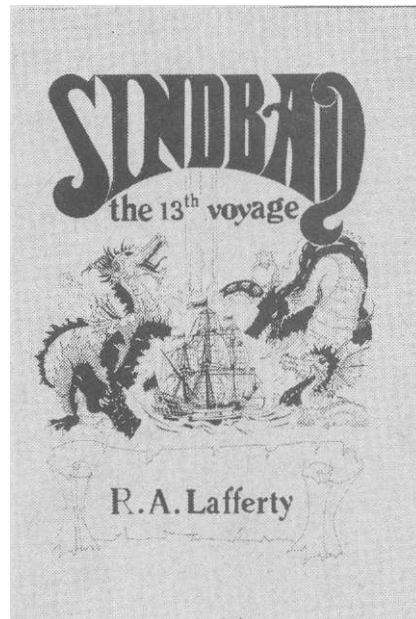
tions are odd, even for Lafferty. (I am merely puzzled by the masochistic Scheherazade, who likes being whipped one moment, but gets the best of everyone by the end of the book.)

Definitely not the standard product. Its strength is Lafferty's unique voice, and his ceaseless invention. He is not a *realistic* writer in any sense, but he has a way of charming our objections away until *anything* he says seems plausible.

The song the Sirens sang is quoted on page 40, by the way.

(Broken Mirrors Press, Box 473, Cambridge, MA 02238.)

Rating:



The Dark Half
By Stephen King
Viking Press, 1989
431 pp., \$21.95

This is Stephen King's coming-out-of-retirement book. The retirement didn't seem very long, with the appearance of a second *Dark Tower* volume and the republished Bachman books, along with *The Tommyknockers* (science fiction), *Misery*, and *Eyes of the Dragon*, but it is his first actual supernatural horror novel under his own name since *It*. It has been a few years. (I am reminded of the old joke that Robert E. Howard dead was more prolific than Alfred Bester living. Stephen King retired was also more prolific than Alfred Bester active, but then that's also true of several other SF figures who "retired" noisily in the mid-'70s.)

It's clearly the product of his recent experience, particularly the Bachman affair, when his secret pseudonym was suddenly revealed by a fan's diligent research. In *The Dark Half*, a critically acclaimed but financially unsuccessful SeriLit author makes big bucks on a series of almost psychopathic, pseudonymous thrillers (which sound like they'd fit on the shelf right next to Rex Miller's *Slob*). Then the secret leaks, and the pseudonym is "buried" complete with a fake gravestone, and the writer hopes to get back to his "real" work. But, alas, the pseudonym has other ideas and climbs out of the grave as a physical entity. Murders ensue. First the author is accused by the law, then blackmailed by the pseudonym, and forced to begin writing a new slasher novel, so the "dark half" can live on.

It's a neat idea, forcefully written, but I detect four main flaws:

1) As is often the case with King, the book doesn't really get cooking till at least page 100. He even describes this process in the course of the novel, how pages and pages of dead matter slowly come alive.

2) He goes for the gross-out much too early. The first supernatural hint in the book (a dream), when *The Dark Half* is inevitably made into a movie, would be worthy of the cover of *Fan-goria*. This tends to dilute the impact of such scenes later on. (Similarly, he uses four-letterisms too freely, until all the characters begin to sound alike.)

3) The rantings about the "creepazoid" who uncovered the pseudonym will inevitably be seen as a mean-spirited attack on Steve Brown (who identified Bachman from copyright records) even if it isn't so intended.

4) The ending is too easy. For all the rhetoric about how much it costs the hero, it seems like *deus ex machina* to me. I won't spoil it for you, but suffice it to say that the means to solve the problem have been around throughout the entire novel, that the little extra the hero needs turns up very handily, and while the climax is genuinely spectacular, it is also terribly convenient. Right as the hero confronts his demonic "twin" we need more of the allure of evil: what was it about this violent, evil man and his violent novels which so fascinated our hero that he created them? King gives only a hint of the greatest terror of all

— that evil should be attractive, for all it simultaneously repels — and then *bang!* the plot kicks in and it's all over.

On the plus side, the action/suspense scenes are taut. King even makes the evil pseudonym a convincing, repulsive human being, a memorable villain where most writers using such a premise would have produced a cartoon. And, unlike the bloated *It*, this is a book that *moves*. The plotting is brisk, the pacing sound, the individual characterizations (mostly) sharp and real (once they get over talking dirty and settle down to the story), and the core idea is, in its own way, original.

Another patented King page-turner, neither his best nor by any means his worst.

Rating:

The Magician Out of Manchuria

By Charles G. Finney
Donald M. Grant, 1989
127 pp., \$25.00

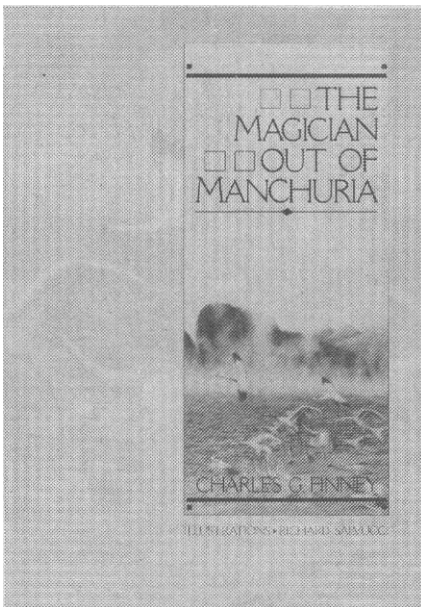
Charles G. Finney was one of those unique writers who would never have made it in today's fantasy field. He was too *odd*. Happily, his *The Circus of Dr. Lao* has become a classic, and has been in print off and on for decades. His other books have fared less well. Another Chinese fantasy, *The Unholy City*, appeared in 1937, and only saw the light of day once more, as a 1968 Pyramid paperback padded out by *The Magician Out of Manchuria* (its only publication). *The Ghosts of Manacle* (1964) is a collection of weird stories set in Arizona and completes the corpus of Finney fantasy. It has never been reprinted.

My guess is that *The Magician Out of Manchuria* was written around 1950, but failed to sell because fantasy was then extremely unfashionable in book publishing and the story was too sexy for the genre magazines of the day. The unnamed magician of the title, an obese old rogue who gets younger and thinner each time he sheds his skin (since he has a snake among his ancestors), attempts to make a living by thievery and thaumaturgy in a newly Communist China which has no time for the old ways and the old magic.

The influence of James Branch Cabell is evident, as everybody talks in satirical highfalutin when the book gets racy — but Finney is much more sexually explicit than Cabell ever

was. The magician attempts to restore the Lustful Queen of La to her rightful throne (stolen by a bandit who has become a commissar). Miracles abound, as does all manner of petty chicanery. Inevitably, the old world — the sort of magical China imagined by western writers — fades before the new, but there is a touch of hope at the end. As might be expected from the author of *The Circus of Dr. Lao*, the writing is polished and witty, and before long we have built up a considerable fondness for the characters, scoundrels that they are.

Don Grant's edition, typically, is very deluxe, illustrated by a new artist (Richard Salvucci), whose



dustjacket is very handsome, but whose interiors, sometimes, are a bit awkward.

Rating:

Noted:

Shadows of Dreams

By Robert E. Howard
Donald M. Grant, 1989
94 pp., \$25.00

Robert Howard, who dead continues to be more prolific than a lot of living writers, now offers a whole book of previously-unpublished verse rescued from the file of his correspondence with Tevis Clyde Smith. It's technically proficient, full of anger, fire, and emotional posturings. The quality runs, as the introduction honestly states, from enjoyable doggerel to a few gems. The title poem is

much too long, but could have been the first draft of something, very fine.

Contemporary poets should do as well. Howard's verse is clear, forceful, and sometimes haunting. It doesn't have to be puzzled out. He makes very good use of rhyme and (especially) meter, writing in a day when poets were expected to be able to do such things.

Rating: ikikftft

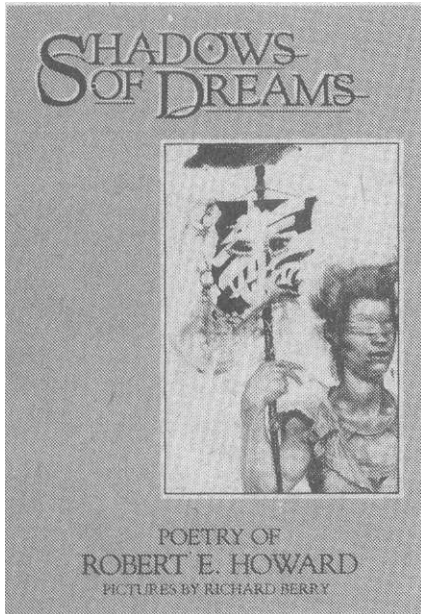
Contemporary Science Fiction, Fantasy, and Horror Poetry

By Scott Green

Greenwood Press, 1989

216 pp., \$35.00

Let me tell you how I review a reference book, since it is impractical to read it cover to cover.



I use it. First, I look up myself. The entry on me is flattering, but inaccurate. (I am purported to write sonnets. I never have.) Then I look up my friends. The entry on John Betancourt contains errors. (He did not work for *Isaac Asimov's*.) Then I start looking up the really important stuff, at which point with this book I realize I am in the presence of one of the strangest would-be reference works ever compiled. I truly cannot fathom the logic that went into this.

Green sent out a questionnaire to various poets. That seems to have been the bulk of his research. The result seems like a club roster of small-press poets, plus anything Green happened to have on his shelf.

Weirdly, there is no listing of books

by the subject authors. Thus, while we learn that Tom Disch has appeared in various small press magazines and won a Rhysling award, there is no indication of his five or six books of verse. (I'm not sure how many. I'll have to look it up somewhere.) There is no entry on L. Sprague de Camp, for all he has published three volumes of avowedly fantastic verse, one of them an Arkham House book. (By way of Arkham House, Green also fails to mention August Derleth's two landmark anthologies, *Dark of the Moon* and *Fire, Sleet, and Candle Light*. This is the equivalent of an encyclopedia of science fiction magazines which omits *Astounding*.) Even enormously important poets of the past, such as Clark Ashton Smith, don't rate an entry if they weren't around to fill out that questionnaire. (Some of the data do go back decades, so it isn't a matter of a time cut-off.)

But there's lots of space wasted on listings of fiction anthologies which contain a small amount of verse. Sporadic attempts to list verse in genre magazines (just a name and an issue — Lovecraft: Summer 73), are restricted mostly to very recent material and not always complete.

So we come away with no historical perspective and very little solid information. I am left with the impression that this book needs to be supplemented by a bibliography and an encyclopedia of some kind. Sigh.

Rating:

Colossus

By Donald A. Wandrei

Fedogan and Bremer, 1989

421 pp., \$28.00

Donald Wandrei (1908-87) was a member of the Lovecraft circle, a co-founder of Arkham House, and a star performer in the pulps of the 1930s. He was a pioneer of science fiction, whose cosmic vision and polished prose placed him head and shoulders above most of his contemporaries. But he burned out early, published little after 1940, and never fulfilled his early promise. Late in life he became — to put it politely — *difficult*, so that a book like this did not become possible until his death. Now we may begin to reevaluate him.

Wandrei had that sense of wonder the old-timers spoke of, but he fell into the latter half of John Campbell's famous dichotomy: "Those who can

think, can't write; those who can write, can't think." In a glorious race through time and the entire universe ("A Race Through Time"), the hero returns to Earth in the year One Million. Everyone is gone. Where is humanity? Scrounging through the ruins he finds a *candle* (about as plausible as a Neanderthal going through a contemporary apartment and finding just the right hide-scraper), which enables him to read a *newspaper* dated September 1, 995,851 ("World Doomed!") which is conveniently in a form of English he can understand. Most of Wandrei's stories are like that: awesome, sweeping, dumb. If only he'd lasted long enough to have learned a little discipline from Campbell. Still, his fiction can be read for actual enjoyment, rather than mere historical interest.

Rating: -frlkikikft

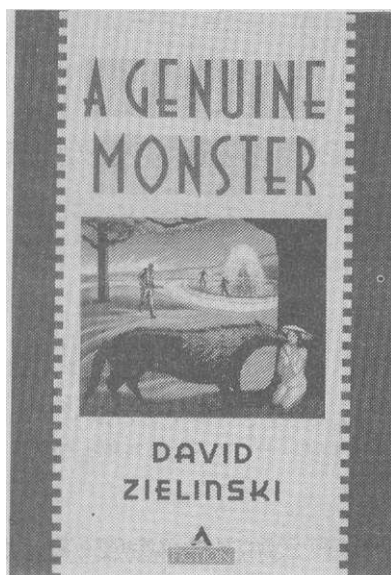
Humans and Others



By John E. Stith
Ace, 1990
about 250 pp., \$3.50

A Genuine Monster
By David Zielinski
Atlantic Monthly Press, 1990
236 pp., \$17.95

Many people have tried to define SF, generally without success. I offer here



a new definition: SF is that which is sent to an SF reviewer for review.

David Zielinski's first novel, *A Genuine Monster*, is certainly not science fictional, though the cover copy made me think so. (The blurb seems to describe another book entirely, one similar, but not identical, to this one.) It is a view into the mind of a madman, a dark comedy mixed with

Rating System

ftftftftft	Outstanding
ft ft ft ft	Very Good
ftftft	Good
ft	Fair
&	Poor

terror. In a sense, by being in the head of a psychotic, when we read this book we do enter a fantasy world.

The book takes us through the last day in the life of Nick Ames, a man with a very fragile grip on reality. He is obsessed with monster movies, seeing in them a reflection of his own inability to connect with others. He has three friends: Mrs. Raylak, his landlady, who is a member of the Nebulae Society, which is making plans for the arrival of space aliens; Argo, a hack writer of thrillers; and LaWanda, a waitress who is the focus of his sexual desires. As the day goes on, Nick gradually loses what distinction he had between fantasy and reality, until he enters a final mania beginning when he sees himself as Steve McQueen in *The Blob*.

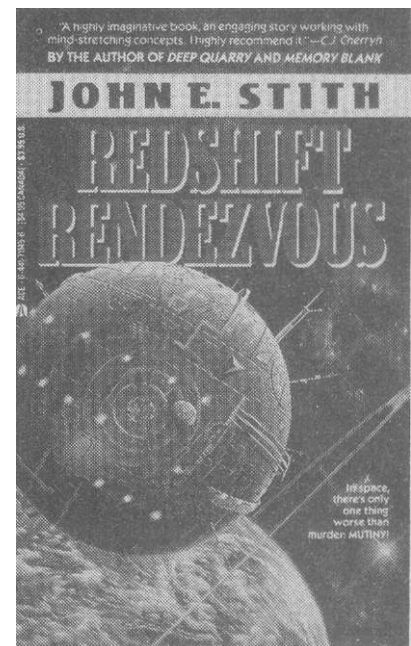
Every one of the other characters is doing something he or she doesn't really want to do, and trying to escape from the real world — the Nebulae Society just more obviously than most. Nick, however, isn't trying so much to escape as to return to the world, but his disturbed mind won't let him.

It's a bit difficult to understand Nick at the beginning, but before you know it you've fallen into his mind, and his bewildered questions and memories almost make sense. He's crazy, and so is the world, though Zielinski doesn't make such a pat comparison as that. Nick is much sicker than the world is.

