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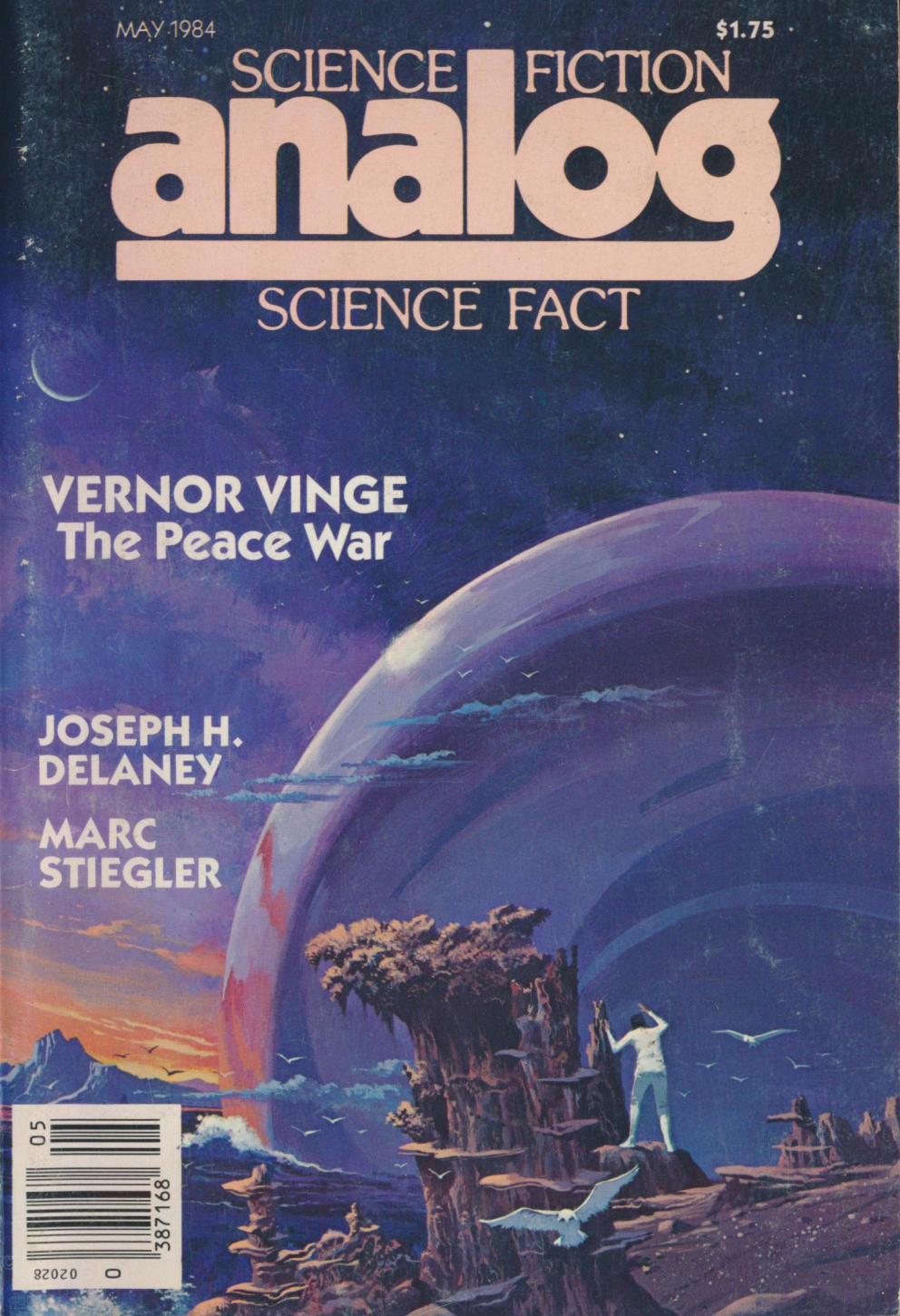

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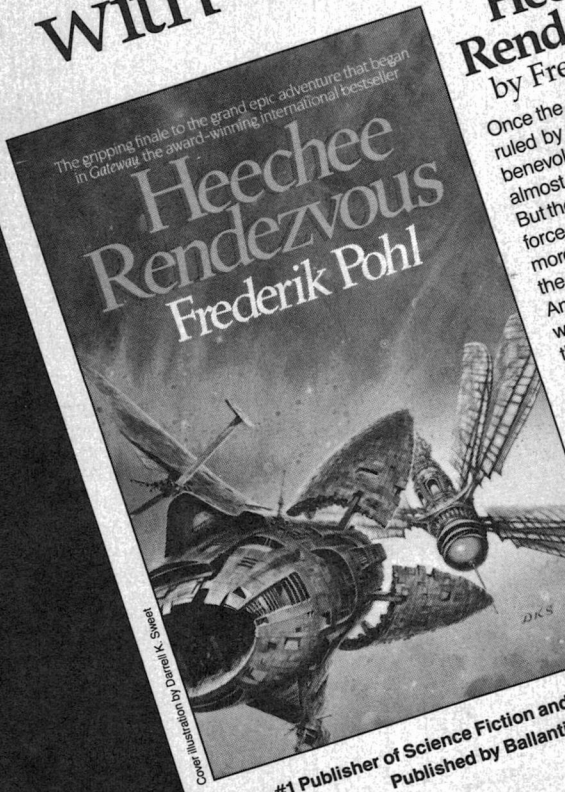

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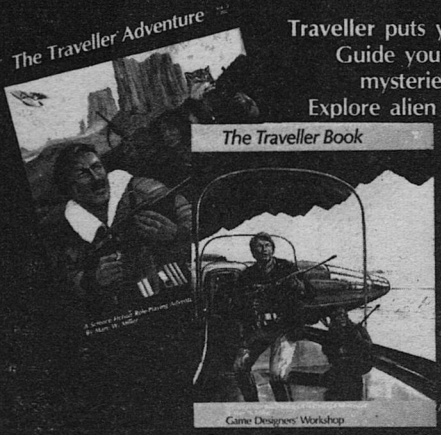

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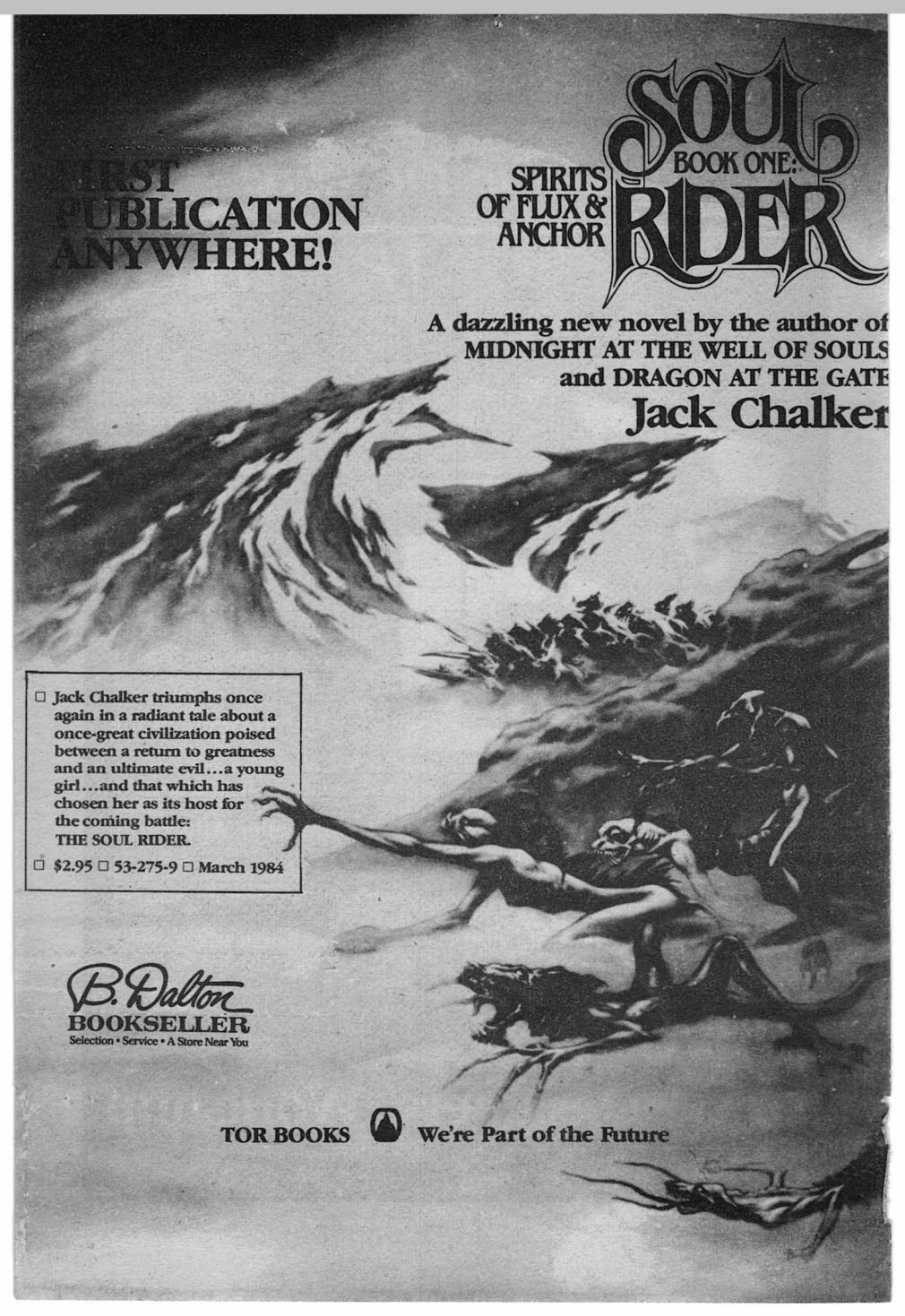
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Editorial

LOYAL OPPOSITION

Stanley Schmidt

By the time you read this, the October invasion of the tiny Caribbean island of Grenada by U.S. Marines and Army Rangers will be relatively ancient history. I have no idea what, if anything, it will have led to by then, and with a five-month lead time I have no intention of trying to analyze or evaluate this or any other current event *per se*. However, such an event often provides an example of some general consideration which needs to be re-examined periodically—if only for future reference. And in this instance, I have an uncomfortable feeling that occasions for future reference will not be long in coming.

As I write (five months before you read this, remember), the invasion is the subject of vigorous controversy, both in government and among the general public. Such information as has so far been released is so incomplete, vague, and sometimes seemingly contradictory that it's hard to get a grip on exactly what happened and why. But, of course, that does not keep people from having opinions. (I have my own suspicions, but I don't plan to discuss them here. I'm waiting for more data.) As one newspaper said a day or two after the invasion, "Congressional reaction was a mixture of praise and condemnation, with the leadership reacting cautiously." House Speaker Tip O'Neill was quoted as saying, "It's no time for the press of America or we in public life to criticize our country when our troops are being committed."

And *that's* what I intend to comment on. Not the incident, but the principle embodied in O'Neill's words. If "when our troops are being committed" is not

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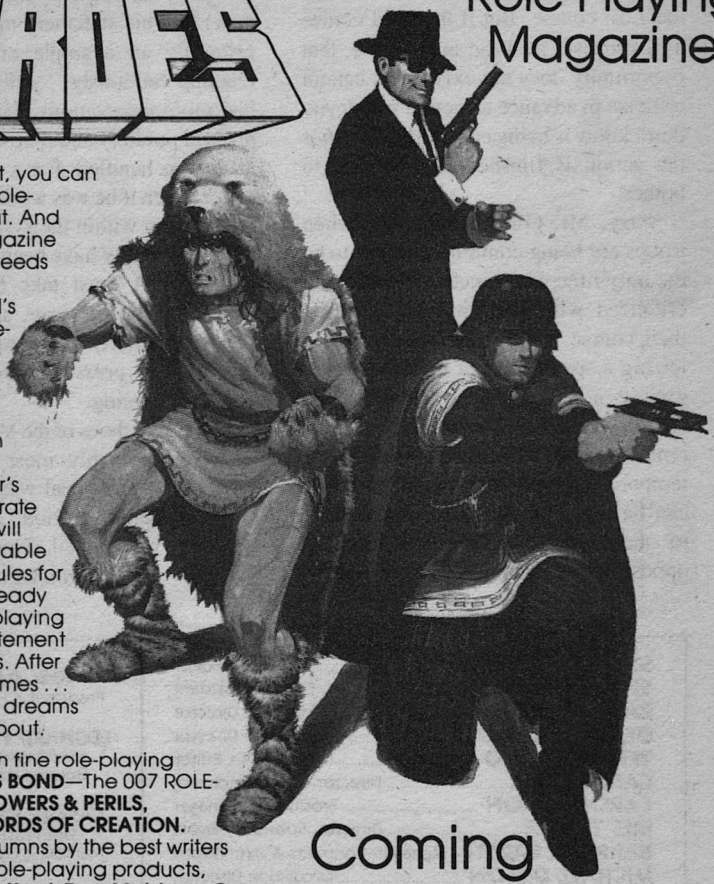

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an appropriate time to criticize, when *is* an appropriate time?

Before they're committed would be ideal, of course. But if the deed comes as a surprise, as it did in this case, that opportunity does not exist. You cannot criticize in advance an action which you don't know is being contemplated. *After* the action is finished is a bit late to bother.

Sorry, Mr. O'Neill—the time when troops are being committed seems to be the only time when such actions *can* be criticized with any hope of affecting their course. And please note that criticizing a specific act of a particular regime is not the same as criticizing the country. As Mark Twain said, the government is not the country itself, but a temporary servant of the country. There can be times when the highest loyalty to one's country consists of vigorous opposition to a government which is serving it badly.

In fairness to Mr. O'Neill, I should add that the context suggests (at least now) that his statement may have been primarily an example of "leadership reacting cautiously," and he may have had more reservations than he then expressed publicly about how the Grenada affair was handled. For a man in public office, even if he was working to change things from within the system, his public reaction may have been the best possible. Yet I must take his words as meaning what they say, and what they say—particularly in regard to commentary by the *press*—I find more than slightly alarming.

It evokes echoes of the Viet Nam war, in which probably most people now agree that a great deal was lost, over a long and painful period, and little, if anything, was gained. Toward its end,

(continued on page 175)

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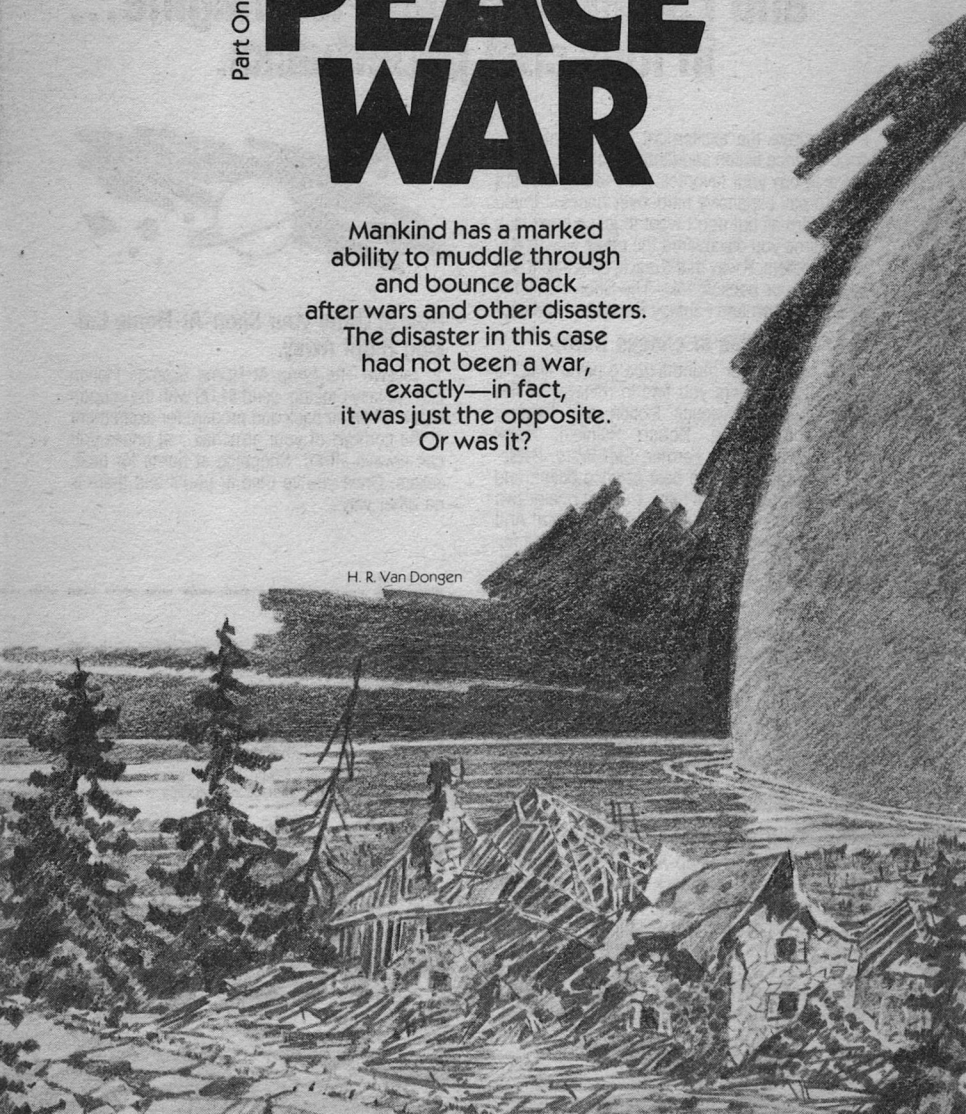
Vernor Vinge

Part One of Four

THE PEACE WAR

Mankind has a marked ability to muddle through and bounce back after wars and other disasters. The disaster in this case had not been a war, exactly—in fact, it was just the opposite. Or was it?



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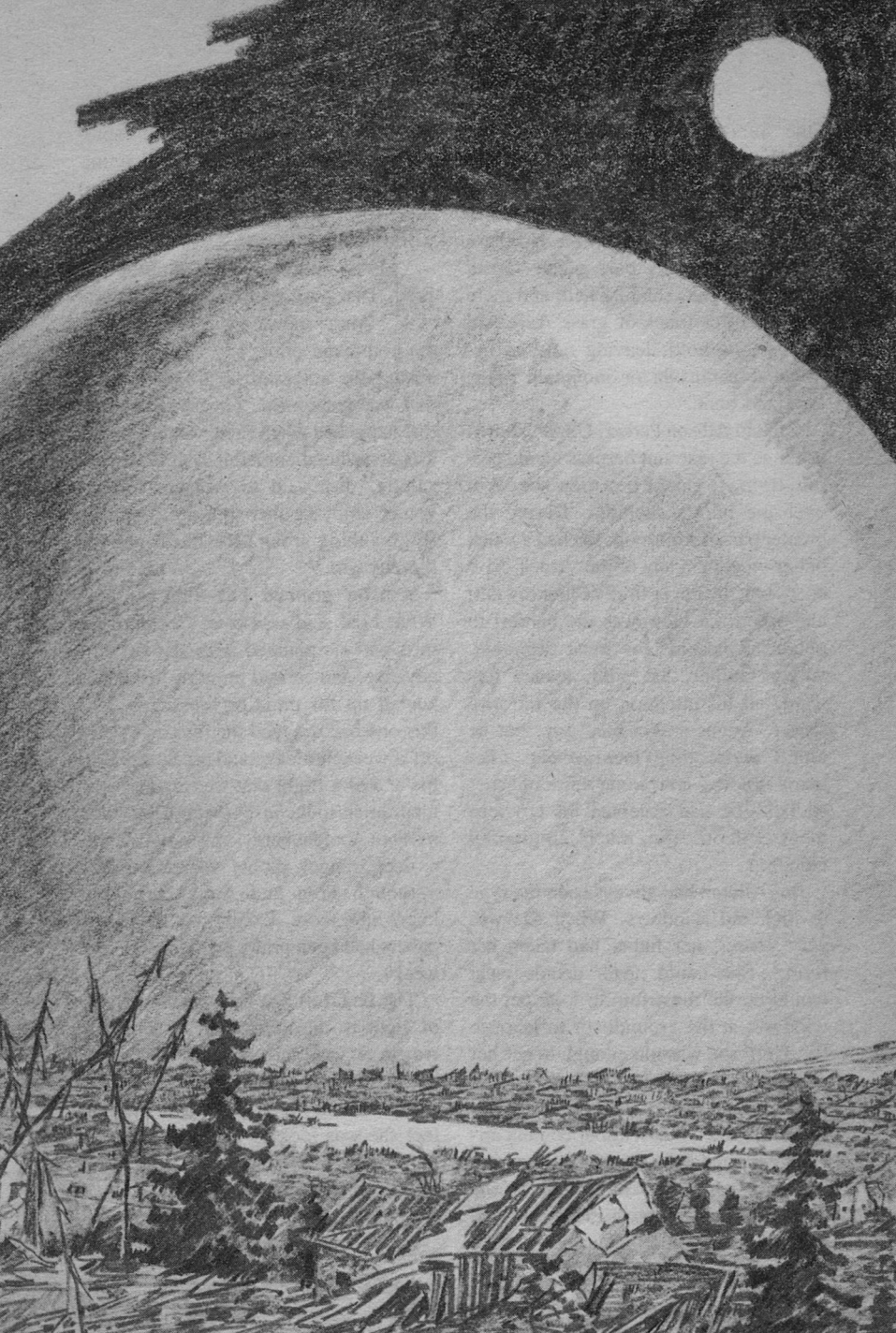

FLASHBACK

One hundred kilometers below and nearly two hundred away, the shore of the Beaufort Sea didn't look much like the common image of the arctic: Summer was far advanced in the Northern Hemisphere and a pale green spread across the land, shading here and there to the darker tones of grass. Life had a tenacious hold, leaving only an occasional peninsula or mountain range gray and bone.

Captain Allison Parker, USAF, shifted as far as the restraint harness would permit, trying to get the best view she could over the pilot's shoulder. During the greater part of a mission, she had a much better view than any of the "truck-drivers," but she never tired of looking out; and when the view was the hardest to obtain, it became the most desirable. Angus Quiller, the pilot, leaned forward, all his attention on the retrofire report. Angus was a nice guy, but he didn't waste time looking out. Like many pilots—and some mission specialists—he had accepted his environment without too much continuing wonder.

But Allison had always been the type to look out windows. When she was very young, her father had taken her flying. She could never decide what would be the most fun: to look out the windows at the ground—or to learn to fly. Until she was old enough to get her own license she had settled for looking at the ground. Later, when she enlisted, she had known that without combat aircraft experience she would never pilot the machines that went as high as she wanted to go—so again she had settled for a job that would let her look out the windows. Sometimes she thought the electronics, the geography, the espionage angles of her job were all unimportant compared to the pleasure that came from simply looking down at the world as it really was.

"My compliments to your autopilot, Fred. That burn puts us right down the slot." Angus never gave Fred Torres, the command pilot, any credit. It was always the autopilot or ground control that was responsible for anything good that happened when Fred was in charge. Torres grunted something similarly insulting, then said to Allison, "Hope you're enjoying this. It's not often we fly this thing around the block just for a pretty girl."

Allison grinned but didn't reply. What Fred said was true. Ordinarily a mission was planned several weeks in advance, and carried multiple tasks that kept it up for three or four days. But this one had dragged the two-man crew off a weekend leave and stuck them on the end of a flight that was an unscheduled quick look, just fifteen orbits and back to Vandenberg. This was clearly a deep range, global reconnaissance —though Fred and Angus probably knew little more. Except that the newspapers had been pretty grim the last few weeks.

The Beaufort Sea had slid almost out of sight to the north. The sortie craft was in an inverted, nose-down attitude that gave some of the specialists a sick stomach, but which just made Allison feel she was looking at the world pass by overhead. When the Air Force got its permanent recon platform, she hoped she would be stationed there.

Fred Torres—or his autopilot, de-

pending on your point of view—slowly pitched the orbiter through 180 degrees to bring it into entry attitude. For an instant the craft was pointing straight down. Glacial scouring could never be an abstraction to someone who had looked down from this height: the land was clearly scraped and grooved, like ground before a dozer blade. Tiny puddles had been left behind: hundreds of Canadian lakes, so many that Allison could follow the sun in specular glints that shifted from one to another.

They pitched still further. The southern horizon, blue and misty, fell into and then out of view. The ground wouldn't be visible again until they were much lower, at altitudes some normal aircraft could attain. Allison sat back and pulled the restraint more tightly over her shoulders. The optical disk pack next to her was also tied down. She patted the baggage, her reason for being here. There were going to be a lot of relieved generals—and some even more relieved politicians—when she got back. The "detonations" the Livermore crew had detected must have been glitches. The Soviets were as innocent as those bastards ever were. She had scanned them with all her "normal" equipment, as well as with deep penetration gear known only to certain military intelligence agencies, and had detected no new offensive preparations. Only . . .

. . . Only the deep probes she had made on her own over Livermore were unsettling. She had been looking forward to her date with Paul Hoehler, if only to enjoy the expression on his face when she told him that the results of her test were secret. He had been so sure his bosses were up to something sinister at Livermore. But now she saw that Paul might be right; there was something going on at Livermore. It might have gone undetected without her deep probe equipment. There had been an obvious effort at concealment. But one thing Allison Parker knew was her high-intensity reactor profiles, and there was a new one down there that didn't show up on the AFIA listings. And she had detected other things—probe-opaque spheres below ground in the vicinity of the reactor.

That was also as Paul Hoehler had predicted.

NMV specialists like Allison Parker had a lot of freedom to make *ad lib* additions to their snoop schedules—that had saved more than one mission. She would be in no trouble for the unscheduled probe of a U.S. lab, as long as a thorough report was made. But if Paul were right, then this would be a major scandal. And if Paul were wrong, then *he* would be in major trouble, perhaps on the road to jail.

Allison felt her body settle gently into the acceleration couch as creaking sounds came through the orbiter's frame. Beyond the forward ports, the black of space was beginning to flicker in pale shades of orange and red. The colors grew stronger and the sensation of weight increased. She knew it was still less than half a gee, though after a day in orbit it felt like more. Quiller said something about radio blackout commencing. Allison tried to imagine the land eighty kilometers below, Taiga forest giving way to farm land and then the Canadian Rockies—but it was not as much fun as actually being able to see it.

Still about four hundred seconds till final pitch-over. Her mind drifted idly, wondering what ultimately would happen between Paul and herself. She had gone out with better-looking men, but no one smarter. In fact, that was probably part of the problem. Hoehler was clearly in love with her, but she wasn't allowed to talk technical with him, and what non-classified work he did made no sense to her. Furthermore, he was obviously something of a troublemaker on the job—a paradox considering his almost clumsy diffidence. A physical attraction could only last for a limited time, and Allison wondered how long it would take him to tire of her—or vice versa. This latest thing about Livermore wasn't going to help.

The fire colors faded from the sky, which now had a faint tinge of blue in it. Fred—who claimed he intended to retire to the airlines—spoke up, "Welcome, lady and gentleman, to the beautiful skies of California . . . or maybe it's still Oregon."

The nose pitched down from reentry attitude. The view was much like that from a commercial flyer, if you could ignore the slight curvature of the horizon and the darkness of the sky. California's Great Valley was a green corridor across their path. To the right, faded in the haze, was San Francisco Bay. They would pass about ninety kilometers east of Livermore. The place seemed to be the center of everything on this flight: it had been the incorrect reports from their detector array which convinced the military and the politicians that Sov treachery was in the offing. And that detector was part of the same project Hoehler was so suspicious of—for reasons he would not fully reveal.

Allison Parker's world ended with that thought.

1

The Old California Shopping Center was the SYP Company's biggest account—and one of Miguel Rosas' most enjoyable beats. On this beautiful Sunday afternoon, the Center had hundreds of customers, people who had traveled up to one hundred kilometers along Old 101 to be here. This Sunday was especially busy: all during the week, produce and quality reports had shown that the stores would have the best buys. And it wouldn't rain till late. Miguel wandered up and down the malls, stopping every now and then to talk or go into a shop and have a closer look at the merchandise. Most people knew how effective the shop-lift detection gear was, and so far he hadn't had any business whatsoever.

Which was okay with Miguel. Miguel Rosas had been officially employed by the Santa Ynez Police Company for three years. Before that, though, all the way back to when he and his sisters had arrived in California, he had been associated with the company. Sheriff Wentz had more or less adopted him, and so he had grown up with police work, and was doing the job of a paid undersheriff by the time he was thirteen. Wentz had encouraged him to look at technical jobs, but somehow police work was always the most attractive. The SYP Company was a popular outfit that did business with most of the families around Vandenberg. The pay was

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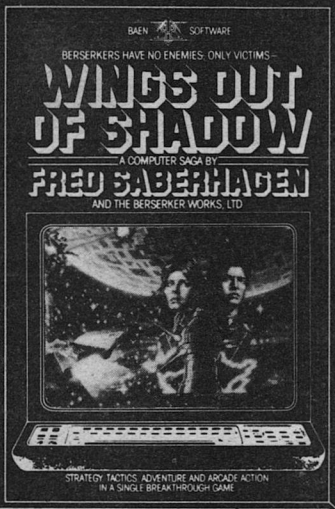

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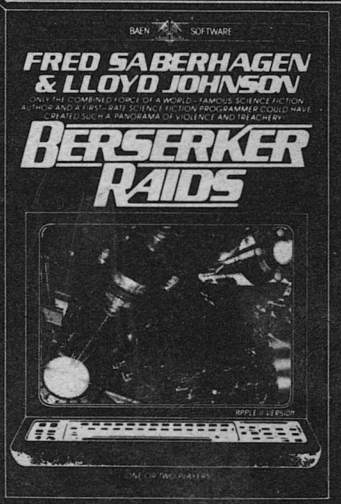

good, the area was peaceful, and Miguel had the feeling that he was really doing something for other people.

Miguel left the shopping area and climbed the grassy hill that the management kept nicely shorn and cleaned. From the top he could look across the Center, see all the shops and the brilliantly dyed fabrics that shaded the arcades.

He tweaked up his caller, in case they wanted him to come down for some traffic control. Horses and wagons were not permitted beyond the outer parking area. Normally this was a convenience, but there were so many customers this afternoon that the owners might want to relax the rules.

Near the top of the hill, basking in the double sunlight, Paul Naismith sat in front of his chess board. Every few months Paul came down to the coast, sometimes to Santa Ynez, sometimes to towns further north. Naismith and Bill Morales would come in early enough to get a good parking spot, Paul would set up his chess board, and Bill would go off to shop for his employer. Come evening, the Tinkers would trot out their specialties and he might do some trading. For now the old man slouched behind his chess board and munched his lunch.

Miguel approached the other diffidently. Naismith was not personally forbidding. He was easy to talk to, in fact. But Miguel knew him better than most—and knew the old man's cordiality was a mask for things as strange and deep as his public reputation implied.

"Game, Miguel?" Naismith asked.

"Sorry, Mr. Naismith, I'm on duty."

Besides, I know you never lose except on purpose.

The older man waved impatiently. He glanced over Miguel's shoulder at something among the shops, then got to his feet. "Ah. I'm not going to snare anyone this afternoon. Might as well go down and window-shop."

Miguel recognized the idiom, though there were no "windows" in the shopping center, unless you counted the glass covers on the jewelry and electronics displays. Naismith's generation was still a majority, so even the most archaic slang remained in use. Miguel picked up some litter, but couldn't find the miscreants responsible. He stowed the trash and caught up with Naismith on the way down to the shops.

The food vendors were doing well, as predicted. Their tables were overflowing with bananas and cacao and other local produce, as well as things from farther away, such as apples. On the right, the game area was still the province of the kids. That would change when evening came. The curtains and canopies were bright and billowing in the light breeze, but it wasn't till dark that the internal illumination of the displays would glow and dance their magic. For now, all was muted, many of the games powered down. Even chess and the other symbiotic games were doing a slow business. It was almost a matter of custom to wait till the evening for the buying and selling of such frivolous equipment.

The only crowd (five or six youngsters) stood around Gerry Tellman's Celest game. What was going on here? A little black kid was playing—had been playing for fifteen minutes, Miguel re-

alized. Tellman had Celest running at a high level of realism and he was not a generous man. Hmmm.

Ahead of him, Naismith creaked toward the game. Apparently his curiosity was pricked, too.

Inside the shop it was shady and cool. Tellman perched on a scuffed wood table and glared at his small opponent. The boy looked to be ten or eleven, and was clearly an outlander: his hair was bushy, his clothes filthy. His arms were so thin that he must be a victim of disease or poor diet. He was chewing on something, and Miguel suspected it was tobacco—definitely not the sort of behavior you'd see in a local boy.

The kid clutched a wad of Bank of Santa Ynez gAu notes. From the look on Tellman's face, Rosas could guess where they came from.

"*Otra vez,*" the boy said, returning Tellman's glare. The proprietor hesitated, looked around the circle of faces and noticed the adults.

"Aw right," agreed Tellman, "but this'll have to be the last time . . . *¿Esta es el final, entiende?*" he repeated in pidgin Spanish. "I, uh, I have to go to lunch now." This remark was probably for the benefit of Naismith and Rosas.

The kid shrugged. "Okay."

Tellman initialized the Celest board—to level nine, Rosas noticed. The kid studied the setup with a calculating look. Tellman's display was a flat, showing a hypothetical solar system as seen from above the plane of rotation. The three planets were small disks of light moving around the primary. Their size gave a clue to mass, but the precise values appeared near the bottom of the display. Departure and arrival planets moved in visibly eccentric orbits, the departure planet at one rev every five seconds—fast enough so precession was clearly occurring. Between it and the destination planet moved a third world, also in an eccentric orbit. Rosas grimaced. No doubt the only reason Tellman left the problem co-planar was that he didn't have a holo display for his Celest. Miguel had never seen anyone without a symbiotic processor play the departure/destination version of Celest at level nine. The timer on the display showed that the player—the kid—had ten seconds to launch his rocket and try to make it to the destination. From the fuel display, Rosas was certain that there was not enough energy available to make the flight in a direct orbit. A cushion shot on top of everything else!