A Genuine Monster is a *tour de force*. If Nick's memories of Vietnam are a bit familiar, if Argo's drunken monologues begin to pale — well, yes, there are flaws, but they don't hold the book back in its headlong flight through Nick's last day. This fascinating and absorbing novel is well worth reading, so long as you don't demand "real" fantasy.

Rating: ftftftft

John E. Stith is best known for his SF mystery novels. His new book, *Redshift Rendezvous*, is not a

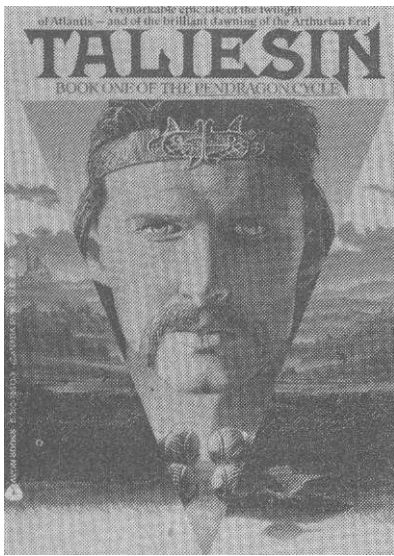


whodunit, but a well-constructed thriller. It passed my test for suspense novels — it kept me up far too late finishing it, though I was very tired. More important, though, is the original and carefully reasoned science-fictional idea on which the book depends.

The novel is set aboard the *Redshift*, an interstellar passenger ship. Faster-than-light travel is possible by shifting into other universes, called hyperspace layers. As these layers move farther from our own, their dimensions shrink, and so does the speed of light. Because the size of the layers decreases twice as fast as the

speed of light, you can shift into a layer, travel for awhile without ever exceeding the local speed of light, and then re-enter our own layer at the analogous point, having effectively traveled many times faster than our own speed of light — in the case of the *Redshift*, over a thousand times faster. (Stith explains the idea more clearly and fully in an appendix to the novel.)

What makes the idea fascinating are the carefully worked out consequences of traveling through a layer where the speed of light is only ten meters per second. People on the *Redshift* live in a relativistic world, where such phenomena as gravitational bending of light, Doppler shifts, contraction and mass increase at high speeds, and



time dilation are observable and important. This is all carefully reasoned, even where Stith has to wave his hands and fudge a little. He works out the ramifications consistently and in (sometimes startling) detail. Best of all, the science-fictional idea is integral to the plot; you could not remove it and still have the same story.

The plot is exciting, with plenty of twists and turns, and the ending is a satisfying completion of the story. The romantic subplot starts out a bit cliched: the moment the love interest boards, we know what's coming. However, it works and becomes more credible as the story continues. I had fun with the chapter titles, which are all based on the titles of well-known SF novels (e.g., "The Door into Hyper-space").

The writing is fine, if not brilliant. The early part of the novel is heavy with lecturing exposition, but it's difficult to get around that in a hard SF novel. While these lumps are noticeable, they're fairly digestible, and much less intrusive than you might expect.

The characters are well-portrayed, though their mind-set, including their cultural references, tends to be too 1980s. Near the beginning of the book, Stith sketches them with purple ink, but when he concentrates on a few main characters, he does them well. The narrator is likable and sympathetic. The villains are too black for my taste, though that does make for an exciting climax.

Stith has done a fine job on two sub-genres not easy to execute successfully: diamond-hard SF, and the SF/crime novel. *Redshift Rendezvous* is delightful, and brimming with Sense of Wonder.

Rating: tY

Taliesin

By Stephen R. Lawhead
Avon, 1990
486 pp., \$4.95

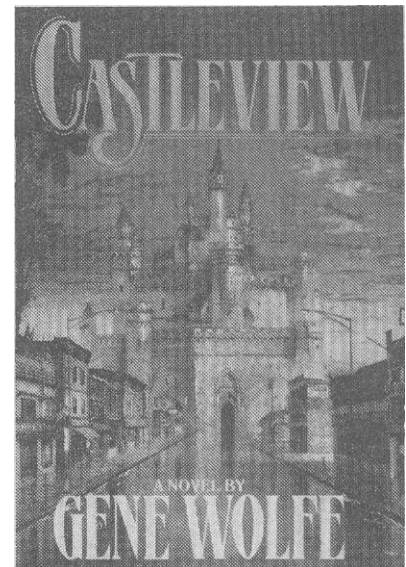
The Arthurian mythos is one of the most familiar and widely used of fantasy settings. A contemporary author who would use it needs to bring something new and different to the legend. In *Taliesin*, the first book of a trilogy, Stephen R. Lawhead has succeeded in doing so.

Taliesin is a beautifully imagined Arthurian tale, though Arthur doesn't appear yet; the novel ends shortly after the birth of Merlin. Lawhead has mixed the mythos with the legend of Atlantis. The Faeries (or Fair Folk) in the Arthur legend are here the fair folk of Atlantis — those who have escaped the island's destruction, whose physical and material splendor leads the Britons to think of them as supernatural. Also, unlike many modern retellings of the legend, Lawhead's is sympathetic toward Christianity, and informed by a true spirituality.

The book gets going a bit slowly; there's always something interesting to look at, but not always much action. I was engrossed, but I can see that some readers might get impatient. Much of the book takes place in Atlantis, and Lawhead has done a brilliant job creating that splendid but doomed

civilization. I have no idea how realistic his depiction of British life in the Dark Ages is, but I liked it, and it rang true to me. Lawhead's detailed portrayals bring both worlds to life, and he has a gruesome imagination when it's called for.

Lawhead does a beautiful job with the character of Charis, a young princess of Atlantis. Her transformation from whiny, spoiled teenager into committed, competent young woman is completely believable and sympathetic. The portrayal of the bard Taliesin is less successful, probably because he's such a magical person; it's hard for him to seem real when everything that happens to him is fraught with mystic meaning. The subordinate characters are quite well



portrayed, particularly a couple of friendly priests. Some of the villainy seems insufficiently motivated, but this is myth, and the rules are different.

If the remaining two books in the trilogy live up to the standard of this one, Lawhead will have made a major addition to Arthurian literature.

Rating: >Y>Y>Y^Y

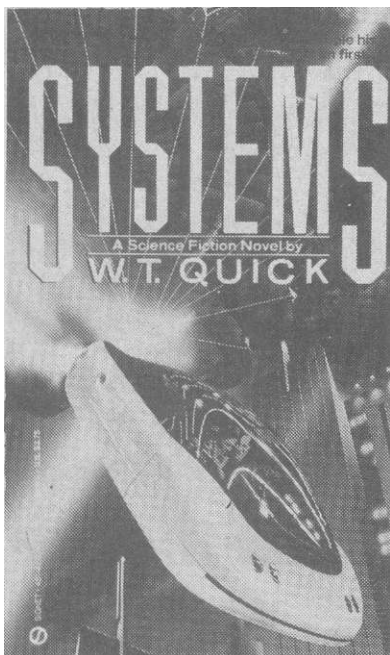
Castleview

By Gene Wolfe
Tor, 1990
400 pp., \$19.95

We come now, coincidentally, to another Arthurian fantasy. Gene Wolfe's *Castleview*, however, has little in common with *Taliesin*, apart from the legend on which it is based. Wolfe's book is a contemporary fan-

tasy with the feel of a horror story, and the Arthurian connection doesn't become evident until well into the book (unless you've read the cover copy).

Will Shields is moving his family to the town of Castleview, where he will run an automobile dealership. Shortly after the family arrives and starts looking for a home, they learn the origin of the town's name: at certain times and places, and under the right conditions, you can see a fairy-tale castle in the distance. This tale of wonder in everyday life quickly turns to horror, as Will chases his obsession with the castle, his wife Ann Schindler tries to track down a mysterious horseman on an otherworldly horse, and their teenage daughter Mercedes finds romance



and then gets involved with a sinister hitchhiker. The plot threads all come together by the end, when we and they learn the secret of the castle.

Castleview is written in a much plainer style than most of Wolfe's noted work, but is still beautifully written. The words draw you in and you coast to the end. Wolfe does a superb job creating a creepy atmosphere, starting in the first few chapters. The plot is suspenseful, though unfortunately Wolfe sometimes feels compelled to give the suspense a boost by ignoring one sub-plot for chapter after chapter until he brings it back and lets us know what happened. There are also some confusing jumps of time and space between scenes.

Gene Wolfe is often considered a "difficult" writer, but this book didn't seem "difficult" until the end. Maybe I'm dense, maybe I don't know enough about Arthuriana, maybe I didn't read as carefully as I thought I did, but I was left with a lot of questions at the end, and some of the questions that were answered were answered so subtly or confusingly that I had to read passages several times to figure out what had happened. I was left bewildered and wondering what I'd missed.

But *Castleview* is still an absorbing book. I was happy to let Wolfe take me along for the ride, even if the ending wasn't all I'd hoped for.

Rating:

Sy stems

By W. T. Quick

Signet, 1989

251pp., \$3.75

Another thriller, this one taking place in the near future. *Systems* is a compelling novel of death, greed, and vengeance.

The story is set in a believable, well-detailed future, about 30 or 40 years from now. It features the well-loved *North by Northwest*-style plot, in which an innocent man is accidentally mixed up in dangerous machinations he doesn't understand. W. T. Quick's protagonist, Josh Tower, is better able to hold his own, though. He is a former operative for the Defense Intelligence Agency, now a happily-married datahunter. When his wife is killed in an air-taxi accident, Josh becomes obsessed with tracking down the monitoring tape that would have her last words on it. In the process, he stumbles on something dangerous. He doesn't know what it is, but before he knows it, his own former employer is trying desperately to kill him. His efforts to save his own life and to find out what's going on make for an exciting and convoluted plot.

Josh is very well characterized. Not much time is spent on the other characters, but they're fine. The action and violence may be excessive in spots, but that's all part of the thriller subgenre. The love story carefully avoids cliché and remains subordinate to the main plot. The villains are extremely black, but I liked the portrayal of these wicked corporate raiders. The ending is realistic, and it won't make you happy

if you insist on seeing virtue rewarded and evil punished.

Systems is well-done and suspenseful, the perfect book to curl up with and read in one sitting.

Rating:

Crescent in the Sky

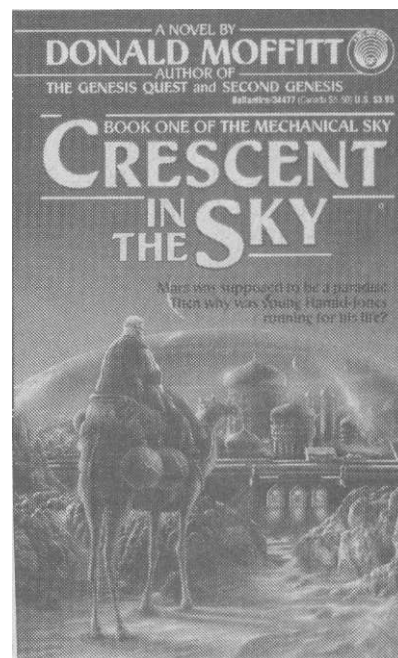
By Donald Moffitt

Del Rey, 1990

280 pp., \$3.95

Donald Moffitt has set his new novel, *Crescent in the Sky*, in a culture which is still very exotic to most Americans: Muslim society. The book has an exciting story, a likable protagonist, and an interesting background and characters.

It is about the year 3000, and Earth

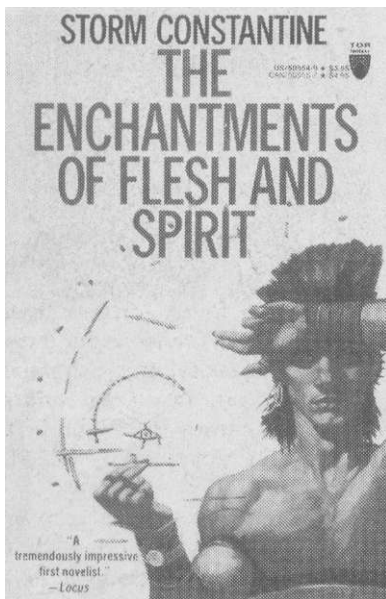


has for some time been dominated by Muslims. The book takes place in a colony on a partly terraformed Mars. The main character, Abdul ben Arthur Hamid-Jones, is a technician in a genetics lab that does work for the Emir. After an assassination attempt on the Emir, Abdul's world is turned upside down, as he is promoted and finds himself caught in a power struggle between the Grand Vizier and the Chief Eunuch, as well as at risk from an underground rebel group and embroiled in interplanetary politics.

The setting of this story is unpleasant — especially for women — and few of the characters are sympathetic. In fact, the only likable figure in authority is the Vizier, the Jewish Rubinstein. The book perhaps

caters too much to Western stereotypes of Islam as a brutal religion, for this society is exceedingly brutal, under the rule of a cruel and capricious despot. Moffitt does portray the society in credible and careful detail.

The plot is exciting, though it gets incredible at times, with Abdul always being rescued just as something horrible is about to happen to him. The book's biggest problem, though, is expository lumps. There's a long conversation in the first chapter in which the characters lecture each other about things they already know; it tempted me to put down the book. Later on there is a lecture on history. It is less ludicrous than the earlier conversation, because Abdul is being



told things he didn't know, but it is still an annoying interruption in the story. I also found the historical explanation of how this society evolved simplistic. I'd have been happier to accept this Muslim-dominated world without the unconvincing history Moffitt gives us; it's just not necessary. Technology didn't seem as highly developed as I would expect by the year 3000, though I suppose that could result from Muslim suppression of science — but they have interplanetary travel and amazing biosciences capability.

The book is in fact the first volume of a two-volume novel, and it doesn't have a real ending. If you must issue one novel in two volumes, though, the way Del Rey did this one — the first book released in January, with the sequel due in February — is the way to do it.

I wouldn't want to live in this world. But I'll look forward to revisiting it in volume two.

Rating:

The Enchantments of Flesh and Spirit

By Storm Constantine

Tor, 1990

318 pp., \$3.95

Storm Constantine's *The Enchantments of Flesh and Spirit* is an elaborate, well-detailed, weird, and original fantasy. But it's not engaging, because it is a very cold, inhuman book.

Sometime in what may be our future, a new race arises to challenge humanity: the Wraeththu. They are physically bisexual, able to play either reproductive role, their bodies are better organized and stronger than those of humans, and they have psychic powers that can be developed to a high level. Young human males can be converted into Wraeththu through a sharing of blood, but Wraeththu can also reproduce among themselves. As the book opens, there is a growing war between humans and Wraeththu, and we follow the plot through the eyes of Pellaz, a boy who is recruited by the Wraeththu near the beginning of the book. The story will be finished in two successor volumes.

The problem with this book lies in the fact that the characters are no longer human. The novel has a Teflon coating — it looks slick, but you slide right off instead of becoming attached to the characters. It's well written, and the Wraeththu are fascinating, but I couldn't become absorbed, never felt compelled to continue reading. Constantine allows us no emotional engagement.

The main character is interesting, if difficult to understand once he becomes Wraeththu. The author has a fine sense of place, and I love the world she's created; it's not pleasant, but it's solidly *there*.

I wish I liked this book more. I kept saying to myself, this is good, interesting, original, and well-written, I should love it — but I didn't. The coldness pushed me away.

Rating:

A Passage of Stars (Highroad vol. 1)

By Alis A. Rasmussen

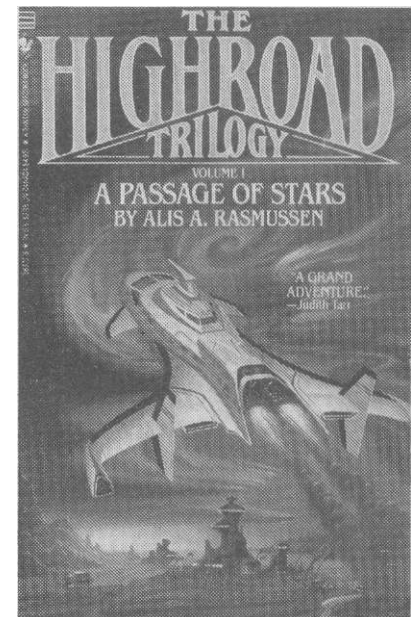
Bantam/Spectra, 1990

289 pp., \$3.95

Space opera can be a lot of fun when done well, as for example by C. J. Cherryh. I was looking forward to enjoying *A Passage of Stars*, by Alis A. Rasmussen. Unfortunately, it's only of middling quality, and the further I read, the less I liked it.

The novel is riddled with cliches: lost colonies that have lost their high technology; a lovable robot; the poor girl helped by the heroine who then becomes her faithful sidekick; most ludicrous of all, a scene where the heroine, about to be killed by soldiers, challenges one to single combat and wins her freedom; and others. These cliches make the book predictable and cause it to lose credibility.

Lilyaka Hae Ransome is the



daughter of a wealthy trading family in an area of space called the Reft, which has long been cut off from Earth. She has no interest in or talent for any useful skill, concentrating only on her martial arts training. When her teacher is kidnapped, Lily defies her family and runs off to space to save him, eventually getting involved in politics and revolution.

Too many elements of the plot are unexplained or given weak explanations. The book almost lost me right near the beginning, when Lily repairs the robot, Bach, which has been lying broken in a garage for ages, since no one remembers how to fix it. Lily, we are told, has no technical skills at all, yet she is able to repair Bach. The only explanation the author gives is: "Barely, not understanding it or its

function, scarcely knowing how she had done it, but she *had* done it." Uh-huh. This also made me wonder how the colonists of the Reft forgot how to use all this technology — didn't they bring the manuals with them? Alien-human mixed breeds, an extremely unlikely possibility (despite Mr. Spock), are important to the story, in another blow to credibility.

Much of the plot action can only happen because others withhold from Lily information that she *should* have been told by any rational criterion. Rasmussen also uses the tired and frustrating cliché of a scene where a revelation is about to be made, but the

conversation is interrupted by the arrival of others, and the original question is never pursued. At the center of the plot is the pursuit of Lily's teacher and his cohorts, but I was unsatisfied by the explanation of this pursuit, and unsure of what the group was trying to accomplish.

A Passage of Stars is competently written for the most part, though a bit breathless at times. People who don't know how to use archaic English, however, shouldn't try it. The character of Lily is fine, though her petulance makes her seem younger than her 25 years, which may have been deliberate on the author's part.

The other characters are generally impenetrable. The robot makes it too easy on the author; since we don't know Bach's capabilities, he functions like Batman's utility belt or Felix the Cat's bag of tricks.

Despite being the first book of a trilogy, this novel does not end with a cliff-hanger, though much remains to be resolved. The author's trick of leaving some mysteries unexplained didn't work on me; I'm in no particular hurry to read volume 2.

Rating: ft ft •

ABORIGINES

By **Laurel Lucas**

Last Trip, for now

Frederik Pohl's "The Gateway Concordance, Part III" brings us more Heechee treasures and reveals that theirs is not a dead culture after all. But we're sorry to say that this is our last installment. So if you want to know anything more, as I'm sure you will, you'll have to read Pohl's novel, *The Heechee Trip*, when it's published later this year by Del Rey.

Pohl's latest book is *Homegoing*, about an alien visit to Earth 100 years from now. And watch for the collaboration of two grand masters, Pohl and **Isaac Asimov**, on a non-fiction book about the environment.

"The Gateway Concordance" is illustrated by **Frank Kelly Freas**, who

produced 100 black and white illustrations for *The Heechee Trip* and some new ones just for *Aboriginal*.



Frank Kelly Freas

For more of Kelly Freas' work, see his latest book, *A Separate Star*, with an introduction by **Robert Silverberg**. Other examples of his work can be found on recent and upcoming covers of *Analog*, *Weird Tales*, and *Fantasy and Science Fiction*.

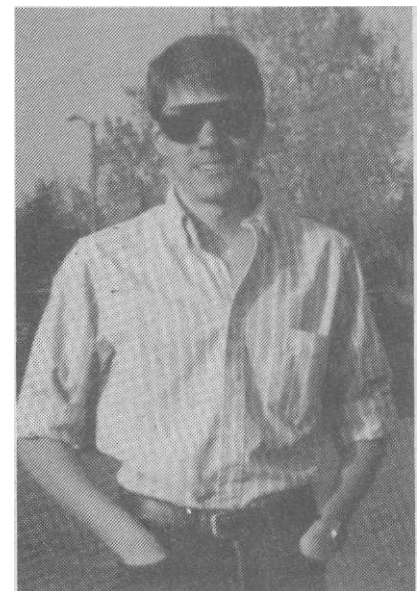
The multiple Hugo-winning artist has been collaborating on some pieces with his wife, **Laura Brodian Kelly Freas, Ph.D.**, who is a broadcaster of classical music. (Sure enough, the last



time I took a Delta Airlines flight, there was Laura's voice coming over the in-flight classical music channel.)

Mike Paxton is an astronaut-turned-space-pirate in "What I Did With the OTV *Grissom*," by **Wil McCarthy**.

I find it a wonder when someone writes so convincingly about spaceship systems. Maybe it helps that McCarthy recently got his



Wil McCarthy



Frederik Pohl



David Brian

bachelor's degree in aerospace engineering and now works on guidance and navigation software for commercial Titan rockets in Colorado.

This is McCarthy's professional debut. He also has a novel, *Point Blank*, waiting for a publisher. McCarthy is married to **Kumiko McCarthy**, a graduate student in psychology, and says his pet loves include his wife's cooking.

"OTV *Grissom*" and our Cover are illustrated by **David Brian**. Brian calls the cover art "the best one I've done yet for a magazine." He says before he painted it, he spent two weeks building a model of the *Grissom* using old model parts and a bubble-



Larry Blamire

topped pencil sharpener for the front capsule.

Brian says he has just signed with a European agent, Uwe Luserke, who called him after seeing his work in a Nova Graphics catalog. Luserke's clients include **Frank Frazetta**,

Morris Scott Dollens, Alan Gutierrez, David Hardy, Kim Poor, and James Warhola.

Robert Metzger is the author of "Self Similar," about a scientist who meets up with a fractal being in trouble.

Metzger has penned many delightfully weird tales for *Aboriginal*, the most recent being "Burns So Bright"



Patricia Anthony

(July-Aug. 1989) and "The Twisted Brat" (Nov.-Dec. 1989). In every issue he also takes us beyond the cutting edge of science in his "What If?" science column.

Metzger recently sold his untitled first novel to New American Library. The action takes place 90 years from now in a world destroyed by biological weapons. All the survivors' brains are scrambled so they think they are fictional or historical characters, and the protagonist has four days to save the world.

Metzger says he got a thrill at a recent convention when he shared an elevator with author **Connie Willis**. He was trying to think of something to say to her when she turned to him and said she'd been reading his stories.

"Self Similar" is illustrated by David Brian.

Patricia Anthony is back with "Coyote on Mars," a story about some miners with a bad case of homesickness.

Anthony's previous stories for *Aboriginal* include "Belief Systems," (Sept.-Oct. 1989), "Bluebonnets," (July-Aug. 1989) and "Eating Memories" (May-June 1989).

Anthony says she rewrote the ending for "Coyote" six or seven times and says she like stories like this with dark humor and "protagonists who are not trustworthy."

Anthony is teaching and working

on a new novel, a political thriller set in the future. She says she's having a hard time tying up the plot into a neat bundle, and she's thinking of giving Robert Metzger a call for some advice about quantum mechanics.

"Coyote on Mars" is illustrated by **Carol Heyer**. Heyer had three children's picture books come out this past fall: *The Dream Stealer*, written by **Stephen Cosgrove**, *Prancer*, also by Cosgrove from the screenplay, and *Beauty and the Beast*, the traditional tale. *Prancer* has already sold 300,000 copies and *Beauty and the Beast* is in its second printing.

She's also working on a religious book for children called *The Easter Story*, another book with Cosgrove called *Excalibur*, and spring covers for *Dungeons* and *Dragon* magazines.

When I asked Heyer about her personal life she laughed and said, "I have no personal life. That's how I get the books out."

In "Queen of the Atzu," by **Phillip C. Jennings**, obese women's bodies are used as emissaries to an alien society where queenly stature depends on girth.

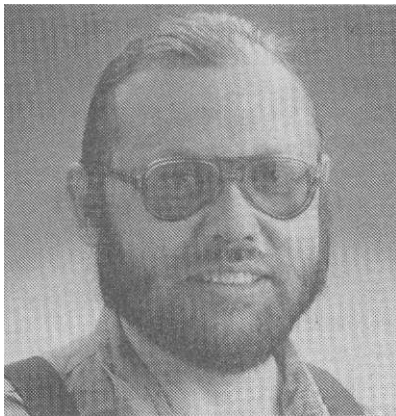


Carol Heyer

Jennings admits that there's a whole list of things he has literary obsessions with. Immensely fat women is one of them. Another is souls in different bodies. "Doctor Quick" (Sept.-Oct. 1988) is a good example.

Jennings is writing short stories that he's been selling to various magazines and says he's feeling settled these days. He already has a family and a dog and he is contemplating the purchase of a lazyboy.

"Queen of the Atzu" is illustrated by **Larry Blamire**, who has done more illustrations for *Aboriginal* than



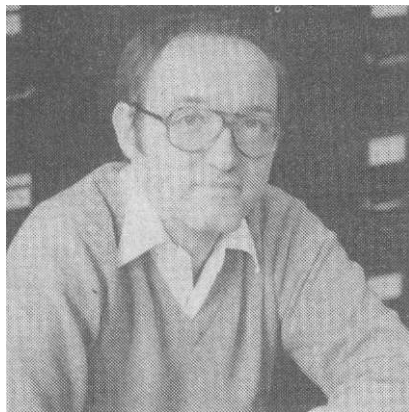
Phillip C. Jennings

there have been issues of the magazine.

The Alliance Theater in Los Angeles recently performed Blamire's dark comedy "Jump Camp," which was first performed in Boston to critical acclaim. When Blamire isn't writing plays, he is acting in plays written by colleagues.

In "Requiem Aeternam," by **Richard Bowker**, a bitter old man refuses to let go of anger in a world where an empty bank account spells the end of the road.

Bowker's latest novel, a thriller



Richard Bowker

called *Summit*, is being published by Bantam. He's also finished a sequel to his book *Dover Beach*. It's called *Locksley Hall*, and like *Dover Beach* it's a private-eye novel that takes place after a limited nuclear war.

Besides writing science fiction, Bowker is a technical writer for a company with a science fiction-sounding name — Thinking Machines Corporation.

"Requiem Aeternam" is illustrated by **Wendy Snow-Lang**. She says for

this art she used acrylic paints and experimented with an Impressionist look.

Snow-Lang recently sold an illustrated story to *Shriek* magazine featuring the same vampire characters that have populated some of her other comic book stories.

She and artist husband **Charles Lang** have moved to a bigger apartment with a larger studio. When I



Wendy Snow-Lang

spoke to her, Charles was working on some sword and sorcery pieces and the couple was preparing to be the artist guests of honor at Balticon.

In other Aborigines news, a mini-anthology of short stories by **Howard V. Hendrix** is being published by BOTU Press this year. It's entitled *Testing, Testing, One Two Three and it includes two Aboriginal stories*, "Doctor Doom Conducting" (Sept.-Oct. 1987) and "The Last Impression of Linda Vesta" (May-June 1988).

"Leaving the Sea of Suns" is by **Jovanka Kink**. Her poem "The Long Hot Silences" was in the March-April 1990 issue.

Kink is a pre-veterinary student at Wright State University in Ohio who has written many poems and several short stories for small press publications. Reptiles are one of her favorite subjects, and she says on a recent trip to Indonesia to visit relatives, she loved listening to the sounds of the geckos at night.

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Boomerang Awards

The deadline has passed and the final tally is in and you, our readers, have chosen the winners of the 1989 annual Boomerang Awards.

In first place with the best story is **Robert A. Metzger** for his story "In the Shadow of Bones" published in the March-April 1989 issue — our special alien issue. Curiously enough the winner for best poetry, "Imprinting" by **Terry McGarry**, was published in the very same issue. The award for best art went to **Carol Heyer** for her cover art for the May-June 1989 issue illustrating the story "Jim-Bob and the Alien," written by Vivian Vande Velde and T. Serio.

A total of 20 different stories received first-place votes with Bob Metzger just edging out **Brooke Stauffer's** debut story "At Kokomo Joe's." Following very closely on Brooke's heels was **Bill Johnson** with "A Matter of Thirst."

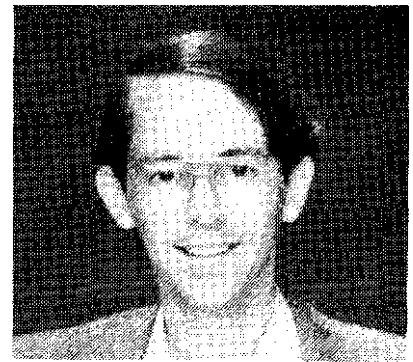
Separated from the first place winner in the art category by only one vote was **Byron Taylor** for his illustrations for "The Runner, The Walker, and the One Who Danced After," written by **Gerald Perkins**. Gerald's story finished in fifth place. Other artists getting a high number of votes from our readers included **Bob Eggleton** for his illustrations for "A Matter of Thirst," and **Pat Morrissey** for her illustrations for "In the Shadow of Bones."

David Lunde and **John B. Rosenman** tied for second place for best poem with "In Great Silence, Listening," and "Moon," respectively-

Congratulations to this year's winners and a thanks from the staff to our readers for sending in their votes.

NEW QUARTERLY CONTEST for amateur science fiction artists worldwide! \$1500 in prizes each quarter. Quarterly winners compete for \$4000 annual prize under professional art direction. No entry fee is required. Entrants retain all rights. All judging by professional artists only. Don't delay! Details SASE: L. Ron Hubbard's illustrators of the Future Contest, P.O. Box 3190, Los Angeles, CA 90078 1-23

Vegetable Vision



Have you ever looked through a microscope? I can only hope that the answer is yes. It's an experience that everyone should have. I can remember quite clearly the first time that I peered through one. I had filled an empty peanut butter jar full of pond water, taken it to school, put a drop of that green-tinted water onto a slide, and then slid it into a little microscope. The thing was ancient, rusted, abused by almost a generation's worth of fifth graders, and had only a single times ten objective, along with a scratched and clouded times ten eyepiece.

When I peered into it, I didn't just see a drop of water that had been magnified by a factor of 100 — I saw a new world, a place full of wriggling and thrashing, translucent little creatures — a world beyond a ten-year-old's wildest imagination. It was the first time that I truly realized that there could be a world beyond my direct senses, that just because I could not see something with my eyes, or feel it with my hands, it didn't mean that it did not exist. I stared into that microscope for almost half an hour, until the drop of water evaporated, and all those squirming little creatures died. For days afterwards, I refused to drink water, now knowing full well about the menagerie of nearly invisible creatures that I might be swallowing.