The kid laid all his bank notes on the table and squinted at the screen. Six seconds left. He grasped the control handles and twitched them. The tiny golden spark that represented his spacecraft fell away from the green disk of the departure world, *inward* toward the yellow sun about which all revolved. He had used more than nine-tenths of his fuel and had boosted in the wrong direction. The children around him murmured their displeasure and a smirk came over Tellman's face. The smirk froze—

As the spacecraft came near the sun, the kid gave the controls another twitch, a boost which—together with the gravity of the primary—sent the glowing dot far out into the mock solar system. It edged across the two-meter screen, slowing at the greater remove, not heading for the destination planet but for the

LOOK
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intermediary. Rosas gave a low, involuntary whistle. He had played Celest, both alone and with a processor. The game was nearly a century old, and almost as popular as chess; it made you remember what the human race had almost attained. Yet he had never seen such a two cushion shot by an unaided player.

Tellman's smile remained but his face was turning a bit gray. The vehicle drew close to the middle planet, catching up to it as it swung slowly about the primary. The kid made barely perceptible adjustments in the trajectory during the closing period. Fuel status on the display showed 0.001 full. The representation of the planet and the spacecraft merged for an instant, but did not record as a collision, for the tiny dot moved quickly away, going for the far reaches of the screen. Around them, the other children jostled and hooted. They smelled a winner, and old Tellman was going to lose a little of the money he had been winning off them earlier in the day. Rosas and Naismith and Tellman just watched and held their breaths. With virtually no fuel left, it would be a matter of luck whether contact finally occurred. The reddish disk of the destination planet swam placidly along while the mock spacecraft arched higher and higher, slower and slower, their paths becoming almost tangential. The craft was accelerating now, falling into the gravity well of the destination, giving the false impression of success that always comes with a close shot. Closer and closer. And the two lights became one on the board.

"Intercept," the display announced, and the stats streamed across the lower part of the screen. Rosas and Naismith looked at each other. The kid had done it.

Tellman was very pale now. He looked at the bills the boy had wagered. "Sorry, kid, but I don't have that much here right now." He started to repeat the excuse in Spanish, but the kid erupted with an unintelligible flood of Spañolnegro abuse. Rosas looked meaningfully at Tellman. He was hired to protect customers as well as proprietors. If Tellman didn't pay off, he could kiss his lease goodbye. The Shopping Center already got enough flak from parents whose children had lost money here. And if the kid were clever enough to press charges . . .

The proprietor finally spoke over youthful screaming. "Okay, so I'll pay. *Pago, pago* . . . you little son of a bitch." He pulled a handful of gAu notes out of his cash box and shoved them at the boy. "Now *get out*."

The black kid was out the door before anyone else. Rosas eyed his departure thoughtfully. Tellman went on plaintively, talking as much to himself as anyone else. "I don't know. I just don't know. The little bastard has been in here all morning. I swear he had never seen a game board before. But he watched and watched. Diego Martinez had to explain it to him. He started playing. Had barely enough money. And he just got better and better. I never seen anything like it. . . . In fact," he brightened and look at Miguel, "in fact, I think I been set up. I betcha the kid is carrying a processor and just pretending to be young and dumb. Hey, Rosas, how about that? I should be protected.

There's some sort con here, especially on that last game. He—''

''—Really did have a snowball's chance, eh, Telly?'' Rosas finished where the proprietor had broken off. ''Yeah, I know. You had a sure win. The odds should have been a thousand to one—not the even money you gave him. But I know symbiotic processing, and there's no way he could do it without some really expensive equipment.'' Out of the corner of his eye, he saw Naismith nod agreement. ''Still,'' he rubbed his jaw and looked out into the brightness beyond the entrance, ''I'd like to know more about him.''

Naismith followed him out of the tent, while behind them Tellman continued to sputter. Most of the children were still visible, standing in clumps along the Tinkers' mall.

The mysterious winner was nowhere to be seen. And yet he should have been. The game area opened on the central lawn which gave a clear view down all the malls. Miguel spun around a couple of times, puzzled. Naismith caught up with him. ''I think the boy has been about two jumps ahead of us since we started watching him, Miguel. Notice how he didn't argue when Tellman gave him the boot. Your uniform must have spooked him.''

''Yeah. Bet he ran like hell the second he got outside.''

''I don't know. I think he's more subtle than that.'' Naismith put a finger to his lips and motioned Rosas to follow him around the banners that lined the side of the game shop. There was not much need for stealth. The shoppers were noisy, and the loading of furniture onto several carts behind the refurbishers pavillion was accompanied by shouting and laughter.

The early afternoon breeze off Vandenberg set the colored fabric billowing. Double sunlight left nothing to shadow. Still, they almost tripped over the boy curled up under the edge of a tarp. The boy exploded like a bent spring, directly into Miguel's arms. If Rosas had been of the older generation there would have been no contest: the ingrained respect for children and unwillingness to damage them would have let the boy slip from his grasp. But the undersheriff was willing to play fairly rough, and for a moment there was a wild mass of swinging arms and legs. Miguel saw something gleam in the boy's hand, and then pain ripped through his arm.

Rosas fell to his knees as the boy, still clutching the knife, pulled loose and sprinted away. He was vaguely conscious of red spreading through the tan fabric of his left sleeve. He narrowed his eyes against the pain and drew his service stunner.

''No!'' Naismith's shout was a reflex born of having grown up with slug guns and then later having lived though a time when life was more than sacred.

The kid went down and lay twitching in the grass. Miguel holstered his pistol and struggled to his feet, his right hand clutching at the wound. It looked superficial, but it hurt like hell. ''Call Seymour,'' Miguel grated at the old man. ''We're going to have to carry that little bastard to the station.''

2

The Santa Ynez Police Company was the largest protection service south of

San Jose. After all, Santa Ynez was the first town north of Santa Barbara and the Aztlán border. Sheriff Seymour Wentz had three full time deputies, and contracts with eighty percent of the locals. That amounted to almost four thousand customers.

Wentz's shop was perched on a good-sized hill overlooking Old 101. From it one could follow the movements of Peace Authority freighters for several kilometers north and south. Right now, no one but Paul Naismith was admiring the view. Miguel Rosas watched gloomily as Seymour spent half an hour on the phone to Santa Barbara, and then even managed to patch through to the ghetto in Pasadena. As Miguel expected, no one south of the border could help. The rulers of Aztlán spent their gold trying to prevent "illegal labor emigration" from Los Angeles, but never wasted time tracking the people who made it. The sabio in Pasadena seemed initially excited by the description, then froze up and denied any interest in the boy.

The only other lead was with a contract labor gang that had passed though Santa Ynez earlier in the week, heading for the cacao farms near Santa Maria. Sy had some success with that. One Larry Faulk, labor contract agent, was persuaded to talk to them. The nattily dressed agent was not happy to see them.

"Certainly, Sheriff, I recognize the runt. Name is Wili Wachendon." He spelled the name out. The *w*s sounded like a hybrid of *w* with *v* and *b*. Such was the evolution of Spañolnegro. "He missed my crew's departure yesterday, and I can't say that I or anyone else up here is sorry."

"Look, Mr. Faulk. This child has clearly been mistreated by your people," he waved over his shoulder at where the kid—Wili—lay in his cell. Unconscious, he looked even more starved and pathetic than he had in motion.

"Ha!" came Faulk's reply over the fiber. "I notice you have the punk locked up; and I also see your deputy has his arm bandaged." He pointed at Rosas, who stared back almost sullenly. "I'll bet little Wili has been practicing his people-carving hobby. Sheriff, Wili Wachendon may have had a hard time someplace; I think he's on the run from the Ndelante Ali. But I never roughed him up. You know how labor contractors work. Maybe it was different in the Good Old Days, but now we are agents, we get ten percent, and our crews can dump on us any time they please. At the wages they get, they're always shifting around, bidding for new contracts, squeezing for money. I have to be damn popular and effective or they would get someone else.

"This kid has been worthless from the beginning. He's always looked half starved; I think he's a sicker. How he got from LA to the border is . . ." His next words were drowned out by a freighter whizzing along the highway beneath the station. Miguel glanced out the window at the behemoth, ten-axle diesel as it moved off southwards carrying LNG to the Peace Authority Enclave in Los Angeles. ". . . took him because he claimed he could run my books. Now, the little bas—the kid may know something about accounting. But

he's a lazy thief, too. And I can prove it. If your company hassles me about this when I come back through Santa Ynez, I'll sue you into oblivion."

There were a couple more verbal go-arounds and then Sheriff Wentz rang off. He turned in his chair. "You know, Miguel, I think he's telling the truth. We don't see it so much in the new generation, but children like your Sally and Arta—"

Miguel nodded glumly and hoped Sy wouldn't pursue it. His Sally and Arta, his little sisters. Dead years ago. They had been twins, five years younger than he, born when his parents had lived in Phoenix. They had made it to California with him, but they had always been sick. They both died before they were twenty and never looked to be older than ten. Miguel knew who had caused that bit of hell. It was something he never spoke of.

"The generation before that had it worse. But back then it was just another sort of plague and people didn't notice especially." The diseases, the sterility, had brought a kind of world never dreamed by the bomb makers of the previous century. "If this Wili is like your sisters, I'd estimate he's about fifteen. No wonder he's brighter than he looks."

"It's more than that, Boss. The kid is really smart. You should have seen what he did to Tellman's Celest."

Wentz shrugged. "Whatever. Now we've got to decide what to do with him. I wonder whether Fred Bartlett would—" this was gentle racism: the Bartlett's were black "—take him in."

"Boss, he'd eat 'em alive." Rosas patted his bandaged arm.

"Well, hell, you think of something better, Miguel. We've got four thousand customers. There must be someone who can help. . . . A lost child with no one to take care of him—it's unheard of!"

Some child! But Miguel couldn't forget Sally and Arta. "Yeah."

Through this conversation Naismith had been silent, almost ignoring the two peace officers. He seemed more interested in the view of Old 101 than what they were talking about. Now he twisted in the wooden chair to face the sheriff and his deputy. "I'll take the kid on, Sy."

Rosas and Wentz looked at him in stupefied silence. Paul Naismith was considered old in a land where two thirds of the population was past fifty. Wentz licked his lips, apparently unsure how to refuse him. "See here, Paul, you heard what Miguel said. The kid practically killed him this afternoon. I know how people your, uh, age feel about children, but—"

The old man shook his head, caught Miguel with a quick glance that was neither abstracted nor feeble. "You know they've been after me to take on an apprentice for years, Sy. Well, I've decided. Besides trying to kill Miguel, he played Celest like a master. The gravity well maneuver is one I've never seen discovered unaided."

"Miguel told me. It's slick, but I see a lot of players do it. We almost all use it. Is it really that clever?"

"Depending on your background it's more than clever. Isaac Newton didn't do a lot more when he deduced elliptical orbits from the inverse square law."

"Look, Paul . . . . I'm truly sorry, but

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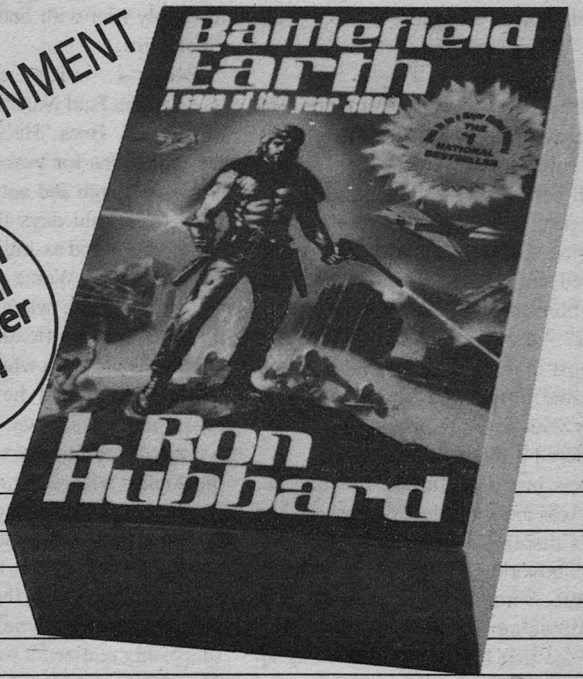

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even with Bill and Irma, it's just too dangerous."

Miguel thought about the pain in his arm. And then about the twin sisters he had once had. "Uh, Boss, could you and I have a little talk?"

Wentz raised an eyebrow. "So? . . . Okay. 'Scuse us a minute, Paul."

There was a moment of embarrassed silence as the two left the room. Naismith rubbed his cheek with a faintly palsied hand and gazed across Old 101 at the pale lights just coming on in the Shopping Center. So very much had changed and all the years in between were blurred now. Central Shopping Center? All of Santa Ynez would have been lost in a good high school basketball game in the 1990's. These days a county with seven thousand people was considered a thriving concern.

It was just past sunset now, and the office was growing steadily darker. The room's displays were vaguely glowing ghosts hovering in the near distance. Cameras from down in the shopping areas drove most of those displays. Paul could see that business was picking up there. The Tinkers and mechanics and 'furbishers had trotted out their wares, and crowds were hanging about the aerial displays. Across the room, other screens showed pale red and green, relaying infrared images from cameras purchased by Wentz customers.

In the next room the two officers' talk was a faint murmur. Naismith leaned back and pushed up his hearing aid. For a moment the sound of his lung and heart action was overpoweringly loud in his ears. Then the filters recognized the periodic noises and they were diminished, and he could hear Wentz and Rosas more clearly than any unaided human. Not many people could boast such equipment, but Naismith demanded high pay and Tinkers from Norcross to Beijing were more than happy to supply him with better than average prosthetics.

Rosas's voice came clearly, ". . . think Paul Naismith can take care of himself, Boss. He's been living in the mountains for years. And the Morales's are tough and not more than fifty-five. In the old days there were some nasty bandits and ex-military up there—"

"Still are," Wentz put in.

"Nothing like when there were still a lot of weapons floating around. Naismith was old even when they were still going strong, and he survived. I've heard about his place. He has gadgets we won't see for years. He isn't called the Tinker wizard for nothing. I—"

The rest was blotted out by a loud creaking that rose to near painful intensity in Naismith's ear, then faded as the filters damped out the amplification. Naismith looked wildly around, then sheepishly realized it was a microquake. They happened all the time this near to Vandenberg. Most were barely noticeable—unless one used special amplification, as Paul did now. The roar had been the barely audible creaking of wall timbers. It passed . . . and he could hear the two peace officers once more.

". . . what he said about needing an apprentice is true, Boss. It hasn't been just us in Middle California who've been after him. I know people in Medford and Norcross who are scared witless he'll die without leaving a successor. He's hands down the best algorithms

man in North America—I'd say in the world except I want to be conservative. You know that comm gear you have back in the control room? I know it's close to your heart, your precious toy and mine. Well, the bandwidth compression that makes possible all those nice color images coming over the fiber and the microwave would be plain impossible without the tricks he's sold the Tinkers. And that's not all—''

''All right!'' Wentz laughed. ''I can tell you took it seriously when I told you to specialize on our high tech customers. I know Middle California would be a backwater without him, but—''

''And it will be again, once he's gone, unless he can find an apprentice. They've been trying for years to get him to take on some students, or even to teach classes like before the Crash, but he's refused. And I think he's right. Unless you are terribly creative to begin with, there's no way you can make new algorithms. I think he's been waiting—not taking anyone on—and watching. I think today he found his apprentice. The kid's mean . . . he'd kill. And I don't know what he really wants besides money. But he has one thing that all the good intentions and motivation in the world can't get us, and that's brains. You should have seen him on the Celest, Boss. . . .''

The argument—or lecture—went on for several more minutes, but the outcome was predictable. The wizard of the Tinkers had at long last got himself an apprentice.

3

Night and triple moonlight. Wili lay in the back of the buckboard, heavily bundled in blankets. The soft springs absorbed most of the bumps and lurches as the wagon passed over the tilting, broken concrete. The only sounds Wili heard were the cool wind through the trees, the steady *clapclapclap* of the horse's rubberized shoes, its occasional snort in the darkness. They had not yet reached the great black forest that stretched north to south; it seemed like all Middle California was spread out around him. The sea fog which so often made the nights dark was absent, and the moonlight gave the air an almost luminous blue tone. Directly west—the direction Wili faced—Santa Ynez lay frozen in the still light. Few lights were visible, but the pattern of the streets was clear, and there was a hint of orange and violet from the open square of the bazaar.

Wili wriggled deeper in the blankets, the tingling paralysis in his limbs mostly gone now; the warmth in his arms and legs, the cold air on his face, and the vision spread below him was as good as any drug high he'd ever stolen in Pasadena. The land was beautiful, but it had not turned out to be the easy pickings he had hoped for when he defected from the Ndelante and headed north. There were unpeopled ruins, that was true: He could see what must have been the pre-Crash location of Santa Ynez, rectangular tracings all overgrown and no lights at all. The ruins were bigger than the modern version of the town, but nothing like the promise of the LA basin, where kilometer after kilometer of ruins—much of it unlooted—stretched as far as a man could walk in a week. And if one wanted some more exciting,

more profitable way of getting rich, there were the Jonque mansions in the hills above the Basin. From those high vantage points, Los Angeles had its own fairyland aspect: horizon to horizon had sparkled with little fires that marked towns in the ruins. Here and there glowed the incandescent lights of Jonque outposts. And at the center, a luminous, crystal growth, stood the towers of the Peace Authority Enclave. Wili sighed. That had been before his world in the Ndelante Ali had fallen apart, before he discovered Old Ebenezer's con. . . . If ever he returned, it would be a contest between the Ndelante and the Jonques over who'd skin him first.

Wili couldn't go back.

But he had seen one thing on this journey north that made it worth being chased here. That one thing made this landscape forever more spectacular than LA's. He looked over Santa Ynez at the object of his wonder.

The silver dome rose out of the sea, into the moonlight. Even at this remove and altitude, it still seemed to tower. People called it many things, and even in Pasadena he had heard of it, though he'd never believed the stories. Larry Faulk called it Mount Vandenberg. The old man Naismith—the one who even now was whistling aimlessly as his servant drove their wagon into the hills—he had called it the Vandenberg Bobble. But whatever they called it, it transcended the name. In its size and perfection it seemed to transcend nature itself. From Santa Barbara he had seen it. It was a hemisphere at least twenty kilometers across. Where it fell into the Pacific, Wili could see multiple lines of moonlit surf breaking soundlessly against its curving arc. On its inland side, the lake they called Lompoc was still and dark.

Perfect, perfect. The shape was an abstraction beyond reality. Its mirror-perfect surface caught the moon, and held in it a second image, just as clear as the first. And so the night had two moons, one very high in the sky, the other shining from the dome. Out in the sea, the more normal reflection was a faint silver bar lying straight to the ocean's horizon. Three moons worth of light in all! During the day, the vast mirror captured the sun in a similar way. Larry Faulk claimed the farmers planted their lands to take advantage of the double sunlight.

Who had made Vandenberg Dome? The One True God? Some Jonque or Anglo god? And if made by man, how? What could be inside? Wili dozed, imagining the burglary of all burglaries—to get inside and steal what treasures would be hidden by a treasure so great as that dome. . . .

When he woke they were in the forest, rolling upward still, the trees deep and dark around them. The taller pines moved and spoke unsettlingly in the wind. This was more of a forest than he had ever seen. The real moon was low now; an occasional splash of silver shouldered past the branches and lay upon further trees, glistening on their needles. Over his head, a band of night, brighter than the trees, was visible. The stars were there.

The Anglo's servant had slowed the horse. The ancient concrete road was gone; the path was scarcely wide enough for the cart. Wili tried to face forward,

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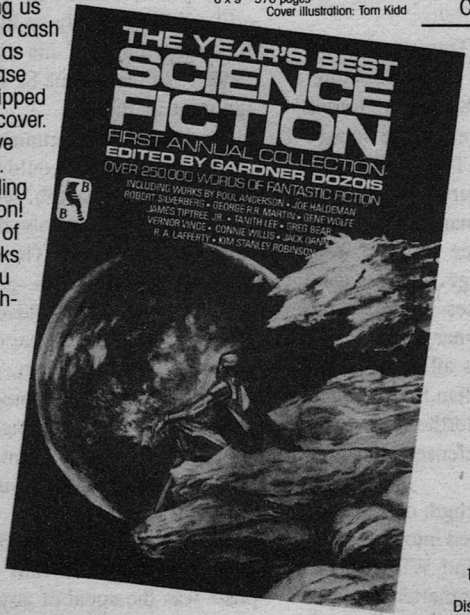

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but the blankets and remaining effects of the cop's stunner prevented this. Now the old man spoke quietly into the darkness. *Password!* Wili doubled forward to see if the cops had discovered his other knife. No. It was still there, strapped to the inside of his calf. Old men running labor camps were something he knew a lot about from LA. He was one slave this old man was not going to own.

After a moment, a *woman's* voice came cheerfully back, telling them to come ahead. The horse took up its former pace. Wili saw no sign of the speaker.

The cart turned through the next switchback, its tires nearly soundless in the carpet of pine needles that layered the road. Another hundred meters, another turn, and—

It was a palace! Trees and vines closed in on all sides of the structure, but it was clearly a palace, though more open than the fortresses of the Jonque jefes in Los Angeles. Those lords usually rebuilt preCrash mansions, installed electrified fences and machine gun nests for security. This place was old, too, but in other ways strange. There was no outward sign of defenses—which could only mean that the owner must control the land for kilometers all around. But Wili had seen no guardian forts on their trip up here. These northerners could not be as stupid and defenseless as they seemed.

The cart drove the length of the mansion. The trail broadened into a clearing before the entrance, and Wili had the best view yet. It was smaller than the palaces of LA. If the inner courtyard were a reasonable size, then it couldn't house all the servants and family of a great jefe. But the building was massive, the dark stone expertly joined. What moonlight was left glinted off metal tracery in the wood, and shone streaming images of the moon's face in the polish of the wood. The roof was darker, barely reflecting. There were gables and a strange turret: dark spheres, diameters varying from five centimeters to almost two meters, impaled on a glinting needle.

"Wake up. We are here." Hands undid the blankets, and the old man gently shook his shoulder. It took an effort to keep from lashing out. He grunted faintly, pretended he was slowly waking. "*Estamos llegado, chico,*" the servant, Morales, said. Wili let himself be helped from the cart. In truth he was still a little unsteady on his feet, but the less they knew of his capabilities the better. Let them think he was weak, and ignorant of English.

A servant came running out of the main entrance (or could the servants' entrance be so grand?). No one else appeared, but Wili resolved to be docile until he knew more. The woman—like Morales, middle-aged—greeted the two men warmly, then guided Wili across the stone flagging to the entrance. The boy kept his eyes down, pretending to be dopey. Out of the corner of his eye, though, he saw something more—a silver net like some giant spider web stretched between a tree and the side of the mansion.

Past the huge carven doors, a light glowed dimly, and Wili saw that the place was the equal of anything in Pasadena, though there were no obvious art treasures or golden statuary lying about.

They led him up (not down! What sort of jefe put his lowest servants on an upper floor?) a wide staircase, and into a room under the eaves. The only light was the moon's, coming through a window more than large enough to escape by.

"*¿Tienes hambre?*" the woman asked him.

Wili shook his head dumbly, surprised at himself. He really wasn't hungry; it must be some residual effect of the stunner. She showed him a toilet in an adjoining room, and told him to get some sleep.

And then he was left alone!

Wili lay on the bed and looked out over the forest. He thought he could see a glint from the Vandenberg dome. His luck was almost past marveling at. He thanked the One God he had not bolted at the entrance to the mansion. Whoever was the master here knew nothing of security and employed fools. A week here and he would know every small thing worth stealing. In a week he would be gone with enough treasure to live for a long, long time!

FLASHFORWARD

Captain Allison Parker's new world began with the sound of tearing metal.

For several seconds she just perceived and reacted, not trying to explain anything to herself: The hull was breached. Quiller was trying to crawl back toward her. There was blood on his face. Through rents in the hull she could see trees and pale sky. *Trees?*

Her mind locked the wonder out and she struggled from her harness. She snapped the disk pack to her side and pulled down the light helmet with its ten minute air supply. Without knowing it, she was following the hull-breach procedures that had been drilled into all of them so many times. If she had thought about it she might have left off the helmet—there were sounds of birds and wind-rustled trees—and she would have died.

Allison pulled Quiller away from the panel, and saw why the harness had not protected him: The front of the shuttle was caved in toward the pilot. Another few centimeters and he would have been crushed. A harsh, crackling sound came clearly through the thin shell of her helmet. She slipped Quiller's in place and turned on the oxygen feed. She recognized the smell that still hung in her helmet: the tracer stench that tagged their landing fuel.

Angus Quiller straightened out of her grasp. He looked around dazedly. "Fred?" he shouted.

Outside, the improbable trees were beginning to flare. God only knew how long the forward hull would keep the fire in the nose tanks from breaking into the crew area.

Allison and Quiller pulled themselves forward . . . and saw what had happened to Fred Torres. The terrible sound that had begun this nightmare had been the left front of the vehicle coming down into the flight deck. The back of Fred's acceleration couch was intact, but Allison could see that the man was beyond help. Quiller had been very lucky.

They looked through the rent that was almost directly over their heads. It was ragged and long, perhaps wide enough to escape through. Allison glanced across the cabin at the main hatch. It was subtly

bowed in; they would never get out that way. Even through their pressure suits, they could feel the heat now. The sky beyond the rent was no longer blue. They were looking up a flue of smoke and flame that climbed the nearby pines. Rivulets of fire opened in the hull ahead of them.

Quiller made a stirrup with his hands and boosted the NMV specialist through the ragged tear in the hull. Allison's head popped through. Under anything less than these circumstances she would have screamed at what she saw sitting in the flames: an immense dark octopus shape, its limbs afire, cracked and swaying. Allison wriggled her shoulders free of the hole and pulled herself up. Then she reached down for the pilot. At the same time, some part of her mind realized that what she had seen was not an octopus but the mass of roots and dirt of a rather large tree which somehow had fallen downwards on the nose of the sortie craft. This was what had killed Fred Torres.

Quiller leaped up to grab her hand. For a moment his broader form stuck in the opening, but after a single coordinated push and tug he came through—leaving part of his equipment harness on the jagged metal of the broken hull.

They were at the bottom of a long crater, now filled with heat and reddish smoke. Without their oxygen, they would have had no chance. Even so, the fire was intense. The forward area was well involved, sending rivulets of fire toward the rear, where most of the landing fuel was tanked. She looked wildly around, absorbing what she saw without further surprise, simply trying to find a way out.

Quiller pointed at the right wing section. If they could run along it, a short jump would take them to the cascade of brush and small trees that had fallen into the crater. It wasn't till much later that she wondered how all that brush had come to lie *above* the orbiter when it crashed.

Seconds later they were climbing hand-over-hand up the wall of brush and vines. The fire edged steadily through the soggy mass below them and sent flaming streamers ahead along the pine needles imbedded in the vines. At the top they turned for a moment and looked down. As they watched, the cargo bay broke in half and the sortie craft slumped into the strange emptiness below it. Thus died all Allison's millions of dollars of optical and deep probe equipment. Her hand tightened on the disk pack that still hung by her side.

The main tank blew, and simultaneously Allison's right leg buckled beneath her. She dropped to the ground, Quiller a second behind her. "Damn stupidity," she heard him say as debris showered down on them, "us standing here gawking at a bomb. Let's move out."

Allison tried to stand, saw the red oozing from the side of her leg. The pilot stooped and carried her through the damp brush, twenty or thirty meters upwind from the crater. He set her down, and bent to look at the wound. He pulled a knife from his crash kit and sawed the tough suit fabric from around her wound.

"You're lucky. Whatever it was passed right through the side of your

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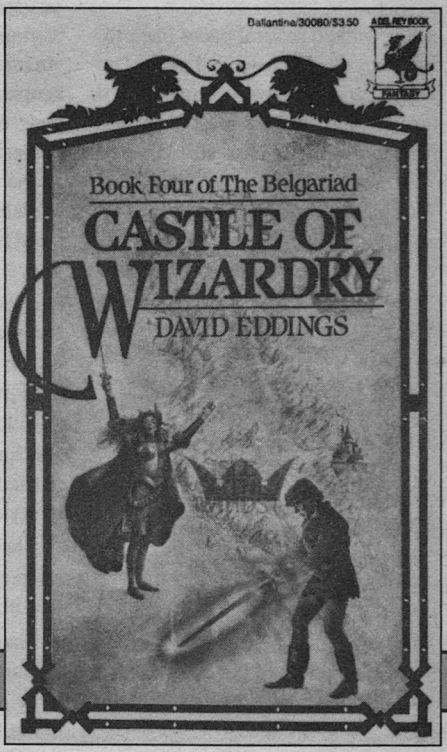

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leg. I'd call this a nick, except it goes so deep." He sprayed the area with first aid glue, and the pain subsided to a throbbing pressure that kept time with her pulse.

The heavy red smoke was drifting steadily away from them. The orbiter itself was hidden by the crater's edge. The explosions were continuing irregularly but without great force. They should be safe here. He helped her out of her pressure suit, then struggled out of his own.

Quiller walked several paces back toward the wreck. He bent and picked up a strange, carven shape. "Looks like it got thrown here by the blast." It was a Christian cross, its base still covered with dirt.

"We crashed in a damn cemetery," Allison tried to laugh, but it made her dizzy. Quiller didn't reply. He studied the cross for some seconds. Finally he set it down and came back to look at Allison's leg. "That stopped the bleeding. I don't see any other punctures. How do you feel?"

Allison glanced down at the red on her gray flight fatigues. Pretty colors, except when it's your own red. "Give me some time to sit here. I bet I'll be able to walk to the rescue choppers when they come."

"Hmm. Okay, I'm going to take a look around. . . . There may be a road nearby." He unclipped the crash kit and set it beside her. "Be back in fifteen minutes."

4

They started on Wili the next morning. It was the woman, Irma, who brought him down, fed him breakfast in the tiny alcove off the main dining room. She was a pleasant woman, but young enough to be strong, and she spoke very good Spanish. Wili did not trust her. But no one threatened him, and the food seemed endless; he ate so much that his eternal gnawing hunger was almost satisfied. All this time Irma talked—but without saying a great deal, as though she knew he was concentrating on his enormous breakfast. No other servants were visible. In fact, Wili was beginning to think the mansion was untenanted, that these three must be housekeeping staff holding the mansion for their absent lord. That jefe was very powerful or very stupid, because even in the light of day, Wili could see no evidence of defenses. If he could be gone before the jefe returned . . .

"—and do you know why you are here, Wili?" Irma said as she collected the plates from the mosaicked surface of the breakfast table.

Wili nodded, pretending shyness. Sure he knew. Everyone needed workers, and the old and middle aged often needed whole gangs to keep them living in style. But he said, "To help you?"

"Not me, Wili. Paul. You will be his apprentice. He has looked a long time, and he has chosen you."

That figured. The old gardener—or whatever he was—looked to be eighty if he was a day. Right now Wili was being treated royally. But he suspected that was simply because the old man and his two flunkies were making illegitimate use of their master's house. No doubt there would be hell to pay when the jefe returned. "And, and what am

I to do for My Lady?'' Wili spoke with his best diffidence.

''Whatever Paul asks.''

She led him around to the back of the mansion where a large pool, almost a lake, spread away under the pines. The water looked clear, though here and there floated small clots of pine needles. Toward the center, out from under the trees, it reflected the brilliant blue of the sky. Downslope, through an opening in the trees, Wili could see thunderheads gathering about Vandenberg.

''Now off with your clothes and we'll see about giving you a bath.'' She moved to undo the buttons on his shirt, an adult helping a child.

Wili recoiled. ''No!'' To be naked here with the woman!

Irma laughed and pinned his arm, continued to unbutton the shirt. For an instant, Wili forgot his pose—that he was a child, and an obedient one. Of course this treatment would be unthinkable within the Ndelante. And even in Jonque territory, the body was respected. No one forced baths and nakedness on others.

But the woman was strong. As she pulled the shirt over his head, he lunged for the knife strapped to his leg, and brought it up toward her face. Irma screamed and back away. Even as she did, Wili was cursing himself.

''No, no! I am going to tell Paul.'' She backed away, her hands held between them, as if to protect herself. Wili knew he could run away now (and he couldn't imagine these three catching him)—or he could do what was necessary to stay. For now he wanted to stay.

He dropped the knife and groveled. ''Please, Lady, I acted without thought.'' Which was true. ''Please forgive me. I will do anything to make it up.'' Even, even . . .

The woman stopped, came back and picked up the knife. She obviously had no experience as a foreman, to trust anything he said. The whole situation was alien and unpredictable. Wili would almost have preferred the lash, the predictability. Irma shook her head, and when she spoke there was still a little fear in her voice. Wili was sure she now knew that he was a good deal older than he looked; she made no move to touch him. ''Very well. This is between us, Wili. I will not tell Paul.'' She smiled, and Wili had the feeling there was something she was not telling him. She reached her arm out full length and handed him the brush and soap. Wili stripped, waded into the chill water, and scrubbed.

''Dress in these,'' she said after he was out and dried himself. The new clothes were soft and clean, a minor piece of loot all by themselves. Irma was almost her old self as they walked back to the mansion, and Wili felt safe in asking the question that had been on his mind all that morning: ''My Lady, I notice we are all alone here, the four of us—or at least so it appears. When will the protection of the manor lord be returned to us?''

Irma stopped, and after a second, laughed. ''What manor lord? Your Spanish is so strange. You seem to think this is a castle that should have serfs and troops all around.'' She continued, almost to herself, ''Though perhaps that is your reality. I have never lived in the South.

''You have already met the 'lord of

the manor,' Wili.'' She saw his uncomprehending stare. ''It's Paul Naismith, the man who brought you here from Santa Ynez.''

''And . . .'' Wili could scarcely trust himself to ask the question, ''. . . you all, the three of you, are alone here?''

''Certainly. But don't worry. You are much safer here than you ever were in the South, I am sure.''

I am sure, too, My Lady. Safe as a coyote among sheep. If ever he'd made a right decision, it had been his escape to Middle California. To think that Paul Naismith and the others had the manor to themselves—it was a wonder the Jonques had not overrun this land long ago. The thought almost kindled his suspicions. But then the prospects of what he could do here overwhelmed all. There was no reason he should have to leave with his loot. Wili Wachendon, weak as he was, could probably be ruler here—if he were clever enough during the next few weeks. At the very least he would be rich forever. If Naismith were the jefe, and if Wili were to be his apprentice, then in essence he was being adopted by the manor lord. That happened occasionally in Los Angeles. Even the richest families were cursed with sterility. Such families often sought an appropriate heir. The adopted one was usually high-born, an orphan of another family, perhaps the survivor of a vendetta. But there were not many children to go around, especially in the old days. Wili knew of at least one case where the oldsters adopted from the Basin—not a black child of course, but still a boy from a peasant family. Such was the stuff of dreams; Wili could scarcely believe that it was being offered to him. If he played his cards right, he would eventually own all of this—and without having to steal a single thing, or risk torture and execution! It was . . . unnatural. But if these people were crazy, he would certainly do what he could to profit by it.