Well, I got over my microbe-ingesting phobia, but I'm happy to report that I never got over the thrill of looking through the eyepiece of a microscope. It's said that the difference between children and adults is the price of their toys. That statement goes double for scientists — actually a lot more than double.

The microscope that I now use is called a scanning electron microscope (SEM). Gone is that times ten

eyepiece and the little glass slides. That old microscope might have cost all of fifty dollars, while my new one goes for several hundred thousand dollars. I no longer look at wriggling bugs, but at integrated circuits whose components are a thousand times smaller than those bugs. My SEM does not see by magnifying and focusing visible light like my old microscope did, but instead uses a beam of relativistic electrons to do its *seeing*. I place the sample I want to look at into a vacuum chamber (that way the electron beam is not scattered by air molecules), smash a beam of electrons into it that are going at a sizeable fraction of the speed of light, and then gather up the electrons that are *reflected* from the sample by catching them in an electron detector. While all this crashing and gathering of electrons is occurring, the electron beam is being scanned across the sample, *seeing* different parts of it. And that's all there really is to an SEM.

It's as simple as that — you're *seeing* with reflected electrons. The complicated part is in the hundred thousand dollars' worth of electronics that transforms the electrons captured by the detector into a beautiful picture that comes up onto the SEM's viewing monitor. My SEM can magnify things by a factor of 100,000, allowing me to see objects that are only a few hundred angstroms across (100,000,000 angstroms equals 1 centimeter). I love this machine, just like my old microscope from the fifth grade, but there is a new toy in town, something that could make my SEM seem no more powerful than that old microscope.

The scanning tunneling microscope (STM).

Have you heard of it?

The 1986 Nobel Prize in physics

was awarded to Binnig and Rohrer of the IBM Zurich Research Laboratory for their invention.

And I want one. I *really* want one.

Why? Because I want to *see* individual atoms (atoms are only a few angstroms across — something far too small for my SEM to resolve). From that very first day, when I looked into a microscope and saw those wriggling bugs, I wanted to see smaller and smaller things. I wanted to see *fundamental* things. I wanted to see atoms! (Note — you can't tell this to your department manager if you expect to get a bigger and better microscope. You have to explain how the new and improved microscope will help you better understand the fundamental aspects of physics, which will then in turn let you build new and novel gizmos, thereby allowing you to capture new markets and to boost the company's bottom line. That's what you tell the managers, but it's just an excuse. The truth is actually quite simple. You just want to see atoms.)

So why can't I see atoms with my SEM?

Here's the problem. Whatever is doing the *seeing* must be smaller than the thing that is being looked at. That is a fundamental. Here's an example. Take a chain link fence that has openings on the order of an inch, one large potato, and a handful of peas. Go ahead. This will be fun. Have you got them? Good. Now stand about twenty feet back from the fence, wind up with a fistful of peas, and let them fly. What happens? Most of them sail right through the fence's open links, while a few hit the chain and bounce back (we'll assume that the sticking coefficient of pea to chain link is zero — a very typical, though admittedly non-realistic, assumption that is charac-

teristic of any physics experiment). Now take the potato and repeat the process. The potato will not pass through the openings between the links — it's too large. It hits the fence and bounces back.

What have we learned? The peas were able to *see* the openings in the chain link fence. Most passed through them, while a few bounced back. The peas were able to *resolve* the openings. For all that the potato could tell, the fence might have been perfectly solid. You cannot *see* something appreciably smaller than the size of the thing that is doing the seeing. You've just learned a fundamental truth here — something that I'm sure you never learned in school — peas can pass through chain link fences while potatoes cannot.

So what does this say about my SEM? Why can't I see those atoms? Why am I limited to a resolution of a hundred angstroms? The trouble is with the electron itself. It's too big to see atoms — it's too potato-like.

What?

It's true. Forget what you might have seen in high school, that cartoon drawing of an atom, with those little, tiny electrons swarming around it. *Wrong*. When you start to get down to these dimensions, quantum mechanics takes over. The electron is no longer pea-like, but it starts to take on the characteristics of a potato. Quantum mechanics *smears* that electron out over a distance of up to 100 angstroms, and the smaller the mass, the more the smearing. This is the crux of Heisenberg's Uncertainty Principle, and that's why electrons turn into potatoes, while the heavier atoms remain pea-like. And you now know what that implies. You can't see atoms that have dimensions of only a few angstroms by hurling an electron at it that has much larger dimensions. It would be like trying to see a pea by bouncing a potato off it. It's just not going to work. What this calls for is a new toy — a new way of *seeing* things. I need a scanning tunneling microscope.

So how does *that* work?

How can I break the potato resolution limit?

You use the very quantum mechanics that limited you in the first place. If you remember back to my first column, I talked about quantum dots. These were structures with dimensions of only a few hundred

angstroms spaced just a few angstroms apart. What we found was that quantum mechanics would allow an electron to *tunnel* through the gap between them because of the wavenature of the electron when these *very* small dimensions are involved.

Tunneling is an interesting phenomenon in that it is *very* nonlinear (actually exponential). Very small differences in the width of the gap that an electron wants to travel through radically change its ability to tunnel that gap (remember the column on nonlinear reality — small differences in inputs make large differences in outputs). Let's say that the gap is 10 angstroms. If you decrease that to 5 angstroms, it is *not* twice as easy for the electron to tunnel, but ten times easier. And as the gap gets smaller, the ease of tunneling increases even more exponentially.

Scanning *tunneling* microscope.

This effect is what drives Binnig and Rohrer's new microscope. If you take a metallic probe, a very sharp probe (the tip can be of atomic dimensions — yes those *can* be built), apply a small voltage to it, and move it *very* near to the sample that you want to see (only a few angstroms away), something very interesting takes place. As you get near enough to the surface of the sample, the electrons *in* the sample can tunnel through the gap between the sample and probe and a measurable current is generated. If you move the probe nearer, the current increases very quickly (remember that tunneling is very nonlinear). But an STM does not operate in that mode. It holds the current *constant*. How could it do that?

Think about what you know about tunneling. If the tunneling current varies as a function of the distance between the probe and sample, then in order to keep the tunneling current constant, you simply keep that distance constant. Therefore, as the probe is scanned across the sample, and encounters a bulging atom, in order to hold the current constant the probe pulls back, keeping the gap constant (this technique is referred to as positive feedback). It's reasonable to ask at this point how a probe could be moved up and down, holding itself steady over distances that are much less than 1 angstrom. The answer is piezoelectrics.

There are no gears or motors moving the probe across the sample —

that would be far too crude, far too unstable. What are used are piezoelectric crystals. These have the remarkable property that if you apply a voltage between two faces of the crystal, the crystal will contract ever so slightly — on the order of atomic dimensions. This is how the fine precision is maintained: the tunneling current, acting as the feedback element, applies voltage to the piezoelectric crystal, thereby keeping the distance between the sample and probe constant. So as the probe scans across the sample, keeping the tunneling current constant, slowly rising and falling as it moves over atoms, this up-and-down movement is recorded. You are now tracing out atomic contours — painting a picture of atomic landscapes. The resolution of this instrument is down to the 0.01 angstrom range (100 times smaller than an atom). With that sort of resolution, atoms will look huge — they'll look like potatoes.

I want one.

I want to see atoms.

But I've got to make up a story before I can get one. I need a plan that I can sell to my managers in order to get my STM. And I've got an idea. You now understand how electrons can *tunnel* from the probe, but something else can come off fine-tip probes — metallic atoms. If you put a thin, *highly mobile* film of metallic atoms on the probe, something like gallium (it's a metal with a very low melting point, so that the atoms can easily *crawl* up and down the probe), you will find that they will actually jump from the probe to the sample if a little electric field is applied at the probe tip. Turn the field on, and a few gallium atoms jump off and land on the sample. Turn the field off and they stop.

Now think of a telegraph — a dot and dash sort of thing. A single gallium atom would be a dot, while several gallium atoms in a row would be a dash. The probe scans along, spitting gallium atoms at the sample surface, able to deposit them at *individual* atomic sites. You can write anything you want, take the sample out, store it, shoot it to the moon, do whatever you want with it, and then load it back into an STM and *read* those dots and dashes. You've got a memory device. But no *standard* memory device. This is one of atomic dimensions. The STM can *read* atoms, can see each of those gallium dots and

dashes. You could even erase the gallium on the surface, physically blowing it off by bombarding it with electrons from another probe tip. You could have two probes, a gallium-covered one for writing and a naked one for erasing.

But things like this don't impress management. It's too technical, too full of science. It's got to be more bottom-line — more how are we going to make a buck out of this thing. And here's the answer to that.

Density.

Atomic density.

If every atomic site can hold a dot, or half of a dash, there are a lot of atomic sites available — an awful lot. Take a sample of dimensions 1 cm by 1 cm (this is a typical size for a state of the art 4-megabit random access memory — 4 million bits of memory) and you will find that there are a *billion million* sites available — that's a *billion* times more memory than the best chip that can now be built. That single chip could hold the contents of *one hundred million* books.

We could build it.

Today.

With technology that exists right now.

But best of all, I'd have a new microscope — one that could see atoms.

I hope that my management agrees with all of this. But if it doesn't, I've got a backup plan. I won't go into details, but I will give you a hint. Potatoes may not be able to *resolve* a chain link fence, but they should have no trouble in *resolving* a department manager. If all else fails, a speeding potato, aimed straight between the eyes, should allow management to *see* the merits in this proposal. □

The Mass Transit Theory of Schizophrenia



I have settled in a place called Boston. It is bitterly cold here, in more ways than one. But it is near the office of *Aboriginal Science Fiction*, which means I can visit Ryan from time to time and "it" in up for a loan.

Ryan is always glad to see me, but he never gives me any money. He says that if he had enough money to give me a loan he would spend it instead on printing additional color in his magazine. Why it is better for Ryan to have color in his magazine than for me to be able to afford taxi fare is a mystery. I no longer drive now, you see. In my current configuration, I am much too short to see over a steering wheel.

Without loans from Ryan, I get around town on public transportation.

Boston's mass transit system is known to be one of the best in North America. Indeed, it is second only to some of the more spectacular rides at Disney World. Disney World, it is true, has a much lower passenger fatality rate. But the Boston rail system is more exciting to ride. The two are about equal in the time the passengers spend waiting to get on them.

The Massachusetts Bay Transportation Authority is a complex system of rail lines and buses which collectively contribute to population control, wealth redistribution, and the maintenance of psychosis. To understand how it works, you must consider the operation of the subsystems in some detail.

Take the subway system. Before the subway train arrives, the passengers stand on the platform like penguins on an ice floe waiting for one of their number to slip off the edge and test for danger. There are no leopard seals under the subway platform, however; just something called a third rail, which is purported to carry current sufficient to electrocute a human being. From time to time, one of the more curious passengers will hurl himself off the platform to see if it's true.

Electrocutions are not the only method of passenger control, however. Crowds of young people frequently go among the passengers brandishing sidearms and shouting.

"You seen the Jets around here? Tell those motherhumpers the Sharks come on their turf to kill their asses!"

They will sometimes murder one or

two people to maintain passenger motivation. Without this incentive, you see, most human beings would be unable to overcome their notions of dignity, self-respect, and privacy enough to willingly compress themselves into a crowded subway car. And pressing against each other as closely as possible is necessary to facilitate the pocket-picking that is a basic aspect of the system.

No matter how closely the passengers pack themselves, there is always an elderly woman with an empty seat to either side of her and a clear space for a radius of four feet about her. When the doors close, the car rolls forward, and the public address system announces the next stop, she begins screaming.

"That's what he thinks! Well, the bastard's got another goddam thing coming! I've got problems, too, you know!"

She repeats this continuously at the top of her surprisingly powerful voice as long as the car is in motion, becoming silent as soon as it stops.

I am not certain as to the role of this shouting woman in the system. But I do know that as long as the human species has had consciousness, an appreciable number of them have been schizophrenic — subject to incoherent thinking, delusions, and hallucinations. While schizophrenics have always been known to humanity, they have rarely been understood. In times past, they have been trephinated, flogged, bled, and deified. None of these methods has been very reliable in altering the schizophrenic's outlook.

In more recent

generations, they have been incarcerated, and their caretakers have administered surgery, electroshock, drugs, and psychotherapy. These methods seem to have more a salutary effect than flogging or worship, but even the most sophisticated of human researchers will admit that treating schizophrenics is largely a process of trial and error.

Boston, however, is known for being in the forefront of health care research, and that is why the city is trying something beyond incarceration and psychotherapy. Boston is putting its schizophrenics on the subway. □

Queen of the Atzu

By Phillip C. Jennings

Art by Larry Blamire

The agronomist swam with buoyant majesty along the Ccurfa Ccinnavi Gul canal, returning from his interview with queen Gwaza CcuCcig.

With majesty, not with ease. He stopped to rest, his huge habitus unused to long exercise. A crew of boat-billies averted their craft: did they recognize him as alien? Between slablike shoulders his wet bullet-head seemed small; not human — despite the blond hair that matted his scalp.

He bobbed in the boat's wake, then with fresh resolve the agronomist paddled on. He passed under a billow of red leaves

His massive arms ached as he breasted toward a dark gray parapet. The rain-stained walls of the human enclave rose from the levee, looming over pompon shrubbery. From unguarded doors a ramp lined with boats descended into the scummy waters of this unimportant side-channel.

The agronomist made for the ramp. Cross-slats compensated for slippery algae. With this help he hauled out of the water. God, all this fat! No doubt his body's owner knew how to walk these mounds of flesh, but after catching his breath the agronomist crawled up to the gate on hands and knees, to don a waiting vest.

The vest fit over his bloat like a camisole. He pushed START and cables drew him to his feet. Overhead tackle supported his dripping mass: mounted on a track it rolled along, allowed him to compass-walk on akimbo legs across a courtyard dense with the pastels of Sa Tlanian road-moss.

Minutes later the agronomist's soul beamed home to space, a datastream augmented by information gained during his interview. On the Lassiter VI his assessments would be reported, analyzed....

Someday the seeds of a valuable alien plant might germinate on Earth; a plant nurtured on the experimental farms that made the atzu world LuSs the center of the galaxy.

Kimberley woke in the memory columbarium, her body a mass of aches. Mercy! She pushed into a sitting position. "Slave labor," she muttered. "I'm going to report this! I shouldn't have to take this abuse!"

She was ravenously hungry. Not fair! Her own body and she only got it eighteen hours of every twenty-eight-hour day, and wasted much of that asleep, or binging to keep her bulk up! Six hours left for classes, videos, and gossip? Not enough!

Kimberley stood, donned a muu-muu, and waddled off to the Tea Shoppe. She ordered a bag of fried yibbers, and squeezed into a booth. As she ate her temper sweetened. Eating wasn't such a chore, and here came Fredrika to keep her company.

"— But you should report it!" Fredrika said. "Physical abuse of a borrowed habitus! Not that they'll pay atten-

tion. We're just mules to be ridden. If they thought we were important they'd do better educating us."

"We share the teachers' time with any atzu billy who wanders in," Kimberley grumbled.

Fredrika patted her frizzy red hair. "We ought to form a union," she whispered. "Problem is, we'll never visit Earth in these bodies, and they'll never come here. We're isolated, so we pick on each other. We don't see ourselves as an underclass exploited by bug scientists."

"It's not natural for bugs to boss people," Kimberley agreed. "Back on Earth they make sure the humans stay on top."