Wili hurried after Irma as she returned to the house.

A week passed, then two. Naismith was nowhere to be seen, and Bill and Irma Morales would only say that he was traveling on 'business.' Wili began to wonder if 'apprenticeship' really meant what he had thought. He was treated well, but not with the fawning courtesy that should be shown the heir-apparent of a manor. Perhaps he was on some sort of probation: Irma woke him at dawn, and after breakfast he spent most of the day—assuming it wasn't raining—in the manor's small fields, weeding, planting, hoeing. It wasn't hard work—in fact, it reminded him of what Larry Faulk's labor company did—but it was deadly boring.

On rainy days, when the weather around Vandenberg blew inland, he stayed indoors and helped Irma with cleaning. He had scarcely more enthusiasm for this, but it did give him a chance to snoop. The mansion had no interior patio, but in some ways it was more elaborate than he had first imagined. He and Irma cleaned some large rooms hidden below ground level. Irma would say nothing about the purpose of the underground halls, though they appeared to be for meetings or banquets. The building's floor space, if not the available food supply, implied a large household. (And now he knew there

were others in the house. He never saw her, but more than once he heard the woman who had spoken to Naismith on the road.) Perhaps that was how these innocents protected themselves: They simply hid until their enemies got tired of searching for them. But that didn't really make sense. If he were a bandit, he'd burn the place down, or else occupy it. He wouldn't simply go away because he could find no one to kill. And yet there was no evidence of past violence in the polished hardwood walls or the deep, soft carpeting.

In the evenings, the two treated him more as they should the adopted son of a lord. He was allowed to sit in the main living room and play Celest or chess. The Celest was every bit as fascinating as the one in Santa Ynez. But he never could attain quite the accuracy he'd had that first time. He began to suspect that part of his win had been luck. It was the precision of his eye and hand that betrayed him, not his physical intuition. Delays of a thousandth of a second in a cushion shot could cause a miss at the destination. Bill said there were mechanical aids to overcome this difficulty, but Wili had little trust for such. He spent many hours hunched before the glowing volume of the Celest, while on the other side of the room Bill and Irma watched the holo. (After the first couple days, the shows seemed uniformly dull—either local gossip, or flat television game shows from the last century.)

Playing chess with Bill was almost as boring as the holo. After a few

games, he could easily beat the caretaker. The programmed version was much more fun than playing Bill.

As the days passed, and Naismith did not return, Wili's boredom intensified. He reconsidered his options. After all this time, no one had offered him the master's rooms, no one had shown him the appropriate deference. (And no tobacco was available, though that by itself was something he could live with.) Perhaps it was all some benign labor contract operation, like Larry Faulk's. If this were the Anglo idea of adoption, he wanted none of it and his situation became simply a grand opportunity for burglary.

Wili began with small things: jeweled ashtrays from the subterranean rooms, a pocket Celest he found in an empty bedroom. He picked a tree out of sight behind the pond, and hid his loot in a watertight bag there. The burglaries, small as they were, gave him a sense of worth and made life a lot less boring. Even the pain in his gut lessened and the food seemed to taste better.

So life continued until he was caught and learned the true meaning of Celest.

5

The horsemen—four of them, with a row of five pack mules—arrived the afternoon of a slow, rainy day. It had been thundering and windy earlier, but now the rains off Vandenberg came down in a steady drizzle from a sky so overcast that it already seemed evening.

When Wili saw the four, and saw that none of them was Naismith, he faded around the mansion, toward the pond and his cache. Then he stopped for a foolish moment, wondering if he should run back and warn Irma and Bill.

But the two stupid caretakers were already running down the front steps to greet the intruders: an enormous fat fellow and three rifle carrying men-at-arms. As he skulked in the bushes, Bill turned and seemed to look directly at his hiding place. "Wili, come help our guests."

Mustering what dignity he could, the boy emerged and walked toward the group. The old, fat one dismounted. He looked like a Jonque, but his English was strangely accented. "Ah, so this is his apprentice, *hein?* I have wondered if The Master would ever find a successor and what sort of person he might be." He patted the bristling Wili on the head, making the usual error about the boy's age.

The gesture was patronizing, but Wili thought there was a hint of respect, almost awe, in his voice. Perhaps this slob was not a Jonque and had never seen a Black before. The fellow stared silently at Wili for a moment and then seemed to notice the rain. He shook his slicker and most of the group moved up the steps. Bill and Wili were left to take the animals around to the outbuilding.

Four guests. That was not the end. By twos and threes and fours, all through the afternoon and evening, others drifted in. The horses and mules quickly overflowed the small outbuilding and Bill showed Wili hidden stables. There were no servants. The guests themselves, or at least the more junior of them, carried the baggage indoors, and helped with the animals. Much of the luggage was not taken to their rooms, but disappeared into the halls

below ground. The rest turned out to be food and drink—which made sense, since the manor produced only enough to feed three or four people.

Night and more rain. The last of the visitors arrived—and one of these was Naismith. The old man took his apprentice aside. "Ah, Wili, you have remained." His Spanish was as stilted as ever, and he paused frequently as if waiting for some unseen speaker to supply him with a missing word. "After the meetings, when our guests have gone, you and I must talk on your course of study. You are too old to delay. For now, though, help Irma and Bill and do not . . . bother . . . our guests." He looked at Wili as though suspecting the boy might do what Wili had indeed been considering. There was many a fat purse to be seen among these naive travelers. "A new apprentice has nothing to tell his elders, and there is little he can learn from them in this short time." With that the old man departed for the halls beneath his small castle, and Wili was left to work with Irma and two of the visitors in the dimly-lit kitchen.

Their mysterious guests stayed all that night and through the next day. Most kept to their rooms and the meeting halls. Several helped Bill with repairs on the outbuilding. Even here they behaved strangely: For instance, the roof of the stable badly needed work. But when the sun came out, the men wouldn't touch it. They seemed only willing to work on things where there was shade. And they never worked outside in groups of more than two or three. Bill claimed this was all Naismith's wish.

The next evening, there was a banquet in one of the halls. Wili, Bill, and Irma brought the food in, but that was all they got to see. The heavy doors were locked and the three of them went back up to the living room. After the Morales had settled down with the holo, Wili drifted away as if to go to his room.

He cut through the kitchen to the side stairs. The thick carpet made speedy, soundless progress possible, and a moment later he was peeking round at the entrance to the meeting hall. There were no guards, but the oak doors remained closed. A wood tripod carried a sign of gold on black. Wili silently crossed the hall and touched the sign. The velvet was deep but the gold was just painted on. It was cracked here and there, and seemed very old. The letters said:

NCC

and below this, hand-lettered on vellum, was:

2047

Wili stepped back, more puzzled than ever. Why? Who was there to read the sign, when the doors were shut and locked? Did these people believe in spirit spells? Wili crept to the door and set his ear against the dark wood. He heard . . .

Nothing. Nothing but the rush of blood in his ear. These doors were thick, but he should at least hear the murmur of voices. He could hear the sound of a century-old game show from all the way up in the living room, but the other side of this door might as well be the inside of a mountain.

Wili fled upstairs, and was a model of propriety until their guests departed the next day.

There was no single leave-taking; they left as they had come. Strange customs indeed, the Anglos had.

But one thing was as in the South. They left gifts. And the gifts were conveniently piled on the wide table in the mansion's entrance way. Wili tried to pretend disinterest, but he felt his eyes must be visibly bugging out of his head whenever he walked by. Till now he had not seen much that was like the portable wealth of Los Angeles, but here were rubies, emeralds, diamonds, gold. There were gadgets, too, in artfully carved boxes of wood and silver. He couldn't tell if they were games or holos or what. There was so much here that a fortune could be taken and not be missed.

The last were gone by midnight. Wili crouched at the window of his attic room and watched them depart. They quickly disappeared down the trail, and the beat of hooves ceased soon after that. Wili suspected that, like the others, these three had left the main trail and were departing along some special path of their own.

Wili did not go back to his bed. The moon's waning crescent slowly rose and the hours passed. Wili tried to see familiar spots along the coast, but the fog had rolled in and only the Vandenberg Dome rose into sight. He waited till just before morning twilight. There were no sounds from below. Even the horses were quiet. Only the faint buzzing of insects edged the silence. If he were going to have part of that treasure, he would have to act now, moonlight or not.

Wili slipped down the stairs, his hand lightly touching the haft of his knife. (It was not the same one he had flashed at Irma. That he had made a great show of giving up. This was a short carving knife from the kitchen set.)

There, glinting in the moonlight, was his treasure. It looked even more beautiful than by lamplight. Far away, he heard Bill turn over, begin to snore. Wili silently filled his sack with the smallest, most clearly valuable items on the table. It was hard not to be greedy, but he stopped when the bag was only half-full. Ten kilos would have to do. More wealth than Old Ebenezer passed to the lower Ndelante in a year! And now out the back, around the pond, and to his cache.

He was halfway across the flagging before he noticed someone—Naismith—sitting in the shadows. *Perdición*. Wili stood absolutely still, not breathing. The old man sat on a lounge chair, his body bundled against the chill. He seemed to be gazing into the sky—but not at the moon, since he was in the shadows. Naismith was looking away from Wili; this could not be an ambush. Nevertheless, the boy's hand tightened on his knife. After a moment, he moved again, away from the old man and toward the pond.

"Come here to sit," said Naismith, without turning his head. Wili almost bolted, then realized that if the old man could be out here stargazing, there was no reason why the excuse should not also serve him. He set his sack of treasures down in the shadows and moved closer to Naismith.

"That's close enough. Sit. Why are you here so late, Young One?"

"The same as you, I think, My

Lord . . . to view the sky." What else could the old man be out here for?

"That's a good reason." The tone was neutral, and Wili could not tell if there was a smile or a scowl on his face; he could barely make out the other's profile. Wili's hand tightened nervously on the haft of his knife. He had never actually killed anyone before, but he knew the penalties for burglary. He cursed himself for trying to play the games of burglar and heir at the same time. With his luck, he would lose at both.

"But I don't admire the sky as a whole," Naismith continued, "though it is beautiful. I like the morning and the late evening especially, because then it is possible to see the," there was one of his characteristic pauses, as he seemed to listen for the right word, "satellites. See? There are two visible right now." He pointed first near the zenith and then waved at something close to the horizon. Wili followed his first gesture, and saw a tiny point of light moving slowly, effortlessly across the sky. Too slow to be an aircraft, much too slow to be a meteor: It was a moving star, of course. For a moment, he had thought the old man was going to show him something really magical. Wili shrugged and somehow Naismith seemed to catch the gesture.

"Not impressed, eh? There were men there once, Wili. But no more."

It was hard for Wili to conceal his scorn. How could that be? With aircraft you could see the vehicle. These little lights were like the stars and as meaningless. But he said nothing and a long silence overcame them. "You don't believe me, do you, Wili? But it is true. There were men and women there, so high up you can't see the form of their craft."

Wili relaxed, squatted before the other's chair. He tried to sound humble, "But then, Lord, what keeps them up? Even aircraft must come down for fuel."

Naismith chuckled. "That from the expert Celest player! Think, Wili. The universe is a great game of Celest. Those moving lights are swinging about the Earth, just like planets on a game display.

Del Nico Dio! Wili sat on the flags with an audible thump. A wave of dizziness passed over him. The sky would never be the same. Wili's cosmology had—until that moment—been an unexamined flatland image. Now, suddenly, he found the interior cosmos of Celest surrounding him forever and ever, with no up or down, but only the vast central force field that was the Earth, with the moon and all those moving stars circling about. And he couldn't disguise from himself the distances involved; he was far too familiar with Celest to do that. He felt like an infinitesimal shrinking toward some unknowable zero.

His mind tumbled over and over in the dark, caught between the relations flashing through his mind and the night sky that swung overhead. So all those objects had their own gravity, and all moved—at least in some small way—at the behest of all the others. An image of the solar system not too far from reality slowly formed in his mind. When at last he spoke, his voice was very small, and his humility was not pretended, "But then the game, it represents trips that men have actually made?

To the moon, to the stars that move? You . . . we . . . can do *that?*''

''We *could* do that, Wili. We could do that and more. But no longer.''

''But why *not?*'' It was as though the universe had suddenly been taken back from his grasp. His voice was almost a wail.

''In the beginning, it was the War. Fifty years ago there were men alive up there. They starved or they came back to Earth. After the War there were the Plagues. Now . . . now we could do it again. It would be different from before, but we could do it . . . if it weren't for the Peace Authority.'' The last two words were in English. He paused, and then said, ''*Mundopaz*.''

Wili looked into the sky. The Peace Authority. They had always seemed a part of the universe as far away and indifferent as the stars themselves. He saw their jets, and occasionally their helicopters. The major highways passed two or three of their freighters every hour. They had their enclave in Los Angeles. The Ndelante Ali had never considered hitting it; better to burgle the feudal manors of Aztlán. And Wili remembered that even the lords of Aztlán, for all their arrogance, never spoke of the Peace Authority except in neutral tones. It was fitting in a way that something so nearly supernatural should have stolen the stars from mankind. Fitting, yet now he knew, intolerable.

''They brought us peace, Wili, but the price was very high.'' A meteor flashed across the sky, and Wili wondered if that had been a piece of man's work, too. Naismith's voice suddenly became businesslike, ''I said we must talk, and this is the perfect time for it. I want you for my apprentice. But this is no good unless you want it also. Somehow, I don't think our goals are the same. I think you want wealth: I know what's in the bag yonder. I know what's in the tree behind the pond.''

Naismith's voice was dry, cool. Wili's eyes hung on the point where the meteor had swept to nothingness. This was like a dream. In Los Angeles, he would be on his way to the headsman now, an adopted son caught in treachery. ''But what will wealth get you, Wili? Minimal security, until someone takes it from you. Even if you could rule here, you would still be nothing more than a petty lord, insecure.

''Beyond wealth, Wili, there is power, and I think you have seen enough so that you can appreciate it, even if you never thought to have any.''

Power. Yes. To control others the way he had been controlled. To make others fear as he had feared. Now he saw the power in Naismith. What else could really explain this man's castle? An hour ago, this insight alone would have made him stay and return all he had stolen. Somehow, he still couldn't take his eyes off the sky.

''And beyond power, Wili, there is knowledge—which some say is power.'' He had slipped into his native English, and Wili didn't bother to pretend ignorance. ''Whether it is power or not depends on the will and the wisdom of its user. As my apprentice, Wili, I can offer you knowledge, for a surety; power, perhaps; wealth, only what you have already seen.''

The crescent moon had cleared the pines now. It was one more thing that would never be the same for Wili.

Naismith looked at the boy, and held out his hand. Wili offered his knife hilt first. The other accepted it with no show of surprise. They stood and walked back to the house.

6

Many things were the same after that night. They were the outward things: Wili worked in the gardens almost as much as before. Even with the gifts of food the visitors had brought, they still needed to work to feed themselves. (Wili's appetite was greater than the others'. It didn't seem to help; he remained as undernourished and stunted as ever.) But in the afternoons and evenings he worked with Naismith and his machines. The displays flashed questions at him as fast as he could answer back. It was like some verbal Celest. In a matter of weeks, Wili progressed from being barely literate to having a fair command of technical written English.

At the same time, Naismith began teaching him math. At first Wili was contemptuous of these problems. He could do arithmetic as fast as Naismith. But he discovered that there was more to math than the four operations. There were roots and transcendental functions; there were the relations that drove both Celest and the planets.

Naismith's machines showed him functions as graphs, and related function operations to those pictures. As the days passed, the functions became very specialized and interesting. One night, Naismith sat at the controls and caused a string of rectangles of varying width to appear on the screen. They looked like irregular crenellations on some battlement. Below the first plot, the old man produced a second and then a third, each somewhat like the first but with more and narrower rectangles. The heights bounced back and forth between 1 and -1. "Well," he said, turning from the display, "what is the pattern? Can you show me the next three plots in this series?" It was a game they had been playing for several days now. Of course, it was all a matter of opinion what really constituted a pattern and sometimes there was more than one answer that would satisfy a person's taste, but it was amazing how often Wili felt a certain rightness in some answers and an unesthetic blankness in others. He looked at the screen for several seconds. This was harder than Celest, where he merely cranked on deterministic relations. Hmmm. The squares got smaller, the heights stayed the same, the minimum rectangle width decreased by a factor of two on every new line. He reached out and slid his finger across the screen, sketching the three graphs of his answer.

"Good," said Naismith. "And I think you see how you could make more plots, until the rectangles became so narrow that you couldn't finger-sketch or even display them properly.

"Now look at this," and he drew another row of crenellations, one clearly not in the sequence: the heights were not restricted to 1 and -1. "Write me that as the sum and differences of the functions we've already plotted. Decompose it into the other functions." Wili scowled at the display; worse than "guess the pattern" this was. Then he saw it: three of the first graph minus four copies of the third graph plus . . .

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BEN BOVA

"People have said that I am the science fiction author who has had the greatest effect on the literary world, but I believe that by far the science fiction author who will have the greatest effect on the scientific world and the world as a whole is Ben Bova. I have nothing but praise for Mr. Bova and how he unlike any other can bridge the gap between the scientific world and the ordinary person that no one else has ever accomplished."

—Ray Bradbury

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His answer was right, but Wili's pride was short-lived, since the old man followed this problem with similar decomposition questions that took Wili many minutes to solve . . . until Naismith showed him a little trick—something called orthogonal decomposition—that used a peculiar and wonderful property of these graphs, these "walsh waves" he called them. The insight brought a feeling of awe just a little like learning about the moving stars, to know that hidden away in the patterns were realities that might take him days to discover by himself.

Wili spent a week dreaming up other orthogonal families, and was disappointed to discover that most of them were already famous—haar waves, trig waves—and that others were special cases of general families known for more than two hundred years. He was ready for Naismith's books now. He dived into them, rushed past the preliminary chapters, pushed himself toward the frontier where any new insights would be beyond the farthest reach of previous explorers.

In the outside world, in the fields and the forest that now were such a small part of his consciousness, summer moved into fall. They worked longer hours, to get what crops remained into storage before the frost. Even Naismith did his best to help, though the others tried to prevent this. The old man was not weak, but there was an air of physical fragility about him.

From the high end of the bean patch, Wili could see over the pines. The leafy forests had changed color and were a band of orange-red beyond the evergreen. The land along the coast was clouded over, but Wili suspected that the jungle there was still wet and green. Vandenberg Dome seemed to hang in the clouds, as awesome as ever. Wili knew more about it now, and someday he would discover all its secrets. It was simply a matter of asking the right questions—of himself and Paul Naismith.

Indoors, in his greater universe, Wili had completed his first pass through functional analysis, and now undertook a three-pronged expedition that Naismith had set for him: into finite galois theory, stochastics, and electromagnetics. There was a goal in sight, though (Wili was pleased to see) there was no ultimate end to what could be learned. Naismith had a project, and it would be Wili's if he were clever enough.

Wili saw why Naismith was valued and saw the peculiar service he provided to people all over the continent. Naismith solved problems. Almost every day the old man was on the phone, sometimes talking to people locally—like Miguel Rosas down in Santa Ynez—but just as often to people in Fremont, or in places so far away that it was night on the screen while still day here in Middle California. He talked to people in English and in Spanish, and in languages that Wili had never heard. He talked to people who were neither Jonques nor Anglos nor Blacks.

Wili had learned enough now to see that these were not nearly as simple as making local calls. Communication between towns along the coast was trivial over the fiber, where almost any bandwidth could be accommodated. For longer distances, such as from Naismith's palace to the coast, it was still relatively easy to have video commu-

nication: the coherent radiators on the roof could put out microwave and infrared beams in any direction. On a clear day, when the IR radiator could be used, it was almost as good as a fiber (even with all the tricks Naismith used to disguise their location). But for talking around the curve of the earth, across forests and rivers where no fiber had been strung and no line of sight existed, it was a different story: Naismith used what he called "short-waves" (which were really in the 1 to 10 meter range). These were quite unsuitable for high-fidelity communication. To transmit video—even the wavery black and white flat pictures Naismith used in his transcontinental calls—took incredibly clever coding schemes and some real-time adaptation to changing conditions in the upper atmosphere.

The people at the other end brought Naismith problems, and he came back with answers. Not immediately, of course; it often took him weeks, but he eventually thought of something. At least the people at the other end seemed happy. (It was still unclear how gratitude on the other side of the continent could help Naismith, but Wili was beginning to understand what had paid for the palace.) It was one of these problems that Naismith turned over to his apprentice. If he succeeded, they might actually be able to steal pictures off the Authority's snooper satellites.

It wasn't only people that appeared on the screens.

One evening shortly after the first snowfall of the season, Wili came in from the stable to find Naismith watching what appeared to be an empty patch of snow-covered ground. The picture jerked every few seconds, as if the camera were held by a drunkard. Wili sat down beside the old man. His stomach was more upset than usual and the swinging of the picture did nothing to help the situation—but his curiosity gave him no rest. The camera suddenly swung up to eye-level, and looked through the pine trees at a house, barely visible in the evening gloom. Wili gasped—it was the building they were sitting in.

Naismith turned from the screen and smiled. "It's a deer, I think. South of the house. I've been following her for the last couple of nights." It took Wili a second to realize he was referring to what was holding the camera. Wili tried to imagine how anyone could catch a deer and strap a camera on it. Naismith must have noticed his puzzlement. "Just a second." He rummaged through a nearby drawer and handed Wili a tiny brown ball. "That's a camera like the one on the critter. Coherent emitter. It's wide enough so I have resolution about as good as the human eye. And I can shift the decoding parameters so it will 'look' in different directions without the deer having to move.

"Jill, move the look axis, will you?" He spoke to his personal command program. "Jill" was the pleasant female voice that had exchanged passwords with Paul that first night. The program was elaborate, could even generate an image to back up the voice.

"Right, Paul." The view slid upwards till they were looking into overhanging branches and then down the other side. Wili and Naismith saw a scrawny back and part of a furry ear.

Wili looked at the object Paul had

placed in his hand. The "camera" was only three or four millimeters across. It felt warm and almost sticky in Wili's hand. It was a far cry from the lensed contraptions he had seen in Jonque villas. "So you just stick them to the fur, true?" said Wili.

Naismith shook his head. "Even easier than that. I can get these in hundred lots from the Greens in Norcross. I scatter them through the forest, on branches and such. All sorts of animals pick them up. It provides just a little extra security. The hills are safer than they were years ago, but there are still a few bandits."

"Um." Wili remembered how defenseless the mansion had seemed when he first saw it. If Naismith had weapons to match his senses, the manor was better protected than any castle in Los Angeles. "This would be greater protection if you could have people watching all the views all the time."

Naismith smiled, and Wili thought of Jill. He knew enough now to see that the program could be made to do just that.

Wili watched for more than an hour as Naismith showed him scenes from a number of cameras, including one from a bird. That gave the same sweeping view he imagined could be seen from Peace Authority aircraft.

When at last he went to his room, Wili sat for a long while looking out the garret window at the snow-covered trees, looking at what he had just seen with godlike clarity from dozens of other eyes. Finally he stood up, trying to ignore the cramp in his gut that had become so persistent these last few weeks. He removed his clothes from the closet and lay them on the bed, then inspected every square centimeter with his eyes and fingers. His favorite jacket and his usual work pants both had tiny brown balls stuck to cuffs or seams. Wili removed them; they looked so innocuous in the room's pale lamplight.

He put them in a dresser drawer and returned his clothes to the closet.

He lay awake for many minutes, thinking about a place and time he had resolved never to dwell on again. What could a hovel in Glendora have in common with a palace in the mountains? Nothing. Everything. There had been safety there. There had been Uncle Sylvester. He had learned there, too—arithmetic and a little reading. Before the Jonques, before the Ndelante—it had been a child's paradise, a time lost forever.

Wili quietly got up and slipped the cameras back into his clothing. Maybe not lost forever.

7

January passed, an almost uninterrupted snowstorm. The winds coming off Vandenberg brought ever higher drifts that eventually reached the mansion's second storey and would have totally blocked the entrances, if not for the heroic efforts of Bill and Irma. The pain in Wili's middle became constant, intense. Winters had always been bad for him, but this one was worse than ever before and the others eventually became aware of it. He could not suppress the occasional grimace, the faint groan. He was always hungry, always eating—and yet losing weight.

But there was great good, too. He was beyond the frontiers of Naismith's

books! Paul claimed that no previous human had insight on the coding problem that he had attacked! Wili didn't need Naismiths's machines now; the images in his mind were so much more complete. He sat in the living room for hours—through most of his waking time—almost unaware of the outside world, almost unaware of his pain, dreaming of the problem and his schemes for its defeat. All existence was groups and graphs and endless combinatorial refinements on the decryption scheme he hoped would break the problem.

But when he ate and even when he slept, the pain levered itself back into his soul.

It was Irma, not Wili, who noticed that the paler skin on his palms had a yellow cast beneath its brown. She sat beside him at the dining table, holding his small hands in her large, calloused ones. Wili bristled at her touch. He was here to eat, not to be the object of some inspection. But Paul stood behind her.

"And the nails look discolored, too." She reached across to one of Wili's yellowed fingernails and gave it a gentle tug. Without sound or pain, the nail came away at its root. Wili stared stupidly for a second, then jerked his hand back with a shriek. Pain was one thing; this was the nightmare of a body slowly dismembering itself. For an instant terror blotted out his gut-pain the way mathematics had done before.

They moved him to a basement room, where he could be warm all the time. Wili found himself in bed most of each day. His only view of the outside, of the cloudswept purity of Vandenberg, was via the holo. The mountain snows were too deep to pass travelers; there

would be no doctors. But Naismith moved cameras and high bandwidth equipment into the room, and once when Wili was not lost in dreaming, he saw that someone from far away was looking on, was being interrogated by Naismith. The old man seemed very angry.

Wili reached out to touch his sleeve. "It will be all right, Uncle S . . . Paul. This problem I have always had and it is worse in the winters. I will be okay in the spring."

Naismith smiled and nodded, then turned away.

But Wili was not delirious in any normal sense. During the long hours an average patient would have lain staring at the ceiling or watching the holo and trying to ignore his pain, Wili dreamed on and on about the communications problem that had resisted his manifold efforts all these weeks. When the others were gone from the room, there was still the Jill program, taking notes, ready to call for help. The pretty face and voice were a vaguely comforting part of the background blur.

In a sense, he had already solved the problem, but his scheme was too slow; he needed n*log(n) time for this application. He was far beyond the tools provided by his brief, intense education. Something new, something clever was needed, and by the One True God he would find it!

And when the solution did come it was like a sun rising on a clear morning, which was appropriate since this was the first clear day in almost a month. Bill brought him up to ground level to sit in the sunlight before the newly cleared windows. The sky was not just clear, but an intense blue. The snow was piled deep, a blinding white. Icicles grew down from every edge and corner, dripping tiny diamonds in the warm light.

Wili had been dictating to Jill for nearly an hour when the old man came down for breakfast. He took one look over Wili's shoulder and then grabbed his reader, saying not a word to Wili or anyone else. Naismith paused many times, his eyes half closed in concentration. He was about a third of the way through when Wili finished. He looked up when Wili stopped talking, "You got it?"

Wili nodded, grinning. "Sure, and in n*log(n) time, too." He glanced at Naismith's reader. "You're still looking at the filter setting up. The real trick isn't for a hundred more lines." He scanned forward. Naismith looked at it for a long time, finally nodded. "I, I think I see. I'll have to study it, but I think . . . my little Ramanujan. How do you feel?"

"Great," filled with elation, "but tired. The pain has been less these last days, I think. Who is Ramanujan?"

"Twentieth century mathematician. An Indian. There are a lot of similarities: You both started out without much formal education. You are both very, very good."

Wili smiled, the warmth of the sun barely matching what he felt. These were the first words of real praise he had heard from Naismith. He resolved to look up everything on file about this Ramanujan. . . . His mind drifted, freed from the fixation of the last weeks. Through the pines, he could see the sun

on Vandenberg. There were so many mysteries left to master. . . .

8

Naismith made some phone calls the next day. The first was to SYPCo.

Miguel Rosas' dark face seemed a bit pale after he watched Naismith's video replay. "Okay," he finally said, "who *was* Ramanujan?"

Naismith felt the tears coming back to his eyes. "That was a bad slip; now the boy is sure to look him up. Ramanujan was everything I told Wili: a really brilliant fellow, without much college education." This wouldn't impress Miguel, Naismith knew. There were no colleges now, just apprenticeships. "He was invited to England to work with some of the best number theorists of the time. He got TB, died young."

". . . oh. I get the connection, Paul. But I hope you don't think that bringing Wili into the mountains did anything to hurt him."

"His problem is worse during winters, and our winters are fierce compared to LA's. This has pushed him over the edge."

"Bull! It may have aggravated his problem, but he got better food here and more of it. Face it, Paul. This sort of wasting just gets worse and worse. You've seen it before."

"More than you!" That and the more acute diseases of the plague years had come close to destroying mankind. Then Naismith brought himself up short, remembering Miguel's two little sisters. Three orphans from Arizona they had been, but only one survived. Every winter, the girls had sickened again. When they died, their bodies were near skeletons. The young cop had seen more of it than most in his generation.

"Listen, Miguel, we've got to do something. Two or three years is the most he has. But hell, even before the War a good pharmaceutical lab could have cured that sort of thing. We were on the verge of cracking DNA coding and—"

" 'Even then,' Paul? Where do you think the plagues came from? That's not just Peace Authority jive. We know the Peace is almost as scared of bioresearch as they are that someone might find the secret of their bobbles. They bobbled Yakima a few years ago just because one of the their agents found a recombination analyzer in the city hospital. That's ten thousand people asphyxiated because of a silly antique. Face it: the bastards who started the plagues are forty years dead—and good riddance."

Naismith sighed. His conscience was going to hurt him on this—a little matter of protecting one's customers. "You're wrong, Miguel. I have business with lots of people. I have a good idea what most of them do."

Rosas' head snapped up. "Bioscience labs, even in our time?"

"Yes. At least three, perhaps ten. I can't be sure, since of course they don't admit to it. And there's only one whose location is certain."

"Jesus, Paul, how can you deal with such vermin?"

Naismith shrugged. "The Peace Authority is the real enemy. In spite of what you say, it's only their word that the bioscience people caused the plagues, trying to win back for their

governments what all the armies could not. I *know* the Peace." He stopped for a moment, remembering treachery that had been a personal, secret thing for fifty years.

"I've tried to convince you tech people: The Authority can't tolerate you. You follow their laws: you don't make high-density power sources, don't make vehicles or experiment with nucleonics or biology. But if the Authority knew what was going on *within* the rules. . . . You must have heard about the NCC: I showed conclusively that the Peace is beginning to catch on to us. They are beginning to understand how far we have gone without big power sources and universities and old-style capital industry. They are beginning to realize how far our electronics is ahead of their best. When they see us clearly, they'll step on us the way they have on all opposition, and we're going to have to *fight*."

"You've been saying that for as long as I can remember, Paul, but—"

"But secretly you Tinkers aren't that unhappy with the status quo. You've read about the wars before the War, and you're afraid of what could happen if suddenly the Authority lost power. Even though you deceive the Peace, you're secretly glad they're there. Well let me tell you something, Miguel." The words came in an uncontrollable rush. "I knew the mob you call the Peace Authority when they were just a bunch of R&D administrators and petty crooks. They were at the right place and the right time to pull the biggest con and ripoff of all history. They have zero interest in humanity or progress. That's the reason they've never invented anything of their own."

He stopped, shocked by his outburst. But he saw from Rosas' face that his revelation had not been understood. The old man sat back, tried to relax. "Sorry, I wandered off. What's important right now is this: A lot of people—from Beijing to Norcross—owe me. If we had a patent system and royalties it would be a lot more gAu than has ever trickled in. I want to call those IOUs due. I want my friends to get Wili to the bioscience underground.

"And if the past isn't enough, think about this: I'm seventy-eight. If it's not Wili, it's no one. I've never been modest: I know I'm the best mathman the Tinkers have. Wili's not merely a replacement for me. He is actually better, or will be with a few years experience. You know the problem he just cracked? It's the thing the Middle California Tinkers have been bugging me about for three years: eavesdropping on the Authority's recon satellites."

Rosas' eyes widened slightly.

"Yes. That problem. You know what's involved. Wili's come up with a scheme I think will satisfy your friends, one that runs a very small chance of detection. Wili did it in six weeks, with the just the technical background he picked up from me last fall. His technique is radical, and I think it will provide leverage on several other problems. You're going to need someone like him over the next ten years.

"Um." Rosas fiddled with his gold and blue sheriff's brassard. "Where is this lab?"

"Just north of San Diego."

"That close? Wow." He looked

away. "So the problem is getting him down there. The Aztlán nobility is damned unpleasant about blacks coming in from the North, at least under normal circumstances."

" 'Normal circumstances'?"

"Yes. The North American Chess Federation championships are in La Jolla this April. That means that some of the best high tech people around are going to be down there—legitimately. The Authority has even offered transportation to entrants from the East Coast, and they hardly ever sully their aircraft with us ordinary humans. If I were as paranoid as you, I would be suspicious. But the Peace seems to be playing it just for the propaganda value. Chess is even more popular in Europe than here; I think the Authority is building up to sponsorship of the world championships in Berne next year.

"In any case, it provides a cover and perfect protection from the Aztlán: Black or Anglo, they've never touched anyone under Peace Authority protection."

Naismith found himself grinning. Some good luck after all the bad. There were tears in his eyes once more, but now for a different reason. "Thanks, Miguel. I needed this more than anything I've ever asked for."

Rosas smiled briefly in return.

FLASHFORWARD

Allison didn't know much about plant identification (from less than 100 kilometers anyway) but there was something very odd about this forest. In places it was overgrown right down to the ground; in other places, it was nearly clear. Everywhere a dense canopy of leaves and vines prevented anything more than fragmented views of the sky. It reminded her of the scraggly second growth forests of Northern California, except there was such a jumble of types: conifers, eucalyptus, even something that looked like a sickly manzanita. The air was very warm, and muggy. She rolled back the sleeves of her flight fatigues.