Teach-bug agronomists. The enemy in loco parentis, but now Fredrika raised her sights. "Earth!" she hissed. "They settled us on LuSs, and chose our germ tissue! We wouldn't be this fat if —"

"We wouldn't be us, Freddie!" Kimberley laughed. "If they grew different bodies, they wouldn't be us! And they wouldn't be queenly! The atzu pity us for having only two sexes. What would they say if they knew what Earth women really look like?"

"... When Lucian Fercho learned to translate brain content into storage, he opened the door to immortality. Each time you submit to the helmet your soul is recorded. If your carcass dies on some mission you'll transmit to space, then to this system's four-dee stargate. After a blink of subjective time you'll wake on Earth! So you're not exiles. As for your impatience with your teachers"

Fredrika squirmed through the teacher's homily. She raised her dimpled hand. "You treat us like children."

Inside the compound, bugs preferred boy bodies, small and nimble. A teacher's words came from Vlad's mouth as he stood on the podium. "Because of body-sharing you're barely teenagers in experience. It's that immaturity I deal with in this class."

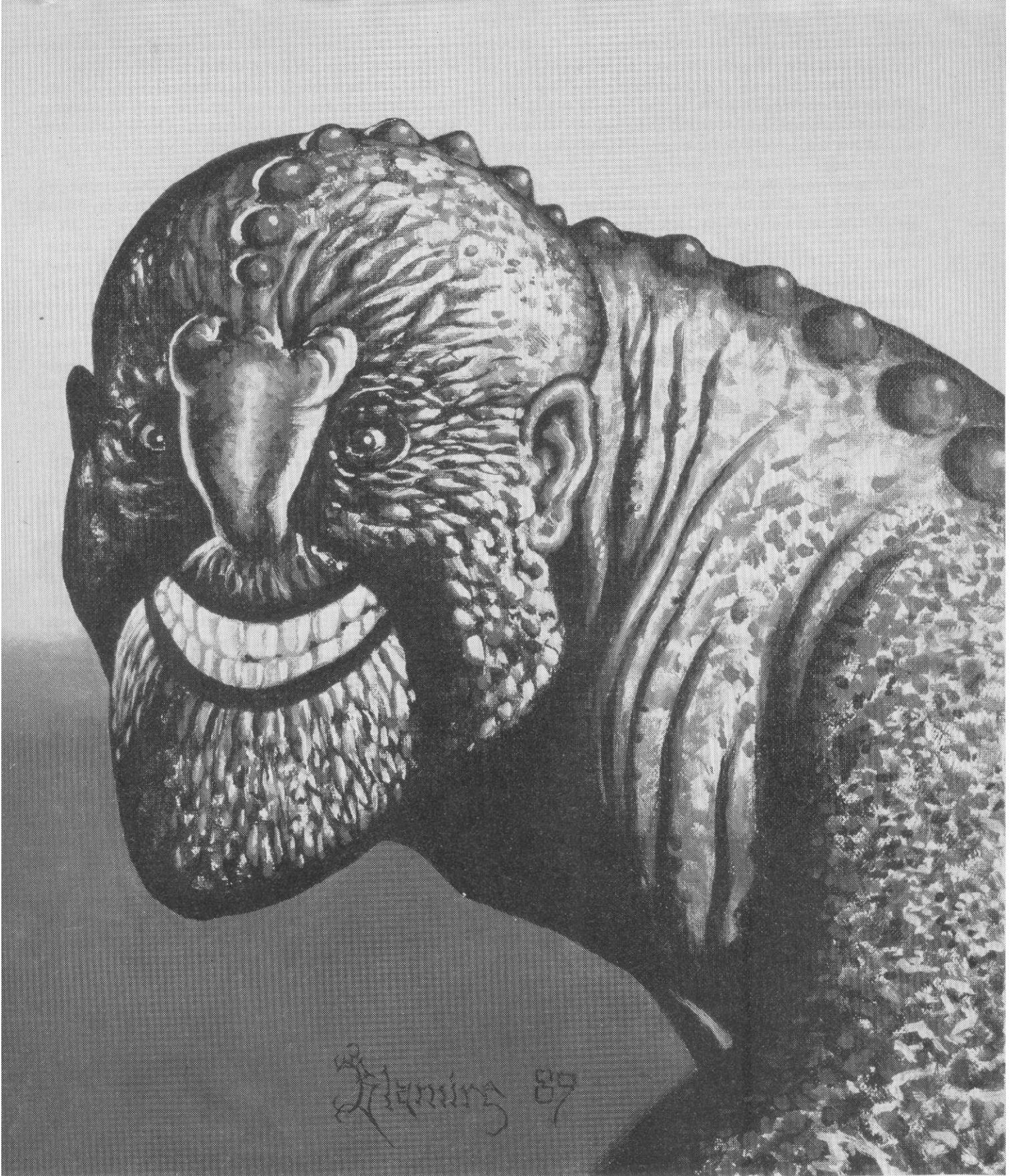
On the girls' side of the schoolroom, straws rose from canisters set in spacious desks. Kimberley sucked, then leaned back into the only other seated posture her giant habitus was capable of. "What bodies do we get on Earth?" she asked. "Two billion humans, twenty billion souls — why should we get priority? We'll be conned into a bug microbox."

The teacher raised his arms. "Patience! In time you'll find yourselves on Earth in human bodies. Unless you commit a felony."

"Like unionizing?" Takio asked. "What do you call that? Treason?"

The teacher frowned. "A dozen alien races support missions on LuSs. Why haven't you seen them?"

"Each enclave is in a different area. We're the only ones in Uitkiol."



"I hope this impresses you with the magnitude of the planet. Five hundred kilometers away a plantation grows just the bean we need on Earth. Suppose your kids' union decided never to lease bodies for more than ten hours at a stretch? We can't get there and back in ten hours, so we'll never find out about that bean."

"Pay us premium rates when something special comes up," Fredrika spoke.

"What's money to you? Here's the situation: you can withhold your bodies. We can refuse to immortalize your souls. What's more important?"

"Then you're tyrants."

"As parents must be with children; but not forever."

After class Kimberley shambled to the Tea Shoppe, seething with the injustice of it all. She folded away a few thousand calories, then decided to go to bed. An interior hall took her to her room. In the neighboring chamber she heard sobbing.

She lay down stiffly; but the weeping continued. Kimberley found it impossible to sleep and buzzed for room service. "Eel-cakes and prossy," she ordered, an edge to her voice.

"Hey, Kim, hard day? Well, here's good news; you've got tomorrow off. The roster just came out. I'll bring it with your belly-timber."

Vlad knocked a long time later. "I put you last on my list so I could stay," the man-boy said before Kimberley could complain. As she sat up to eat he pulled a pipe from his pocket.

"Did I invite you?"

"You could use a massage."

"Sex? Why not try a little charm? Wait a minute! You lit your pipe with your right hand! A teach-bug in Vlad's body!"

"Uh ..."

"Vlad's left-handed. Why are you sneaking down from space during off-hours?"

Vlad leaned back with a teacher's lack of grace. "Good, you're clever. Yes, I'm what you say, and I mean to teach you questions. First, what's my name? We teachers have names, you know. We don't use them because if you could tell us apart you'd learn that some of us play a different game than others."

"Why should I care?"

"It affects your future. Know what happened to you today? Your body swam six kilometers."

Kimberley shuddered.

"You kids are monumentally uninterested in the atzu. You probably can't name the three nearest queens, but the fact is, our agronomists have done business with the close ones first. Now their ambitions carry them further. They can't use you for those forays, Kim. You're too near the top of the scale. Care to hear more?"

Kimberley answered cautiously. "I'm out of a job?"

"Faction A says why ape atzu queens so closely? They're rigid, but they'd get used to boat transport for human females, if we dared make it our practice. They'd get over the shock. They'd talk to our agents even if they aren't in hugely fat bodies. To which faction B says nonsense."

"Now that boat idea —" Kimberley began.

Vlad interrupted. "Faction B is losing power. Our agronomists yearn for seeds only far travel can bring them, so there's been a shift in policy. Kim, your future is a sop to the diehards. You won't be used on missions. You'll have lots of time, and you'll use it to eat. You'll grow enormous, and if we ever do need to impress an atzu queen with sheer bulk-and-twenty, you'll be there. Sound like a good way to spend your next decade?"

"I'll have more time for school, too."

"Or to foray on your own. What's the purpose of your life, Kimberley? To get into the freaks chapter of the Guinness Book of Records? Know what amazes us, up in space? None of you kids has ventured even a kilometer from the human enclave!"

Kimberley polished off her last eel-cake. "Is something

out there? Besides plantations and canals?"

The boy rose and took the tray. "Wheels within wheels. I shouldn't have come down at all — it's close to cheating. All I can say is, you're the one human on LuSs to have free time these next weeks. Use it well."

Kimberley did use the next day well — she binged as enclave-girls did during random holidays. Next day she continued to feast, but with less fervor. It sank in that her evening visitor was right. Two days off in a row, and her name was missing from tomorrow's duty roster!

A third day of gluttony? As Kimberley prepared for bed she pondered: why not go to the library instead? She knew embarrassingly little about the world where she'd been raised. Irrationally she blamed LuSs for making her a victim of those who stole her body to perform incomprehensible negotiations. She went so far as to draw her curtains against the outdoors, but on this special night she gazed through the rain toward the compound gates and the green waters beyond.

Next day she took "Beginning Uitkioli" to the Tea Shoppe. As she snacked she mastered a few score roots and basic modifiers. Those who borrowed her brain knew the Uitkioli language, so there were ... circuits? Uitkioli was far easier to learn than Kimberley expected. By the time she moved to an atlas of local canals, she could interpret names like Uit OlluSszu Kivit.

Two kilometers from the enclave, Uit OlluSszu Kivit intersected with Fa CurnaCeim Gulvi, which bore north-east for nine kilometers. Then the waterway bent, blocked by a plateau. The plateau was a green blank, uninteresting to the atzu, whose amphibious queens could never live there. Tectonically less active than Earth, LuSs had few highlands, yet here, intriguingly close ...

... and on its slope, ten kilometers south of the bend, a black dot labeled ZuluSsuit Ki.

Next morning Kimberley ate an austere breakfast. Fredrika noticed; jealous Fredrika, whose days were scheduled with duties. "What happened to fat pride? You on a diet?"

How would fifty obese young women react if she answered yes? What would the teachers say? That it was her duty to eat! "I'm going to try swimming this morning. You shouldn't swim with a full stomach."

"Who says that?"

"Swim?"

"You don't know how to swim!"

A torrent of voices let Kimberley off the hook. "My body knows how, but I don't. I think I'll learn fast."

She waited. Those with assignments headed to the columbarium, to be copied from their bodies and shelved. Agronomist-diplomats waddled out the gates, attended by male assistants. By nine-thirty the enclave was depopulated. Kimberley went to the columbarium — it was more acceptable to cross the courtyard naked if she seemed like some agronomist on a mission.

She trod down the ramp into water a few degrees cooler than the air. Her toes reached into soft silt. Surprise! She was weightless!

Kimberley began to stroke. Swimming came easily. She moved into the deeper waters of Ccurfa Ceimnavi Gul as the morning mists burnt off and an alien sun arched high toward zenith.

For the first time in her life Kimberley found joy in exertion. Later that afternoon she doubled her Uitkioli vocabulary. She went to class an accomplished young woman, no mere neurotic glutton. Amazing that on his nocturnal visit that mysterious teacher had kindled such a fire in her!

She squeezed into her seat. A teacher lurched up to the podium. "Today, the atzu, culture and instincts."

The class groaned. "We going to be tested on this?"

"Atzu billies wander the compound, chatting with anyone. Who can tell me about them?"

"They're stage-four males. You can tell cuz their, uh, equipment's fallen off."

The class tittered; the teacher nodded. "We have hive societies on Earth, not all insects either. There's the naked mole rat, *Heterocephalus Glaber*. Our best shot is that the atzu have been intelligent much longer than humans —"

"Intelligent?" Takio snorted. "No cities, no factories!"

"Nor any government," Fredrika added.

"Ah, you do know something!" the teacher responded.

"Yes, the basic social group is the atzu queen and her offspring. If a queen breeds neuters to work a piece of land, then that land's hers. What else? There's one other society that has nothing to do with queens."

The class sat silently. The teacher expelled his breath. "Who runs the boats? Who trucks food? Boat-billies are second-stage males, outcasts who gang together and find a boat. I should say 'steal,' because males can't build boats. Nor do they load cargo."

"They can't work," Fredrika said. "Work is for neuters."

"We had an era on Earth," the teacher nodded, "when leisured Greeks studied while slaves did all the work. It was a time of stunted progress. Minds and hands belong together. The long plateau of atzu existence shows what happens when they're kept apart."

The teacher paused. "Nevertheless they have guest aliens to challenge their wits. In interstellar commerce the only commodity is seed. Years ago some atzu queen planted a foreign crop. She fed more neuters than her neighbors, and taught them a lesson: it's worth it to gamble."

Kimberley raised her hand. "How long have they been doing this?"

The teacher shrugged. "Each plantation uses ciphers to keep inventory, but they don't have what we'd call history. All we can tell is, there's damn little native to LuSs. Everything above the waves is hybrid, or frankly alien."

That evening Kimberley heard a rap at her door. Young Takio tottered in. The boy settled his wiry body into the guest chair. His feet failed to reach the floor; he swung them, then frowned.

"You'll never ask. My name's Tom. I was born in a deception zone and died a failure at forty. Then in 2053 I emigrated to Mars. Three years later I helped found the Augustinian House of Nodus Gordii.

"In the '70s there were debates on Earth: should we try this weird billions-year-old stargate thirteen light-hours from the sun? My bug order volunteered to staff various stations; we ended up orbiting the gate.

"In 2095 instructions from the gate told us how to cross to LuSs. The way the Gatekeepers talked it was the nexus of galactic civilization. The imperial planet! In 2110 my

mission reached a mere swamp world in a pre-industrial stage of development!

"We radioed home. A revised second mission launched that same year; bugs, of course. Bugs orbited the gate. Big radio shuffle; their souls went home, agronomist souls replaced them. As for your germ tissue — ready to hear this? Anyhow, you were raised by bugs; we used fifteen years to construct this enclave for you."

Kimberley's mind stabbed off. "What does ZuluSsuit Ki mean?"

"House of Rule. Want to go there?"

"I didn't know we had bugs down here. I thought you were all in orbit in the Lassiter VI. I just didn't think. Of course someone cared for us when we were babies."

Brother Tom looked sad. "Go there. We'll talk again."

Go to the House of Rule? Late next morning Kimberley reached the intersection of Uit OlluSszu Kivit and Fa CcurnaCcim Gulvi. Here her fatigue and the bustling boat traffic frightened her, and she hauled onto an embankment.

The local queen specialized in Earth crops; sugar cane, okra, camphor trees. Kimberley ate a few tomatoes, comforted by the familiar taste.

Two kilometers here, two back. She could swim further, though hardly the full distance. She sighed. Taboo to take a boat — why? She decided to paddle back to the enclave and learn more of atzu society.

"Hi! Here!" Kimberley was sliding toward water when the shout distracted her. An atzu billy came close, frog-walking on rear flippers like an exaggerated Popeye. "You forgived for eat tomatoes! Don't be scared!"