The fire was barely audible now. This forest was so wet that it could not spread. Except for the pain in her leg, Allison could almost believe she were in a park on some picnic. In fact, they might be rescued by *real* picknickers before the Air Force arrived.

She heard Quiller's progress back toward her long before she could see him. When he finally came into view, the pilot's expression was glum. He asked again about her injury.

"I—I think I'm fine. I pinched it shut and resprayed." She paused and returned his somber look. "Only . . ."

"Only what?"

"Only . . . to be honest, Angus, the crash did something to my memory. I don't remember a thing from right after entry till we were on the ground. What went wrong anyway? Where did we end up?"

Angus Quiller's face seemed frozen. Finally he said, "Allison, I think your memory is fine—as good as mine, anyway. You see, I don't have any memory from some place over Northern California till the hull started busting up on the ground. In fact, I don't think there *was* anything to remember."

"What?"

"I think we were something like forty klicks up and then we were down on a

planetary surface—just like that." He snapped his fingers. "I think we've fallen into some damn fantasy." Allison just stared at him, realizing that he was probably the more disturbed of the two of them. Quiller must have interpreted the look correctly. "Really, Allison, unless you believe that we could have exactly the same amount of amnesia, then the only explanation is . . . I mean one minute we're on a perfectly ordinary reconnaissance operation, and the next we're . . . we're here, just like in a lot of movies I saw when I was a kid."

"Parallel amnesia is still more believable than that, Angus." *If only I could figure out where we are.*

The pilot nodded. "Yes, but you didn't climb a tree and take a look around, Allison. Plant life aside, this area looks vaguely like the California coast. We're boxed in by hills, but in one direction I could see that the forests go down almost to the sea. And . . ."

"And?"

"There's something out there on the coast, Allison. It's a mountain, a silver mountain sticking kilometers into the sky. There's never been anything on Earth like that."

Now Allison began to feel the bedrock fear that was gnawing at Angus Quiller. For many people, the completely inexplicable is worse than death. Allison was such a person. The crash—even Fred's death—she could cope with. The amnesia explanation had been so convenient. But now, almost half an hour had passed. There was no sign of aircraft, much less of rescue. Allison found herself whispering, reciting all the crazy alternatives, "You think we're in some kind of parallel world, or on the planet of another star—or in the future?" *A future where alien invaders set their silvery castle-mountains down on the California shore?*

Quiller shrugged, started to speak, seemed to think better of it—then finally burst out with, "Allison, you know that . . . cross near the edge of the crater?"

She nodded.

"It was old, the stuff carved on it was badly weathered, but I could see . . . it had your name on it and . . . and today's date."

Just the one cross, and just the one name. For a long while they were both silent.

9

It was April. The three travelers moved through the forest under a clear, clean sky. The wind made the eucs and vines sway above them, sending down misty sprays of water. But at the level of the mud road, the air was warm and still.

Wili slogged along, reveling in the strength he felt returning to his limbs. He been fine these last few weeks. In the past, he always felt good for a couple months after being really sick, but this last winter had been so bad he'd wondered if he would get better. They had left Santa Ynez three hours earlier, right after the morning rain stopped. Yet he was barely tired, and cheerfully refused the others' suggestions that he get back into the cart.

Every so often the road climbed above the surrounding trees and they could see some distance. There was still snow in the mountains to the east. In

the west, there was no snow, only the rolling rain forests, Lake Lompoc spread sky blue at the base of the Dome—and the whole landscape appeared again in that vast mirror.

It was strange to leave the home in the mountains. If Paul were not with them, it would have been more unpleasant than Wili could admit.

Wili had known for a week that Naismith intended to take him to the coast, and then travel south to La Jolla—and a possible cure. It was knowledge that made him more anxious than ever to get back in shape. But it wasn't until Jeremy Kaladze met them at Santa Ynez that Wili realized how unusual this first part of the journey might be. Wili eyed the other boy surreptitiously. As usual, he was talking about everything in sight, now running ahead of them to point out a peculiar rock fall or side path, now falling behind Naismith's cart to study something he had almost missed. After nearly a day's acquaintance, Wili still couldn't decide how old the boy was. Only very small children in the Ndelante Ali displayed this sort of open enthusiasm. On the other hand, he was nearly two meters tall and played a good game of chess.

"Yes sir, Dr. Naismith," said Jeremy—he was the only person Wili had ever heard call Paul a doctor—"Colonel Kaladze came down along this road. It was a night drop and they lost a third of the Red Arrow battalion, but I guess the Russian government thought it must be important. If we went a kilometer down those ravines, we'd see the biggest pile of armored vehicles you can imagine. Their parachutes didn't open right." Wili looked in the direction indicated, saw nothing but green undergrowth and the suggestion of a trail. In LA the oldsters were always talking about the glorious past, but somehow it was strange that in the middle of this utter peace a war was buried, and that this boy talked about ancient history as if it were a living yesterday. His grandfather, Lt. Col. Nikolai Sergeivich Kaladze, had commanded one of the Russian air drops, made before it became clear that the Peace Authority (then a nameless organization of bureaucrats and scientists) had made warfare obsolete.

Red Arrow's mission was to discover the secret of the mysterious forcefield weapon the Americans had apparently invented. Of course, they discovered the Americans were just as mystified as everyone else by the strange silvery bubbles, baubles—bobbles?—that were springing up so mysteriously, sometimes preventing bombs from exploding, more often removing critical installations.

In that chaos, when everyone was losing a war that no one had started, the Russian airborne forces and what was left of the American army fought their own war with weapon systems that now had no depot maintenance. The conflict continued for several months, declining in violence until both sides were slugging it out with small arms. Then the Authority had miraculously appeared, announcing itself as the guardian of peace and the maker of the bobbles.

The remnant of the Russian forces retreated into the mountains, hiding as the nation they invaded began to recover. Then the war viruses came, released (the Peace Authority claimed) by the Americans in a last attempt to retain

national autonomy. The Russian guerrillas sat on the fringes of the world and watched for some chance to move. None came. Billions died and fertility dropped to near zero in the years following the War. The species called Man came very close to extinction, but never quite fell over the edge. The Russians in the hills became old men, leading ragged tribes.

But Colonel Kaladze had been captured early (through no fault of his own), before the viruses, when the hospitals still functioned. There had been a nurse, and eventually a marriage. Fifty years later, the Kaladze farm covered hundreds of hectares along the south edge of the Vandenberg Dome. That land was one of the few places north of Central America where bananas and cacao could be farmed. Like so much of what had happened to Colonel Kaladze in the last half century, it would have been impossible without the bobbles, in particular the Vandenberg one: The doubled sunlight was as intense as could be found at any latitude, and the high obstacle the dome created in the atmosphere caused more than 250 centimeters of rain a year in a land that was otherwise quite dry. Nikolai Sergeivich Kaladze had ended up a regular Kentucky colonel—even if he was originally from Georgia.

Most all of this Wili learned in the first ninety minutes of Jeremy's unceasing chatter.

They stopped in late afternoon to eat. Belying his gentle exterior, Jeremy was a hunting enthusiast, though apparently not a very expert one. The boy needed several shots to bring down just one bird. Wili would have preferred the food they had brought along, but it seemed only polite to try what Jeremy shot. Six months before, politeness would have been the last consideration to enter his mind.

They trudged on, no longer quite so enthusiastic. This was the shortest route to Red Arrow Farm but it was still a solid ten hour hike from Santa Ynez. Given their late start, they would probably have to spend the night on this side of the Lompoc ferry crossing. Jeremy's chatter slowed as the sun slanted toward the Pacific and spread double shadows behind them. In the middle of a long discussion (monologue) on his various girlfriends, Jeremy turned to look up at Naismith. Speaking very quietly, he said, "You know, sir, I think we are being followed."

The old man seemed to be half-dozing in his seat, letting Berta, his horse, pull him along without guidance. "I know," he said. "Almost two kilometers back. If I had more gear, I could know precisely, but it looks like five to ten men on foot, moving a little faster than we are. They'll catch up by nightfall."

Wili felt a chill that was not in the afternoon air. Jeremy's stories of Russian bandits were a bit pale compared to what he had seen with the Ndelante Ali, but they were bad enough. "Can you call ahead, Paul?"

Naismith shrugged. "I don't want to broadcast; they might jump on us immediately. Jeremy's people are the nearest folks who could help and even on a fast horse that's a couple hours. We're going to have to handle most of this ourselves.

Wili glared at Jeremy, whose distant relatives—the ones he had been bragging about all day—were apparently out

to ambush them. The boy's wide face was pale. "But I was mostly farking you. No one has actually seen one of the outlaw bands down this far in . . . well, in ages."

"I know," Naismith muttered agreement. "Still, it's a fact we're being crowded from behind." He looked at Berta, as if wondering if there was any way the three of them might outrun ten men on foot. "How much of a rifle is that thing you carry, Jeremy?"

The boy raised his weapon. Except for its elaborate telescopic sight and chopped barrel, it looked pretty ordinary to Wili: a typical New Mexico auto rifle, heavy and simple. The clip probably carried ten 8mm rounds. With the barrel cut down, it wouldn't be much more accurate than a pistol. Wili had successfully dodged such fire from a distance of one hundred meters. Jeremy patted the rifle, apparently ignorant of all this, "Really hot stuff, sir. It's smart."

"And the ammunition?"

"That, too. One clip anyway."

Naismith smiled a jagged smile. "Kolya really coddles you youngsters —but I'm glad of it. Okay," he seemed to reach a decision, "it's going to depend on you, Jeremy. I didn't bring anything that heavy. . . . An hour walk from here is a trail that goes south. We should be able to reach it by twilight. A half hour along that path is a bobble. I know there's a line of sight from there to your farm. And the bobble should confuse our 'friends,' assuming they aren't familiar with the land this close to the coast.

New surprise showed on Jeremy's face. "Sure. We know about that bobble, but how did you? It's real small."

"Never you mind. I go for hikes, too. Let's just hope they let us get there."

They proceeded down the road, even Jeremy's tongue momentarily stilled. The sun was straight ahead. It would set behind Vandenberg. Its reflection in the dome edged higher and higher, as if to touch the true sun at the moment of sunset. The air was warmer and the green of the trees more intense than any normal sunset. Wili could hear no evidence of the men who, his friends said, were pursuing.

Finally the two suns kissed. The true disk slipped behind the dome into eclipse. For several minutes, Wili thought he saw a ghostly light hanging over the dome above the point of the sun's setting.

"I've noticed that too," Naismith replied to Wili's unspoken question. "I think it's the corona, the glow around the sun that's ordinarily invisible. That's the only explanation I can think of, anyway."

The pale light slowly disappeared, leaving a sky that went from orange to green to deepest blue. Naismith urged Berta to a slightly faster walk and the two boys swung onto the back of the cart. Jeremy slipped a new clip into his rifle and settled down to cover the road.

Finally they reached the cutoff. The path was as small as any Jeremy had pointed to during the day, too narrow for the cart. Naismith carefully climbed down and unhitched Berta, then distributed various pieces of equipment to the boys.

"Come on. I've left enough on the

cart to satisfy them . . . I hope.'' They set off southwards with Berta. The trail narrowed till Wili wondered if Paul was lost. Far behind them, he heard an occasional branch snap, and now even the sound of voices. He and Jeremy looked at each other. ''They're loud enough,'' the boy muttered. Naismith didn't say anything, just switched Berta to move a bit faster. If the bandits weren't satisfied with the wagon, the three of them would have to make a stand, and evidently he wanted that to be further on.

The sounds of their pursuers were louder now, surely past the wagon. Paul guided Berta to the side. For a moment the horse looked back at them stupidly. Then Naismith seemed to say something in its ear and the animal moved off quickly into the shadows. It was still not really dark. Wili thought he could see green in the tree tops, and the sky held only a few bright stars.

They headed into a deep and narrow ravine, an apparent cul-de-sac. Wili looked ahead and saw—*three figures coming toward them out of a brightly lit tunnel!* He bolted up the side of the ravine, but Jeremy grabbed his jacket and pointed silently toward the strange figures: Now one of *them* was holding another and pointing. *Reflections*. That's what he was seeing. Down there at the back of the ravine, a giant curved mirror showed Jeremy and Naismith and himself silhouetted against the evening sky.

Very quietly, they slid down through the underbrush to the base of the mirror, then began climbing around its side. Wili couldn't resist: Here at last was a bobble. It was much smaller than Vandenberg, but a bobble nevertheless. He paused and reached out to touch the silvery surface—then snatched his hand back in shock. Even in the cool evening air, the mirror was warm as blood. He peered closer, saw the dark image of his head swell before him. There was not a nick, not a scratch in that surface. Up close, it was as perfect as Vandenberg appeared from a distance, as transcendentally perfect as mathematics itself. Then Jeremy's hand closed again on his jacket and he was dragged upward around the sphere.

The forest floor was level with the top. A large tree grew at the edge of the soil, its roots almost like tentacles around the top of the sphere. Wili hunkered down between the roots and looked back along the ravine. Naismith watched a dim display while Jeremy slid forward and panned the approaches through his rifle sight. From their vantage Wili could see that the ravine was an elongated crater, with the bobble—which was no more than twenty meters across—forming the south end. The history seemed obvious: Somehow, this bobble had fallen out of the sky, carving a groove in the hills before finally coming to rest. The trees above it had grown in the decades since the War. Given another century the sphere might be completely buried.

For a moment they sat breathless. A cicada started buzzing, the noise so loud that he wondered if they would even hear their pursuers. ''They may not fall for this.'' Naismith spoke almost to himself. ''Jeremy, I want you to scatter these around behind us as far as you can in five minutes.'' He handed the boy something, probably tiny cameras like he had scattered around the manor. Jeremy hesitated, and Naismith said, ''Don't

worry, we won't be needing your rifle for at least that long. If they try to come up behind us, I want to know about it."

The vague shadow that was Jeremy Kaladze nodded and crawled off into the darkness. Naismith turned to Wili and pressed a coherent transmitter into his hands. "Try to get this as far up as you can." He gestured at the conifer in whose roots they crouched.

Wili moved out more quietly than the other boy. This had been Wili's specialty, though in the Los Angeles basin there were more ruins than forests. The muck of the forest floor quickly soaked his legs and sleeves, but he kept close to the ground. As he oozed up to the base of the tree, he struck his knee against something hard and artificial. He stopped and felt out the obstacle: an ancient stone cross, a Christian cemetery cross really. Something limp and fragrant lay in the needle mulch beside it—flowers?

Then he was climbing swiftly up the tree. The branches were so regularly spaced they might as well have been stair steps. He was soon out of breath. He was just out of condition; at least he hoped that was the explanation.

The tree trunk narrowed and began to sway in response to his movement. He was above the nearby trees, pointed forms of darkness all around him. He was really not very high up; almost all the trees in the rain forest were young.

Jupiter and Venus blazed like lanterns, and the stars were out. Only a faint yellow glow showed over Vandenberg and the western horizon. He could see all the way to the base of the Dome; this was high enough. Wili fastened the emitter so it would have a clear line of sight to the west. Then he paused a moment, letting the evening breeze turn his pants and sleeves cold on his skin. There were no lights anywhere. Help was very far away.

They would have to depend on Naismith's gadgets and Jeremy's inexperienced trigger finger.

He almost slid down the tree, and was back at Naismith's side soon after that. The old man scarcely seemed to notice his arrival, so intent was he on the little display. "Jeremy?" Wili whispered.

"He's okay. Still laying out the cameras." Paul was looking through first one and then another of the little devices. The pictures were terribly faint, but recognizable. Wili wondered how long his batteries would last. "Fact is, our friends are coming in along the path we left for them." In the display, evidently from some camera Paul had dropped along the way, Wili could see an occasional booted foot.

"How long?"

"Five or ten minutes. Jeremy'll be back in plenty of time." Naismith took something out of his pack—the master for the transmitter Wili had set in the tree. He fiddled with the phase aimer and spoke softly, trying to raise the Strela farm. After long seconds, an insect-like voice answered from the device, and the old man was explaining their situation.

"Got to sign off. Low on juice," he finished. Behind them, Jeremy slid into place and unlimbered his rifle. "Your Grandpa's people are coming, Jeremy, but it'll be hours. Everyone's at the house."

They waited. Jeremy looked over Naismith's shoulder for a moment. Fi-

nally he said. "Are they sons of the originals? They don't walk like old men."

"I know," said Naismith.

Jeremy crawled to the edge of the crater. He settled into a prone position and rested his rifle on a large root. He scanned back and forth through the sight.

The minutes passed, and Wili's curiosity slowly increased. What was the old man planning? What was there about this bobble that could be a threat to anyone? Not that he wasn't impressed. If they lived through to morning, he would see it by daylight and that would be one of the first joys of survival. There was something almost alive about the warmth he had felt in its surface, though now he realized it was probably just the reflected heat of his own body. He remembered what Naismith once told him. Bobbles reflected everything; nothing could pass through, in either direction. What was within might as well be in a separate, tiny universe. Somewhere beneath their feet lay the wreckage of an aircraft or missile, embobbled by the Peace Authority when they put down the national armies of the world. Even if the crew of that aircraft could have survived the crash, they would have suffocated in short order. There were worse ways to die: Wili had always sought the ultimate hiding place, the ultimate safety. To his inner heart, the bobbles seemed to be such.