"I'm not scared." The idea of being frightened of an atzu billy was foreign to Kimberley. Why? Her host's face was far from disarming. Dark wattles around the eyes, a death's head grin, all these features tiny and close-set, surrounded by the twitchy muscles that irised his breathing snorkel open and shut — his upside-down nose was the only thing above his superthick neck larger than its human equivalent.

"I'm sorry I took your tomatoes," she apologized.

"Oh, not my significant. All this is queen stuffs. What the hell, be happy. Why are you come here?"

"Not for business. Have you seen me before? That was my business mind. In my present mind I don't know you."

"My name is Vifar Na, consort of Vifar Ssolki. I see you in human enclave, super fatso, yellow hairs on head. I be there many often to play video games. Bang! Pow! Humans make me happy."

"Well, thank you ... uh, may I ask something?"

"Shoot away."

"I've never been on a boat. My teachers worry that because I'm female —"

Vifar made firecracker noises inside his fleshy nose. "Ah! What you conceit! Boat-billies love for you? Make you choose one, take his seeds inside? You not shape right; boat-billies got bright orange shovel thing."

"To get in a boat — is it a signal for sex ...?"

"Queen daughter so fat and pretty, by and by boat-billies go wild for love and steal her to boat. Sudden quick, boat gang break up. Bright orange hate! All fight. Daughter find one she likes. She says 'You' and gives him a name. That one feel good, others pathetic and want to die, so choosed one kill them all with love-wrath, like I

die, so choosed one kill them all with love-wrath, like I done years back, and then give seeds to Vifar Ssolki, and with seeds she become queen."

Kimberley shivered, setting her blubber-flesh in motion. "I could get in a boat? I could summon that crew out there, and nothing would happen?"

"They never turn bright orange for you. If they do, oh boy kinky neurosis. Years since I was bright orange, but I guess no problem. You careful don't choose favorite, that's all."

"Uh ... would you come along while I try?"

"Sure. Surprise? Atzu very obliging, except grumpy queens. Not like in human videos, so many negatives. Human Bible says if you be willing and obedient, you eat good of the land."

So, filled with misgivings, Kimberley edged into the water. Vifar circled her with enthusiasm as she swam toward an oncoming canal boat. Her heart beat fast. For six years agronomists used her body on an almost daily basis, and never dared what she was about to do. Timid scientists! "GulCcimfa vi Ccur kizvat uitluSsna ol!" Kimberley shouted.

"VinaCcur Ccimfa?" came the response.

"Fa CcurnaCcim Gulvi," Kimberley answered. "That way! Twenty kilometers!"

They hauled her aboard, squeezing her abundant flesh, feeling the heats of her body. Of course the sensation must be as alien to them as the clammy, over-intricate boniness of their hand-paddles was to her.

Life departed from some sci-fi script; the genitals of these second-stage billies brightened not a lumen. Vifar clambered on board, complimented Kim on her mastery of Uitkioli, and scooped her a few poached yibbers from a communal cookpot.

This was the point of no return; Kimberley could swim back to the enclave, and maybe get home in time for class. Yet she'd made her decision hours ago, without daring to tell herself — too incongruous for one rooted in gluttony to launch on a runaway adventure!

So she let her boat-billies pole her eastward, slicing past a panorama of orange-green-purple fecundity, field after exotic field.

In the near distance she saw a blue-green horizon. The heights drew close, the canal veered. Gullies debouched into the flats: here clustered forests of segmented stalks. A hundred species contended for the middle slopes — wineglass flowers; red, pink and white. Above them, a lumpish woolly green: Kimberley was slightly myopic.

A long, slow day, and a long way for atzu arms to pole. The rose-mists of sunset obscured the bluffs and ZuluSsuit Ki was not yet in view. "I'll miss my destination," she worried in Uitkioli, and pointed up, forward and to her left. "The House of Rule —"

"We know it," came the soft answer. "But best we rest, and see you fed."

Kimberley had misgivings. "I wouldn't care to sleep outside. I'd hoped they might invite me in." She felt proud for using the conditional mood, yet the atzu looked puzzled. She repeated herself.

"Sleep in there?" Vifar responded. "Yes, but we feed you first. Important job to feed a queen, even if human."

Kimberley finished four helpings of uninspired stew, and claimed to be satisfied. In truth she was eager to move on.

It began gently, the piss-warm rain of evening. The atoms of light that swarmed around the boat flew off by squadrons to shelter under shoreline trees. The atzu rinsed their bowls and worked their boat south along the canal. Not much later they sniffed, and turned hard to port. "Used to be a ramp here," said one of the boat-billies.

Kimberley eased out into a mass of rushes, slimy with rot. She climbed to land and caught her breath, reeling with fatigue. An active day, and now a hike! She'd never worried about the trials of walking back at the enclave, but she'd had walls to lean on, couches and booths and excuses to break her journeys ...

Vifar moved ahead, hacking a trail. Kimberley wheezed after. Things snapped in her wattled knees. What compulsion drove the inhabitants of the House of Rule to site so far uphill?

She rested, then waddled another distance: less than half a kilometer to an edifice of stained metal: uniform, dark, substantial. Kimberley shambled into the open bailey, noticing doors too squat for humans, everything too small, even for atzu neuters.

And empty. The courtyard's road-moss was buried under bramble. Up ahead Kimberley saw a cross. Sudden torrents of rain made her doubt her vision, but she heaved close: yes, the verdigrised nailed feet of a human Christ ...

Bugs had worshipped here. Augustinians who'd plunged from orbit, knowing no way to laserkick themselves back into the skies, knowing mold and moisture were the bane of microbug existence. They'd come down to build the human enclave, rear infants, and retreat into final piety ...

Kimberley sank to the ground. She trembled with exhaustion, naked in the dark night rain, yet her thoughts raced fast. How sad! The first mission to LuSs, hoping to find a galactic empire, reduced to this!

But they'd had robot miners to dig, robot factories to smelt metal to make the enclave. All that, and an orbiting spaceship to beam down power — why hadn't they built a laser-launcher to rescue themselves? No need to get maudlin! They'd gone back to space, merged with the second mission — but perhaps not perfectly? Factions, wheels in wheels ...

"They used to teach us here," said Vifar.

"Yes?"

"LuSs is simple compared to Earth. Complex about sex, and stages of life, but very simple. No cable democracy, no Brain Police, no body swapping. No prejos, no contrabandistas, no bugs."

"Five billion years ago there were Gatekeepers," Kimberley responded. "They made stargates between worlds just then coming to birth. We found our gate in 2070. Voices from that gate told humans to come here. Why?"

"To trade seed," Vifar answered in English. "That answer satisfies you of the enclave. It never satisfied these bug-humans, though."

"Maybe LuSs is a test. Could that be it?"

"These ones thought the Gatekeepers wanted them to teach us —" Vifar flaired his paddle-hands wide in the atzu equivalent of a shrug. "... science and medicine."

"Five billion years, Vifar! How long to pass a test? I'll be dead, and you, and we'll have barely started!" Kimberley fell silent. Was it injured vanity that told her agronomy was not the queen of arts, the crossroads dis-



because of vanity?

Or was agronomy a metaphor? What was a seed? A design with power to implement itself! Galactic commerce was limited to items of small bulk. What could be less bulky than a blueprint?

Brother Tom's Augustinians had pursued that metaphor and educated the atzu, planting mental seeds that failed to germinate.

Kimberley's mind drowsed off the paths of logic. She snapped to, and reconsidered. Metaphor, yes. Seed and sprout, claiming its place in the sun — would it work? She'd review her thoughts in the morning. If they seemed sound ...

Well, then, the history of humanity in the cosmos might depend on her!

The sun rose to illumine morning fog. Kimberley woke. Terror almost brought her to her feet. Years and years she'd slept in the same bed, and now to open her eyes in this strange place!

More terror. Had she forgotten that idea? Let's see ... key word "metaphor" — Kimberley relaxed. "Vifar!" she called. "Are you here?"

Vifar bowed through the bailey. "Yes?"

"When a queen dies, what happens to her neuters?"

"They work until her last orders grow unreal. Then they lie down and die."

"I want you to go down to the canal. Tell the boat-billies to spread the word among all the boats, and have it shouted into the fields as far as a hundred kilometers away."

This was the moment. Kimberley paused for breath and her empty belly rumbled. "Tell all the neuters of dead queens to come here. I have orders for them. I want them to bring seed, and food, and cultivate this wasteland for me."

Vifar stood, his head cocked. "You have been on a boat, and now you are a queen. A puzzle — all the middle parts are missing, the blood and sex —"

"But I am a queen?"

"To obey is perfect liberty. If you are generous enough to give orders, multitudes delight to accept them."

"How simple! How alien! I must feed those multitudes, and I'm hungry myself. Help me down to the waterside." Kimberley smiled. "I'm ready for an enormous breakfast!"

Kimberley! Where are you? Everyone's looking for you!"

"ZaSSa!" Vifar Na extended his arms in triumph as Fredrika's voice shrilled from the rust-stained grid. Kimberley moved her head a width away and answered: "Shh! This is a secret call! There's only one place outside the enclave where I can do this, so make sure there's no teach-bugs listening. Are you secure?"

"Nobody but me in my room," Fredrika answered. "Kim, you're right to be worried. These weeks since you left they've been swarming all over, and sending out search parties. You can't imagine the rumors!"

Kimberley's shade-umbrella was camouflage colored, but the brilliant feather-fans that kept her cool spoiled the military effect. Nevertheless she answered: "It's us versus them, Freddie. I'm trying to free you and the other kids from any more mule-work."

"Save us? It's worse than ever; they hardly ever let the

boys into their own bodies except for sleep. They're always around, always spying — did you know they've shut the compound doors? For the first time in six years they're keeping them shut, and using our boy-bodies to stalk the parapets."

"Any guns?" Kimberley looked at the billies mustered smartly in the House of Rule's inner bailey, and at the sharpened staves that comprised her present armory.

Fredrika paused. "Should I tell you? We're scared, we thought you might be dead or kidnapped. Maybe your captors are making you ask me questions."

Kimberley laughed. "I'm giving orders now. No atzu commerce with the human enclave, and no more food. Tell the other girls. I'm not doing this because I'm your enemy. You'll suffer some, but trust me. I know what I'm doing."

Kimberley's words came true. Boat-billies no longer trafficked the canals that defined the enclave. In the night, lights coruscated and splashes were heard. One morning boats collected in the middle length of Uit Ollu-Sszu Kivit. The fleet poled within hailing distance. "I guess you humans don't got guns?" Vifar shouted. "No killing, huh? No killing?"

"We won't be the first to shed blood," came the answer.

"ZaSSa! All you business phantasms, pickthatch agronomists! Queen Kimberley orders you got to leave your bodies, and put kids back in. Never use memory helmet no more to steal bodies, just to save kid souls if they die, and radio them off to Earth."

"Kimberley can say anything. The answer is no."

"Use your telescopes. Telescope her in our boats, eating all many foods. We cook pat to her orders, many good food airs go your way with delicious smells. Oh yes, she eats, but what for you? Never no more food for any!"

The teacher using Vlad's body signaled down into the compound. Fredrika heaved up the stairs. "Vlad" handed her the squawk-box. "I countermand Kimberley's orders!" she shrilled.

"Pah! Less-fleshed queen-daughter? Never been on boat? Anyhow, how does you really say in your true mind?"

False "Fredrika" flushed angrily. "Kimberley! Yes, Kim, you can hear me! You're engaged in treason against Earth's mission!"

Kimberley shifted her bowls and pushed onto her feet. "What do agronomists ask of a good crop?" she shouted. "That it sprout quickly, not trespass beyond its field, ripen without harm to the soil, and bless those who plant it."

"Who planted humans on this planet? You? The Augustinian mission? The Gatekeepers? Awesome partners, but it's the atzu who assigned us to Uitkiol! Why? As an experiment, to see if we're good to have around! Yes, we're a crop, and we've tried to be good, but we've always been timid. That's proper in a seedling, but now it's time for humans to flower."

"And time to leave the enclave. I know a better place for our children, the highlands behind ZuluSsuit Ki. You never thought about these bodies having children, did you?"

The answer came after a pause. "You should know you're not exactly human, Kimberley. Selection and tampering —"

"Indeed. Agronomists work with hybrids. We're hybrids in new soil, doubly removed from the wild species."

In time we'll accommodate to some strange niches here on LuSs, and be triply different. Maybe that's what the Gatekeepers are waiting for — to see how we evolve, and if we can share this planet with others. Does that make sense? Can I ask Brother Tom if that sounds possible?"

"Tom's clique are on the shelf. We've had some trouble —"

"His Augustinian "clique" will help us restore the House of Rule, and move your equipment to that better site. Bring him down now. I'm used to giving orders, and having them obeyed. My atzu males are capable of cheerful butchery, and think little of their own lives, and I've got all Uitkiol to call on."

"You wouldn't dare!"

"You have one hour."

Boats and more boats. The canals grew jammed. Bodies disappeared from the parapet, and appeared again. "Kimberley?" one shouted. "It's me: Tom. They want me to talk you out of madness."

"Is this madness?"

Tom considered. "A human madness, this business of empires. Kimberley the First, Queen of Uitkiol! Does it mark us virulent? Will our species be praised or condemned for doing what comes naturally?"

With atzu help Kimberley stepped across to a nearer boat. "You led me to this, Tom."

"Perhaps it was wrong. It's humans who are being tested here, not bugs. If you kids had continued to drowse that would have said something about you, but I just couldn't tolerate your intellectual sleep. Intellectual sleep blighted my own fleshly life — I had to wake you up! Better to make the wrong answer than not even recognize the question!

"And God bless you, now you've made that answer. It's genuine, Kim. It rings true. I hope it does us credit, this scrub empire of yours."

"Will you stand by me, Tom? Every queen needs an archbishop."

The figure on the parapet turned away, then back. "Some of your friends want nothing but to retreat to Earth."

"Choose teachers to take their bodies. I want one to be you."

The doors of the enclave opened. "It's not all up to Tom yet, Kimberley," Fredrika sang out through the amplifier. She lurched down the ramp, waving a long, lethal knife. "Some of us figure when I take care of you, the atzu will transfer their loyalties to me."

"A duel? Where's my weapon?"

"Fredrika" laughed. "Codes of honor? Think, Freddie's your best friend. Kill me and you kill any chance of seeing her again!"

The red-head leaned on an atzu shoulder to step into his boat. Kimberley shook her head. "You're clumsy, whoever you are. Maybe you think that just because you're twenty kilos lighter you've got a chance —"

"Are you really going to make me chase you deck to deck?" came the taunt. "How unqueenly!"

"True. All right, billies, seize her! Take that blade. She's no intention of playing fair, so why should I stand still and be skewered?"

Vifar translated Kimberley's orders, and turned to face her. "This custom of dueling — is it something we should learn?"

Fredrika's shrieks died away, and Kimberley could be heard again. "No. It comes out of a book about bees. Someone in the enclave has quite an imagination!"

That afternoon the fleet-jam broke up to pass boats from the enclave. One hundred humans with their lifetime possessions, trailed by kitchen equipment, VCR's, furniture — orderly plunder continued into the night. By that time Kimberley and Tom were anchored at the bend of Fa CurnaCcim Gulvi.

"You'll be surprised," Kimberley whispered across the dark. "We've got a regular dock, and a clear road up, and fields laid out and planted! Your power tap's cleaned of vines, and the air conditioners work now and again. We've sheds and lean-tos for temporary shelter — I didn't build anything presumptuous before today, but what do you think? A house for each human queen — do fifty palaces count as a city? On Earth they'd laugh —"

In Takio's small body Tom patted her hand. "Let the humans of Earth laugh, as wild laughs at tame. Wish them well in their native reserve, but we're committed to a planet of give-and-take. The eyes of the Gatekeepers are on us. If there's truth to our hopes, then it's your children who'll claim the future!" □

Coyote on Mars

(Continued from page 2)

He got real quiet.

"But there are spirits," Chee said. "There are totems. And the only totem who made it here was the Coyote, the trickster. He thought to play the ultimate trick. Only the trick got played on him. He's on fucking Mars, man. Don't you get it? He's on fucking Mars, and he can't get back. It's lonely here for a spirit. And he's pissed. An angry spirit is a dangerous spirit, even if it specializes in pratfalls."

The Russian's voice shook. "There is a sand storm coming and Martin is out there." Without waiting for an answer, he tore open the door to the hydroponics section and peered inside. "Oh, God! The pump is off!" he shouted. "You idiots! Did you turn off the pump?" When he turned the skin of his cheeks was still pale, but the part around his eyes was red and swollen as if he wanted to cry. He was shaking a little like he'd caught a fever.

I got up out of my chair and ambled over to the controls. All the lights were green except one. "Looks like it broke," I told him.

Lubenov screamed in my face, "If it is broken, then you must fix it! You must fix it now! If your plants die, you will die. Don't you understand that?"

"So big deal. So we just didn't notice," Chee said as he shifted his long body on the couch. A couple of more uniforms fell. He retrieved them and arranged them over his legs.

"Pump is broken a long time now," the Russian said, his grammar suffering from his fury. "I smell rot in the water already. And you are telling me you have just noticed?"

"Let the Coyote fix it." Chee sort of giggled.

Lubenov moved faster than I'd ever imagined he could move. I know he moved faster than Chee had counted on.



CAROL HEYER

In three quick strides Lubenov was on him. The Russian grabbed the Indian by the front of his uniform and jerked him upright. Slap. Slap. Slap. The Russian's arm pumped so fast I could hardly see the motion. Lubenov's open palm against Chee's face sounded like three rapid shots. Slap. He hit him once more for good measure and then let the Indian drop back into the scattered dirty clothing.

Chee had never once put his hand up to stop the Russian. I stood in the corner by the pump controls and never said a thing. Chee's nose was running blood, as bright red as Lubenov's uniform.

"Idiots," Lubenov said sadly. He sat down on the sofa next to Chee and stared at his hands. "You are such idiots to let them kill you."

At that moment the roof creaked. The bubble bowed in a foot or two on the left side. Lubenov's head snapped up. He stared at the ceiling suspiciously. "You have checked the seals?" he asked.

"Yeah," I said.

Lubenov got up and went to check, anyway.

The blow was going to be a bad one. The metal struts above my head groaned. The bubble rubbed against its armature with the sound of a badly tuned oboe.

"Martin is dead now," Lubenov said. "Are you happy?"

I poured myself another fair-sized hit of Chee's moonshine and sat down.

"He is out there in this storm, and now he is dead."

The Russian sounded pretty upset about the whole thing. Chee rolled over and went to sleep, his nose still running blood. In a few minutes Lubenov got up, went to hydroponics, found a spare pump and started to work.

A little later I went in to watch him. "If you knew there was a blow coming, why did you go out?" I asked.

He wrapped electrical tape around two wires and flicked the switch. The pump started a shusha-shusha rhythm. "I have cleaned the filter, but the water will taste bad for a few days."

Lubenov was sitting on the floor. I was standing over him. From that perspective I could see that he was going bald in a neat little monk's tonsure at the back of his head. He got up and studied the ceiling again. It was making end-of-the-world noises.

"It'll hold," I told him, speaking loud over the roar of the storm. "It always does."

He sniffed a laugh. "Such faith. You Americans have such faith in engineering. We Russians understand technology, therefore we've learned not to trust it."

In a moment he walked back into the lounge and sorted through our next shipment of diamonds, which was due out in three days.

"I hate the South Africans," he said.

"Good. They're dead, anyway."

Lubenov went on as if he hadn't heard. "They and their nuclear suicide are the cause of this. Why did they have to do it?"

"Serious deed restrictions," I told him, but he didn't seem to get the joke.

I looked over at Chee. The Indian might have died in his sleep, he was so still, so quiet. I wondered if I should go check.

"A good Kimberlite pipe," Lubenov said in what sounded like envy as he held up a four carat VSI. Below the florescent lamp, the uncut stone glinted with a cold, bluish light.

Then he leaned over and whispered in my ear, as if he thought Chee were a spy or something. "We can get home."

I shook my head. "The U.S. doesn't have funding for replacements."

He dropped his gaze to the stones and ran his fingers through them. They made subtle, clinking music. Ice music. "That is the excuse they give us, too. But the funding is here. Right here. We simply refuse to ship. We do not load and fire our rockets when the time comes. I ask you which is less expensive: to lose the diamonds or to send replacements for us?"

I shrugged. "Yeah. Maybe," I said. "Then again, they could punish us. Not ship the food. They could starve us to death."

"That is why you must preserve everything. Everything," he hissed. His face was close to mine, close enough so that I could smell the ghost of Chee's liquor on his breath. "We are dying already."

He backed away from me as if he'd just realized he'd come far too close. "I have a plan," he said.

I raised my eyebrows.

"We send both governments a message. Whoever gets here first gets all the diamonds. Understand me? The first to get here and take us all home, wins. My miners already agree, but you must be in the plan."

"A Martian revolution?" I laughed.

He didn't. His eyes picked me apart. "Yes," he said. "A revolution."

He dropped his gaze and ran his hands through the stones again, this time lovingly. "I am thinking. They will be angry with us. We will lose our pensions, perhaps. But diamonds can be hidden in the anus."

"I hear my people X-ray."

Lubenov glanced at me, startled. Then he gazed back down at the stones, amused. "Americans. So they don't have as much faith as I thought." He picked up a diamond, a good six-carat fancy yellow, and weighed it in his hands. "Then we hope that the Soviets will get here first."

"Okay," I told him. "I'm in."

His eyes were tiny, bulbous and grey. The whites were a little bloodshot from the dry air in the lounge. "You are sure?"

"Yeah. Might as well."

"And you will tell Chee to go along with it? He will listen to you."

"Chee doesn't give a shit. He stays drunk." I wandered over to the other sofa and lay down, my hands crossed at my chest, my eyes to the bowed ceiling.

Lubenov followed. His heavy cheeks sagged as he bent over me. "Standifer is dead," he told me.

"Right."

"He does not come back to the lounge. He is buried out on Mars. I came to the funeral, you remember?"

"Yeah."

"So you do not see him in the cooler, Dawson?"

"He comes," I said as I closed my eyes, shutting out Lubenov's worried face. "I see Standifer and Mike Bledsoe and all the others. They're just as real as you, only I can't touch them."

"They are dead. They are buried. They cannot come back," he said patiently. "You must believe that. If we are to die in this revolution, at least we should die sane."

My eyes popped open in sudden fright. "Give me your

hand!" I said.

He hesitated, then put his hand in mine. It was warm. I could feel the pulse in his wrist.

"Okay," I said with relief. Releasing him, I closed my eyes and slept.

Lubenov woke me up. It was late afternoon of a polar summer day when the light is stretched so long, so thin, that day itself seems brittle. The lounge was silent except for Chee snoring in the corner.

"The storm is over," the Russian said.

"Yeah." I wiped my eyes. They stung.

"We will go search for Martin."

"Yeah. Okay."

He helped me up. We got our helmets and went out the airlock to the Soviet creeper. We tugged the tarp off, brushing away mounds of sand and a scattering of ice. Lubenov and I clambered up into the chilly cabin. The creeper started with a roar and a jerk, picking its way north over the stones.

"How do you know which way Martin went?" I asked him.

In the protection of the cab he'd taken his helmet off. Loose skin bagged under his eyes. "Martin is from Vermont," he said as if that explained everything.

Dry air, prickly and perfumed with the stench of heating coils, beat against my face. Ahead of us knife-edged shadows ran straight as plumb lines from the russet rocks. To the west the sun was a blood spot in a bruised and purple sky.

"Have you ever thought," he asked after a time, "how much Mars looks like just any desert?"

I looked out the cab window to my right and stared at the sharp, blue edges of a mountain. It seemed that there should have been predatory birds wheeling the updrafts above it.

"Did it ever seem to you," Lubenov asked, "that if you simply kept walking that you would finally see trees and then houses?"

"New Mexico," I whispered. Suddenly I saw myself in Albuquerque, the way I used to be. I'd kept a scrupulously neat office filled with painstakingly neat files. There had been a place for everything but ghosts; and everything that was ordinary had been in its place. Tears of nostalgia welled up in my eyes. I turned my head hard to the right so that Lubenov couldn't see.

"Afghanistan," he said.

I dared a glimpse at him.

He wasn't looking my way. "When I was seventeen my troop transport was shot down over Afghanistan by an American rocket."

"Sorry," I muttered.

He shook off my apology. "When I climbed out of the wreckage I walked a long way. And while I walked I kept thinking" Lubenov stopped as if he had simply run out of words.

"What?"

The creeper clambered and slipped over a crumbling ridge. Lubenov held the steering wheel steady. "I thought that if I walked far enough, I would get home. I was right, of course, but I pictured not arriving in Uzbekistan, but in Siberia, instead. Isn't that strange? I thought that if I kept walking north, I would come to the snow, and there I would find the hunting cabin that my grandfather had built. And I imagined that I would walk up to find smoke

drifting out of the chimney. The ponies would be tethered in the front yard, the dogs sleeping beside them."

"Yeah. Strange," I said.

"I could smell the tang of wood smoke so ... vividly. In the air I imagined I caught the scent of snow."

We were quiet a few minutes. The sun dipped lower but didn't set. The day slipped into the lingering, dull twilight that passed for evening. Lubenov turned on his headlights. They were a warm yellow in the blue haze. "What happened?" I asked.

"The helicopter they sent found me," he shrugged.

"So?"

"So I am thinking I understand what our people are looking for when the Coyote calls their names and they walk out into the rocks. I am afraid that if I hear the call of the Coyote, it may be a voice I already know."

Lubenov stopped the creeper. I could feel the thrum-thrum of the warm engine under my legs and hear the ticking of the heater.

"What?" I asked. He was staring off to his left. I looked left with him and saw the blue-clad leg sticking out from under a new dune.

I put on my helmet. My hands were shaking. We clambered down from the creeper and walked over to Martin. There was no sense now in hurrying. Getting down on our hands and knees, we scooped the sand from around the rest of his body.

Martin had taken his helmet off and it lay beside him. His eyes were open. There was dust clotted in them. His mouth was ajar and sand trickled out of it in a stream.

With an oddly maternal gesture, Lubenov lifted the body up by its shoulders and cradled the head in the crook of his arm. He wiped the sand from the staring eyes and closed them. For a moment I thought he was about to rock Martin to sleep, but he whispered, "Help me lift him."

I got Martin's legs. He was heavier than I would have expected, but I supposed the weight was from all the sand he'd eaten; all the Mars he'd breathed. We carried him to the back of the creeper. Lubenov opened the boot with one hand and we settled Martin behind the heavy glass. The boot hadn't been designed for bodies. Martin was too long. So Lubenov coaxed him into a fetal posture on his side: arms crossed over his chest; legs tucked to his middle.

It seemed as if we should have said a few words over Martin, but all Lubenov did was gently close the boot.

We got back in the cab. I was shivering, so Lubenov found me a blanket and tucked it around me. It smelled of wool and rich human oils. He turned the creeper around and set off south towards the American mine at a slow, funereal pace. I closed my eyes and in the heavy-machinery beat of the creeper's engine, drifted off to sleep.

I woke up with a jerk. The sun was peering over the horizon to my right, turning the sky and rocks pink. The creeper was stopped, its engine still throbbing, but Lubenov's captain's chair was empty. The headlights were still on.

Ice granules fine as snow filled up the low spots in the sand around me. They blew in smoky drifts against the rocks. "Nikolai?" I whispered.

In the glare of the headlights I could see the corrugated tracks of a set of boots. A single walker, heading north.

Snatching my helmet from the floor, I stuffed it on and climbed outside. "Nikolai!" I shouted.

Even though I knew he wasn't there, I walked around

the cab to the back. Martin was still curled in the boot. The sun edged into the dark space behind the glass and lit up his face with peach light, so that he looked like a transfigured saint in an Eastern Orthodox icon. Sand still leaked from his open lips. St. Martin, the patron saint of sand-drowned men.

"Nikolai!" I screamed and then listened hard. In the rose-pink dawn I thought I should have heard the wake-up calls of birds, but there was only Mars's huge silence.

I stumbled a couple of yards after the mute tracks of Lubenov's shoes and wailed to him again. "Nikolai!"

I listened for the only living sound possible, but heard the empty hiss of the wind, the soft clatter of the ice. I struggled back through the ice-blown sand, clambered up in the cab, put the creeper into drive, and started after him.

The sun had freed itself from the horizon by the time I saw the Soviet. Ahead of me in the glaring white was one tiny spot of red, as if something had pricked the ground and brought out a bead of blood.

As I drove closer I could see the lowered helmet bob with the rhythm of his walk. Lubenov was making good time towards nothingness.

When I drove abreast of him, I opened the door of the cab and shouted his name. He didn't look up.

I put the creeper into neutral and scrambled down the side. "Nikolai!"

I knew he could hear me, but he didn't stop; he didn't answer. He kept going as if over the very next rise he would see his grandfather's cabin, the fire banked in the hearth.

"Goddamn it! Nikolai!" I reached for his arm, but my thick glove slipped off his sleeve.

It was clumsy in my suit, but I sort of tackled him, coming down with my spread arms on his shoulders. He dropped hard to his knees, one hand out to stay his fall. We teetered there for a moment, two beasts of differing species in a brutal coupling: A red creature and a blue. I bent far enough towards him so that our helmets clicked. "Don't you leave me alone out here, you bastard."

He turned his head a bit. Frost had grown skeletal, grasping fingers up the outside of his helmet. The inside was fogged. With an angry movement, he shoved me off him. "Our resistance. It will never work," he said.

"Jesus, Nikolai. Lenin would be disappointed."

The opaque faceplate of his helmet snapped towards me. On the glass I could see the reflection of Mars' weak sun. It made an eerie Cyclops of him. "You make fun of me." Even through the filter of his speaker and my receiver, I could tell his voice was tight.

"No, man. I'm not making fun of you. But think about it for a minute. The Martian revolution is upon us. What would Lenin say?"

He grabbed me by the arms and shook me. My teeth clicked together and I bit my tongue hard. "If Lenin could speak, he would call me traitor!"

He let me go suddenly. I was dizzy. Maybe Chee was right, I thought, and the only totem who got to Mars was the Coyote. If he had, if he were the god here, then it would make sense that we'd think we could walk out of Mars' desert and somehow find our way home. In the blue mountains beyond I thought I caught a glimpse of a swiftly moving shadow.

"What do they do with the diamonds?" Lubenov asked

quietly.

I looked away from the shadow and towards him. The Soviet was featureless: a red rag doll with a black bowl for a head. The playful Martian wind chortled in my helmet.

His voice rose a notch. "Answer me! What do they do with the diamonds?"

"Precision drill bits."

"What else?"

"Screw it, Nikolai. I'm no metallurgical engineer. I don't understand all the new technology."

"What do they do with the rest? Why do they continue the expense of keeping us up here during a world-wide recession?"

"I don't know."

His padded glove hit me hard on my padded shoulder with enough force to drive me backwards. I fell with a crunch in the ice.

"Think! You may be crazy and irresponsible, but you can think!" Then he answered the question for me. "They hoard them! Just like OPEC used to do with oil. Just as De Beers used to do with their own diamonds. Our two nations hoard the diamonds to drive the price upwards. And then they dole them out in little bits and pieces to other countries. That is where they get their power. So if the Soviet Union gets to us first, that will mean the end of the American empire; and if the Americans reach us instead, they will drive the Soviet Union to its knees."

That was the most ironic trick of the Coyote, I decided, that he would give his idea to the very one of us to whom the consequences still mattered.

"Let me go and I will walk home. The revolution is over. I don't know how I could have ever believed they would let us get away with it. The cartel will work it out between themselves and let us starve."

"There," I said, looking out towards the denuded mountains that burst up like knives from the white ice.

Lubenov turned to where I was pointing. "What?" he asked.

The shadow was closer, nearly upon us.

"There," I said and started to laugh.

I couldn't tell if Lubenov saw it, too. He might not have gotten to the point of hallucinations yet. But he jerked, it seemed in recognition. And he stared out into the mountains for a long, long time.

Finally he shivered hard as if something with a cold breath had whispered a secret into his ear. I started to get up, but Lubenov whirled and pushed me down again. He leaned over and the dark globe of his helmet was above me; his fingers were pressed to either side of my faceplate release.

"Dawson," he said. There was a little manic giggle in his voice.

I started to struggle. Any moment I figured I'd feel the pressure of his thumbs at the edge of the polarized acrylic. There would be an anticyclimactic pop. A hiss.

"Listen. Dawson."

He held me tighter and brought his faceplate right down to mine, so close that there was a light tap as the two helmets met. Behind the dark screen I could finally see his expression. There was a glint in his eyes, a grin on his lips.

"Let's call Japan," he said. □

Requiem Aeternam

By Richard Bowker

Art by Wendy Snow-Lang

The room is silent, except for a slight hum. And the room is empty, after a fashion. But there is tension in the room — tension that has permeated the air and seeped into the few pieces of furniture. Tension that does not go away. The room has been like this for a long, long time.

The old man burst into the room. “They won’t get away with this,” he said. “It’s not fair. I won’t stand for it.”

The beautiful young woman sitting in the straight-backed chair gazed at him. “What won’t you stand for, darling?” she asked. Her voice was soft but concerned.

“This!” The old man brandished a letter. He sat down in a wing chair opposite the woman. The room was small and dark, except for a soft light that glowed around the woman. The old man was wearing a tattered, stained robe and slippers with caved-in heels. He needed a shave. “Hand-delivered,” he added, “as if it made things better to listen to some simpering bureaucrat while you read the thing.”

“What is it, Charles?” the woman asked. She had shoulder-length brown hair that framed a pale oval face. Her hazel eyes were fixed on the old man.

“A termination notice,” he growled. His rage appeared to have subsided somewhat, but he was still breathing heavily. The hand that held the letter trembled.

“But I thought you filed for an extension.”

“They turned me down. The bastards turned me down.”

“Can you appeal?”

The old man crumpled the letter and threw it onto the floor. “I suppose. But what good will it do? My benefits are running out. When the benefits are gone — termination. Case closed.”

They were both silent for a while. The woman’s hands were folded on her lap. She was wearing a long white dress with a narrow waist; a lace shawl covered her shoulders. She wore no jewelry except for a wedding ring. “You could talk to David,” she whispered finally.

“I knew you were going to say that,” the old man exploded. “I thought I told you never to mention that no-good —”

“But what else can you do, darling?”

“I’d rather go to the rest home today than beg a favor from my son. He’s never done a thing for me, and he isn’t going to start now.”

“But this is different, isn’t it?”

“Just drop it, would you please? I won’t ask him for anything.”

The old man stared into space, an aggrieved expression on his face. The young woman unclasped her hands and leaned forward. “There’s always me, you know,” she said. “Without me you’d have more money, and —”

“Don’t be stupid. Why don’t I just sell everything, so I can sit here for a few more months and stare at the bare

walls? That’s not a solution.” The old man stood up. “It’s not fair. My health is okay. My mind is as sharp as ever. Most people still have plenty of benefits at my age. It wasn’t my fault I needed those transplants. Nothing has ever gone right for me. Nothing.” He glared at her.

The young woman’s eyes glistened. “I’m so sorry, darling. It’s all my fault.”

“Sorry” doesn’t do me any good now,” the old man muttered. He turned and left the room.

The woman watched him go; then her eyes moved to the crumpled termination notice on the floor.

Her eyes stayed there.

It wasn’t fair. The old man sat on the edge of his unmade bed. He felt better having gotten it all off his chest to Angela. But not a great deal better. She shouldn’t have suggested he call David. After all these years, didn’t she know any better? What was the matter with her?

He glanced around the cluttered room. Once upon a time he had been happy. He and his wife had lain together in this bed while their infant slept quietly in the next room, and life had seemed perfect.

And now life was one long scream of rage and frustration.

What was he going to do?

He filed an appeal. He looked for a job.

He called up Arnie Feltser. They weren’t exactly friends, but they had worked together for twenty years, and that was worth something, after all.

“Hello, Arnie,” he said when the man’s face appeared on the screen. “It’s been a long time.” Arnie looked terrible — old and bald and haggard. Did *he* look that bad to Arnie?

Arnie seemed surprised. “Well, Charles, it certainly has. How’ve you been?”

“Oh, not that great, Arnie. I had a couple of transplants, you know, and that sort of set me back.”

“Sorry to hear it, Charles.” Arnie didn’t sound especially interested.

Maybe it wasn’t quite time to bring up the reason for the call. “And what about yourself, Arnie?”

“Oh, well, not too good either, Charles. It’s my wife, actually. She came down with this new disease they brought back from that space probe — you know, the one that attacks the nerves and you gradually lose control of your body, and then the mind starts to go — and, well, she’s too old to qualify for the treatments, of course, and her benefits are gone, and now I’ve transferred mine to her, and I don’t really know what I’m going to do. Actually,



I was wondering, Charles, if you could possibly see your way clear to —

It was unbelievable. The nerve. The old man cut the connection.

A “t least he *has* a wife,” he pointed out to Angela. “I’ve got no one.”

Angela nodded. “And he’s wasting his benefits on someone like her, with an incurable disease,” she added. “You’ve still got your health.”

“Precisely.” The old man paced back and forth in the small room in front of her. “But now I can’t think of anyone else to ask. And I don’t have much time.”

The beautiful young woman gazed at him and said nothing.

He got a job running the laundromat next door to his apartment building.

It was hell. The machines were constantly breaking, and the customers were so damn rude. It wasn’t *his* fault the machines were no good. And frankly, he didn’t care whether their clothes got washed — the things people were wearing nowadays looked just as ugly clean as they did dirty. And after a while he got so fed up he started telling people that.

He was going to quit the third day, but the obnoxious little owner fired him first and saved him the trouble.

I “’m too old to have to put up with that kind of stuff,” he said to Angela. “I’ve worked hard all my life, and now I deserve a chance to relax.”

“I know you do,” she replied. “But you’ve got to —”

“Don’t tell me what I’ve got to do,” he shouted at her. “I don’t need to hear it.”

“Of course, darling. I’m sorry.”

The old man glared at her. “Maybe I’ll win the appeal,” he said finally.

He lost the appeal. “You know why?” he demanded when he got back from the hearing.

Angela shook her head and adjusted her shawl nervously.

“Because I have an immediate family member who isn’t contributing to my support. And you know what else I found out?”

“No,” she whispered.

“The termination notice also goes out to immediate family members. *He knows about it!* But has he called? Has he done anything?”

She sighed. “Darling, obviously he’s ungrateful. He’s unworthy of your love. But you haven’t got any choice — unless you do something about me.”

“I’m not going to do anything about you.”

They stared at each other for a while, and then the old man walked out of the room.

The old man sat in his bedroom. It wasn’t fair. They say your personality is formed by your early childhood experiences. That meant it was his wife’s fault that David had turned out this way. *He* hadn’t had the time to do much — he had to work so hard — and she never understood, never appreciated — and then afterwards it was already too late, wasn’t it?

He sighed and went over to the desk. The phonescreen sat on the desk, blank, waiting. *I haven’t got any choice*, he thought. He punched in the number.

A secretary answered. She put him on hold. A forest scene appeared on the screen. Birds chirping. Leaves rustling. Stupid. David was probably trying to come up with an excuse not to speak to him.

Finally David appeared. Silver hair, cold eyes. His suit was expensive. He was doing well. “Hello, Dad.”

“Did you get the notice?”

“Yes. I’m very sorry.”

“What do you mean, ‘sorry’? It’s not as if you’re helpless in this situation.”

His son raised an eyebrow. “I’m afraid I don’t understand.”

Yes, he was trying to make his father beg. Well, he wouldn’t succeed. “You understand perfectly well. They’ve already scheduled my appointment at the rest home, dammit.”

“It’s not as if you couldn’t see it coming, Dad. I warned you that you were spending —”

“You’re so damn eager to give advice,” the old man said, “but I don’t see you offering any help.”

“If you’d taken my advice, you wouldn’t need help. You spend all your money on that — that creature, just so you’ll have someone to complain to all day —”

“She’s my one indulgence!” the old man cried.

“It’s sick. It’s just a way of getting back at —”

“Don’t I deserve one indulgence, after all these years?”

His son sighed. “It’s not a question of what you deserve, and you know it,” he replied. “You’re a rational adult, and society treats you that way. You saved a certain amount of money before you retired, and now you’ve spent it. You could have worked longer, but you didn’t. The government gave you a certain number of benefits, and now you’ve used them up. It’s time to take the consequences.”

“But the transplants —”

“— were predicted by the healthscans years ago, but you didn’t exercise or stop drinking, and you didn’t save enough to cover the operations. If the government paid for every medical procedure needed by every old person, the entire gross national product would go for health care. You voted for this system, and you have no right to complain about it.”

“Who are you to tell me what I have a right to complain about?” the old man demanded. “I’ll tell you the main thing I have a right to complain about — a selfish son who’d rather see his father die than spend a nickel to keep him alive.”

David shook his head. “Not even that, Dad. Not even that. I am what you made me. If I’m selfish, I learned it from example. The only example I had.”

“Wait just a minute, now. Your mother —”

“Oh, don’t talk to me about my mother. You’ve tried to blame every problem in your life on her, but I don’t buy it. The problems were there before her, and the problems are still there now that she’s gone. The problems are in you, Dad.”

The old man was suddenly very frightened. “I don’t want to go to the rest home,” he whispered.

“Then don’t,” his son replied. “There’s no law that says you can’t do it yourself. It’s just that they’re professionals at the rest home, and you’re an amateur. I recommend the professionals.”



The old man stared at his son, then quickly cut the connection.

The bastard.

I "raised him myself," the old man said. "You don't know how hard it was, having to work for a living and look after him at the same time. You have no idea."

"No, I don't," Angela admitted. "I'm sorry. Sorry for everything."

"Look. I added up all the money I spent on him. College tuition, dental bills, clothing. Here — do you want to see?"

"Yes."

The old man held the sheet in front of her face. "I should send him a bill," he said. "I should sue him."

"It's just not fair," she murmured.

The old man lowered himself back into his chair. "Maybe he'll be in this position himself someday. And then I hope his children treat him the same way."

He fell silent. Angela fingered her shawl. "Now what?" she whispered.

"Now what?" he muttered. "Now the money runs out, and then termination. Of course the bureaucrats don't call it that anymore. Too gruesome. You go to a 'rest' home. They put you to 'sleep.' I don't know. I'm so damn tired all of a sudden. Maybe it would be a good idea after all."

"Oh, darling, don't say that."

"What do you want me to say?" the old man demanded. "You're the expert. What would *you* do? Huh?"

She looked down. "I'm sorry," she said. "Whatever you decide, I'll be here."

"Of course you will."

The room is still silent, but if anything, the tension inside it is greater now. It has been a long, long time.

The bureaucrats tried to talk him into going to the rest home, of course, but he wouldn't budge. So finally they relented, and they gave him the pills, along with pamphlets about how to prepare yourself and how to take care of your affairs. He threw the pamphlets away. He went back to his apartment with the pills, and he sat on the bed, and he thought.

He had lived in this apartment a long, long time. It had been so long since he had been happy that sometimes he thought it was all a dream, a fantasy. His wife, their baby, a future filled with contentment ... What had gone wrong?

It wasn't his fault.

He looked down at the small vial he was holding with the pills in it. Such a long life, and it had come to these final moments, alone.

It wasn't his fault.

He took a last look around the bedroom, and then went into the small room where Angela was sitting in her straight-backed chair. Her hands were folded. The white shawl was draped over her lovely shoulders. She stared at him; her eyes were glistening.

"I have the pills," he said.

"Oh, darling."

"What do you think it's like, to do this?"

"I — I'm sure it's painless."

"How can you be sure?"

She tried to say something, then just shook her head.

The old man opened the vial and poured the pills into his mouth and swallowed.

And then for the first time he was afraid. Not of pain; he was sure she was right; there would be no pain. But of what came after. What if there was no rest? What if the rage and the frustration just went on and on, like a stuck needle playing the same dissonance over and over again?

But then he thought: could it be worse than this?

Angela was staring at him. She was leaning forward; her hands were pressed to her cheeks. "I'm so sorry. It was all my fault."

He felt strange all of a sudden. Was it her? Or was it the other one?

He was becoming confused.

It was such a long, long time ago that it was a dream, a fantasy. Or was it? Was he young again, and happy? Out having a few drinks with the boys — he worked hard, he deserved it. The kid was away at camp. And she hadn't been any fun at all lately. The same old silences, the same old averted looks, the same old eyes filled with tears. So what was the problem?

What was the problem?

The problem was the silence in the darkened apartment. The utter silence. Angela? *Angela? ANGELA?*

She was lying on the bed in her white dress. A lace shawl covered her shoulders. Her left hand clasped the empty bottle of pills. He picked her up, and her arms were cold, and her head fell back, and her left hand did not let go of the bottle. *Damn you!* he screamed. He started to shake her, and he couldn't stop, he felt as if he would go on shaking her forever. *How could you do this to me! Damn you! "Damn you!"*

He looked at her, and she was sitting in the straight-backed chair. Her cheeks were wet; her hazel eyes gazed at him with love. "I'm so sorry, darling," she whispered. "It was all my fault. I'm so sorry, darling. It was all my fault..."

Damn you! Damn you! It was getting dark. He struggled against the darkness. He reached out to shake her as he had so long ago. It was hard to move. She reached out to help him. He touched her hand, but he touched nothing — particles of light fading in the darkness.

"Damn you," he gasped. But he didn't think she heard him. He couldn't make her understand; he could never make her understand. And now it was too late.

I " 'm so sorry, darling. It was all my fault." Its visual sensors note the shape slumped forward in the chair. It waits. "Darling?" it whispers finally.

No response. It waits some more. No sign of movement. There is silence, except for the hum of the motors that make it exist.

He is dead, then. The benefits are gone. Soon someone will come and take him away, and the electricity will be shut off, and the hum too will be gone.

It adjusts its shawl and closes its eyes and folds its hands on its lap. It has waited a long time, but now it is going to find rest.

Eternal rest. □