Voices. They were not loud, but there was no attempt at secrecy. There were footsteps, the sounds of branches snapping. In Naismith's fast-dimming display, Wili could see at least five pairs of feet. They walked past a bent and twisted tree he remembered just two hundred meters back. Wili strained his ears to make sense of their words, but it was neither English nor Spanish. Jeremy muttered, "Russian, after all!"

Finally, the enemy came over the ridge that marked the far end of the ravine. Unsurprisingly, they were not in a single file now. Strung out against the starry sky, Wili counted ten figures. Almost as a man, the group froze, then dove for cover with their guns firing full automatic. The three on the bobble hugged the dirt as rounds whizzed by, thunking into the trees. Ricochets off the bobble sounded like heavy hail on a roof. Wili kept his face stuck firmly in the moist bed of forest needles and wondered how long the three of them could last.

10

"Gentlemen of the Peace Authority, Greater Tucson has been destroyed." The New Mexico Air Force general slapped his riding crop against the topo map by way of emphasis. A neat red disk had been laid over the downtown district, and paler pink showed the fallout footprint. It all looked very precise, though Hamilton Avery suspected it was more show than fact. The government in Albuquerque had communication equipment nearly on a par with the Peace, but it would take aircraft or satellite recon to get a detailed report on one of their western cities this quickly: the detonation had happened less than ten hours earlier.

The general—Avery couldn't see his name tag, and it probably didn't matter anyway—continued. "That's three

thousand men, women and children immediately dead, and God knows how many hundreds to die of radiation poisoning in the months to come.'' He glared across the conference table at Avery and the assistants he'd brought to give his delegation the properly important image.

For a moment it seemed as though the officer had finished speaking, but in fact he was just catching his breath. Hamilton Avery settled back and let the blast roll over him. ''You of the Peace Authority deny us aircraft, tanks. You have weakened what is left of the nation that spawned you until we must use force simply to protect our borders from states that were once friendly. But what have you given us in return?'' The man's face was getting red. The implication had been there, but the fool insisted on spelling it out: If the Peace Authority couldn't protect the Republic from nuclear weapons, then it could scarcely be the organization it advertised itself to be. And the general claimed the Tucson blast was incontrovertible proof that some nation possessed nukes and was using them, despite the Authority and all its satellites and aircraft and bobble generators.

On the Republic's side of the table, a few heads nodded agreement, but those individuals were far too cautious to say aloud what their scapegoat was shouting to the four walls. Hamilton pretended to listen; best to let this fellow hang himself. Avery's subordinates followed his lead, though for some it was an effort. After three generations of undisputed rule, many Authority people took their power to be God-given. *Hamilton knew better.*

He studied those seated around the general. Several were Army generals, one just back from the Colorado. The others were civilians. Hamilton knew this group. In the early years, he had thought the Republic of New Mexico was the greatest threat to the Peace in North America, and he had watched them accordingly. This was the Strategic Studies Committee. It ranked higher in the New Mexico government than the Group of Forty or the National Security Council—and of course higher than the cabinet. Every generation, governments seemed to breed a new inner circle out of the older, which was then used as a sop to satisfy larger numbers of less influential people. These men, together with the President, were the real power in the Republic. Their ''strategic studies'' extended from the Colorado to the Mississippi. New Mexico was a powerful nation. They could invent the bobble and nuclear weapons all over again if they were allowed.

They were easy to frighten even so. This Air Force general couldn't be a full-fledged member of the group. The NMAF manned a few hot air balloons and dreamed of the good old days. The closest they ever got to modern aircraft was a courtesy flight on an Authority plane. He was here to say things their government wanted said but did not have the courage to spit out directly.

The old officer finally ran down, and sat down. Hamilton gathered his papers and moved to the podium with its Peace Authority seal. He looked mildly across at the New Mexico officials and let the silence lengthen to significance.

It was probably a mistake to come here in person. Talking to national gov-

ernments was normally done by officers two levels below him in the Peace Authority. Appearing in person could easily give these people an idea of the true importance of the incident. Nevertheless, he had wanted to see these men close up. There was an outside chance they were involved in the menace to the Peace he had discovered the last few months.

Finally he began. "Thank you, General, uh, Halberstamm. We understand your anxiety, but wish to emphasize the Peace Authority's long-standing promise. No nuclear weapon has exploded in nearly fifty years and none exploded yesterday in Greater Tucson."

The general spluttered. "Sir! The radiation! The blast! How can you say—"

Avery raised his hand and smiled for silence. There was a sense of *noblesse oblige* and faint menace in the action. "In a moment, General. Bear with me. It is true: there was an explosion and some radiation. But I assure you no one besides the Authority has nuclear weapons. If there were, we would deal with them by methods you all know.

"In fact, if you consult your records, you will find that the center of the blast area coincides with the site of a ten meter confinement sphere generated," he pretended to consult his notes, "5 July 1997."

He saw various degrees of shock, but no questions broke the silence. He wondered how surprised they really were. From the beginning, he knew there was no point in trying to cover up the source of the blast. Old Alex Schelling, the President's science adviser, would have put two and two together correctly.

"I know that several of you have studied the open literature on confinement," *and you, Schelling, have spent a good many thousand cautious man-hours out in the Sandia ruins, trying to duplicate the effect,* "but a review is in order.

"Confinement spheres—bobbles—are not so much force fields as they are partitions, separating the in- and out-side of their surfaces into distinct universes. Gravity alone can penetrate. The Tucson bobble was originally generated around an ICBM over the arctic. It fell to earth near its target, the missile fields at Tucson. The hell bomb inside exploded harmlessly, in the universe on the far side of the bobble's surface.

"As you know, it takes the enormous energy output of the Authority's generator in Livermore to create even the smallest confinement sphere. In fact, that is why the Peace Authority has banned all energy intensive usages, to safeguard this secret of keeping the Peace. But once established, you know that a bobble is stable and requires no further inputs to maintain itself."

"Lasting forever," put in old Schelling. It was not quite a question.

"That's what we all thought, sir. But nothing lasts forever. Even black holes undergo quantum decay. Even normal matter must eventually do so, though on a time-scale beyond imagination. A quantum effect analysis has not been done for confinement spheres until quite recently." He nodded to an assistant who passed three heavy manuscripts across the table to the NM officials. Schelling scarcely concealed his eagerness as he flipped past the Peace Authority Secret seal—the highest classification a government official ever

saw—and began reading.

"So, gentlemen, it appears that—like all things—bobbles do decay. The time constant depends on the sphere's radius and the mass enclosed. The Tucson blast was a tragic, fluke accident."

"And you're telling us that every time one of the damn things goes, it's going to make a bang as bad as the bombs you're supposed to be protecting us from?"

Avery permitted himself to glare at the general. "No, I am not. I thought my description of the Tucson incident was clear: There was an exploded nuclear weapon inside that confinement."

"Fifty years ago, Mr. Avery, *fifty* years ago."

Hamilton stepped back from the podium. "Mr. Halberstamm, can you imagine what it's like inside a ten-meter bobble? Nothing comes in or goes out. If you explode a nuke in such a place, there is nowhere to cool off. In a matter of milliseconds, thermodynamic equilibrium is reached, but at a temperature of several million degrees. The innocent-seeming bobble, buried in Tucson all these decades, contained the heart of a fireball. When the bobble decayed, the explosion was finally released."

There was an uneasy stirring among the Strategic Studies Committee as those worthies considered the thousands of bobbles that littered North America. Geraldo Alvarez, a presidential confidant of such power that he had no formal position whatsoever, raised his hand and asked diffidently, "How frequently does the Authority expect this to happen?"

"Dr. Schelling can describe the statistics in detail, but in principle the decay is exactly like that of other quantum processes: We can only speak of what will happen to large numbers of objects. We could go for a century or two and not have a single incident. On the other hand, it is conceivable that three or four might decay in a single year. But even for the smallest bobbles, we estimate a time constant of decay greater than ten million years."

"So they go off like atoms with a given half-life, rather than chicken eggs hatching all at once?"

"Exactly, sir. A good analogy. And in one regard, I can be more specific and encouraging: Most bobbles do not contain nuclear explosions. And large bobbles—even if they contain 'fossil' explosions—will be harmless. For instance, we estimate the equilibrium temperature produced by a nuke inside the Vandenberg or Langley bobbles to be less than one hundred degrees. There would be some property damage around the perimeter, but nothing like in Tucson.

"And now, Gentlemen, I'm going to give our side of the meeting over to Liaison Officers Rankin and Nakamura." He nodded at his third level people. "In particular, you must decide with them how much public attention to give this incident." *And it better not be much!* "I must fly to Los Angeles. Aztlán detected the explosion, and they deserve an explanation, too."

He gestured his top Albuquerque man, the usual Peace rep to the highest levels of the Republic, to leave with him. They walked out, ignoring the tightened lips and red faces across the table. It was necessary to keep these people in their places, and one of the

best ways of doing that was to emphasize that New Mexico was just one fish among many.

Minutes later they were out of the nondescript building and on the street. Fortunately, there were no reporters. The NM press was under fair control; besides, the existence of the Strategic Studies Committee was itself a secret.

He and Brent (the chief liaison officer here) climbed into the limo and the horses pulled them into the afternoon traffic. Since Avery's visit was unofficial, he used local vehicles and there was no escort; he had an excellent view. The layout was similar to the capital of the old US (if he could ignore the bare mountains that jaggedly edged the sky). He could see at least a dozen other vehicles on the wide boulevard. Albuquerque was almost as busy and cosmopolitan as an Authority enclave. But that made sense: The Republic of New Mexico was one of the most powerful and populous nations on Earth.

He glanced at Brent. "Are we clean?"

The younger man looked briefly puzzled, then said, "Yessir. We went over the limo with those new procedures."

"Okay. I want to take the detail reports with me, but summarize. Are Schelling and Alvarez and company as innocently surprised as they claim?"

"I'd stake the Peace on it, sir." From the look on Brent's face, the fellow understood that was exactly what he was doing. "They don't have anything like the equipment you warned us of. You've always supported a strong counter-intel department here. We haven't let you down; we'd know if they were anywhere near being a threat."

"Hmm." The assessment agreed with Avery's every intuition. The Republic government would do whatever they could get away with. But that was why he'd kept watch on them all these years: he knew they didn't have the tech power to be behind what he was seeing.

He sat back in the padded leather seat. So Schelling was "innocent." Well then, would he buy the story Avery was peddling? Was it really a story at all? Every word Hamilton spoke in that meeting was the absolute truth, reviewed and rereviewed by the science teams at Livermore. . . . But the whole truth it was not. The NM officials did not know about the ten meter bobble burst in Central Asia. The theory could explain that incident too, but who could believe that two decays would happen within a year after fifty years of stability?

Like chicken eggs hatching all at once. That was the image Alvarez had used. The science team was certain it was simple, half-life decay, but they hadn't seen the big picture, the evidence that had been trickling in for better than a year. *Like eggs hatching* . . . When it came to survival, the rules of evidence became an art, and Avery felt a dread certainty that someone, somewhere, had figured out how to cancel bobbles. ■

CONTINUED IN NEXT ISSUE

● If the mind were exercised as much as the mouth, we would be a race of geniuses.

Kelvin Throop III

On Gaming

Dana Lombardy

The Fellowship of the Ring® (FOTR) is a fantasy board game based on J.R.R. Tolkien's three volume epic, *The Lord of the Rings,* with the focus on the action in the first volume, *The Fellowship of the Ring*. (The game is $25 at your local store, or direct from Iron Crown Enterprises Inc., Box 1605, Charlottesville, VA 22902.)

Readers who've come under the spell of Tolkien's monumental work will be pleased by the care the designers have taken in presenting a board game faithful to the book.

If you're unfamiliar with Tolkien, you may at first find the large number of characters, monsters, etc., somewhat overwhelming, so simplified rules are included as an option to help you get into game play faster. Furthermore, the game is so attractively presented you may be encouraged to read *The Lord of the Rings* series after you've played the game.

The action in the game centers around "The Ring"—the "One True Ring" . . . the "Ruling Ring" . . . the greatest focus of power in Middle Earth. Should Sauron of Mordor possess this Ring, he would then have the power to destroy all his foes and completely rule Middle Earth.

Conversely, should the Fellowship —the group of hobbits, dwarves, elves, and men who oppose Mordor—succeed in destroying the Ring, this would annihilate Sauron and his evil minions, thereby freeing Middle Earth from his domination and influence.

But the game stops short of the Ring's being carried into Mordor and destroyed at Mt. Doom. *FOTR* covers the early periods of the trilogy: the flight of the hobbits from the Shire, the formation of the Fellowship, the approach to Mordor's vicinity, and the dissolving of the Fellowship so a few members can sneak through Mordor to Mt. Doom.

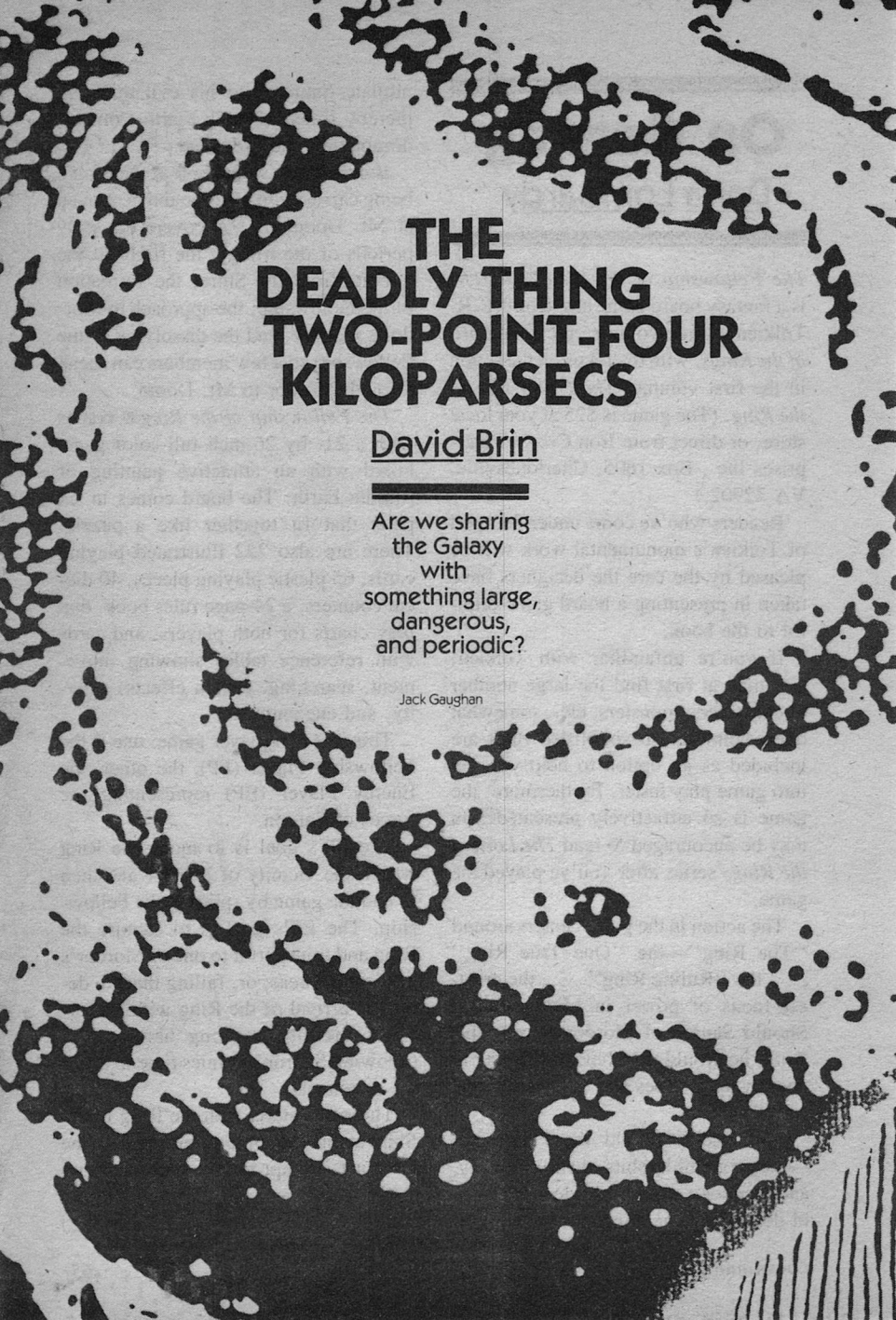
The Fellowship of the Ring® comes with a 21- by 26-inch full-color game board with an attractive painting of Middle Earth. The board comes in six parts that fit together like a puzzle. There are also 222 illustrated playing cards, 65 plastic playing pieces, 40 die-cut counters, a 24-page rules book, display charts for both players, and cards with reference tables showing movement, searching, terrain effects, activity, and encounters.

This is a two-player game: one is the Fellowship Player (FP); the other, the Enemy Player (EP) representing the forces of Sauron.

The FP's goal is to move the Ring within the vicinity of Mordor and then to end the game by splitting the Fellowship. The EP's goal is to capture the Ring and transport it to one of Mordor's garrisoned areas; or, failing that, to delay the arrival of the Ring within Mordor's vicinity as long as possible (allowing Sauron's armies time to crush his opponents).

The game starts with the Ring in the Shire at one side of the game board. The FP must attempt to gather the Fellowship together and transport the Ring to

(continued on page 162)

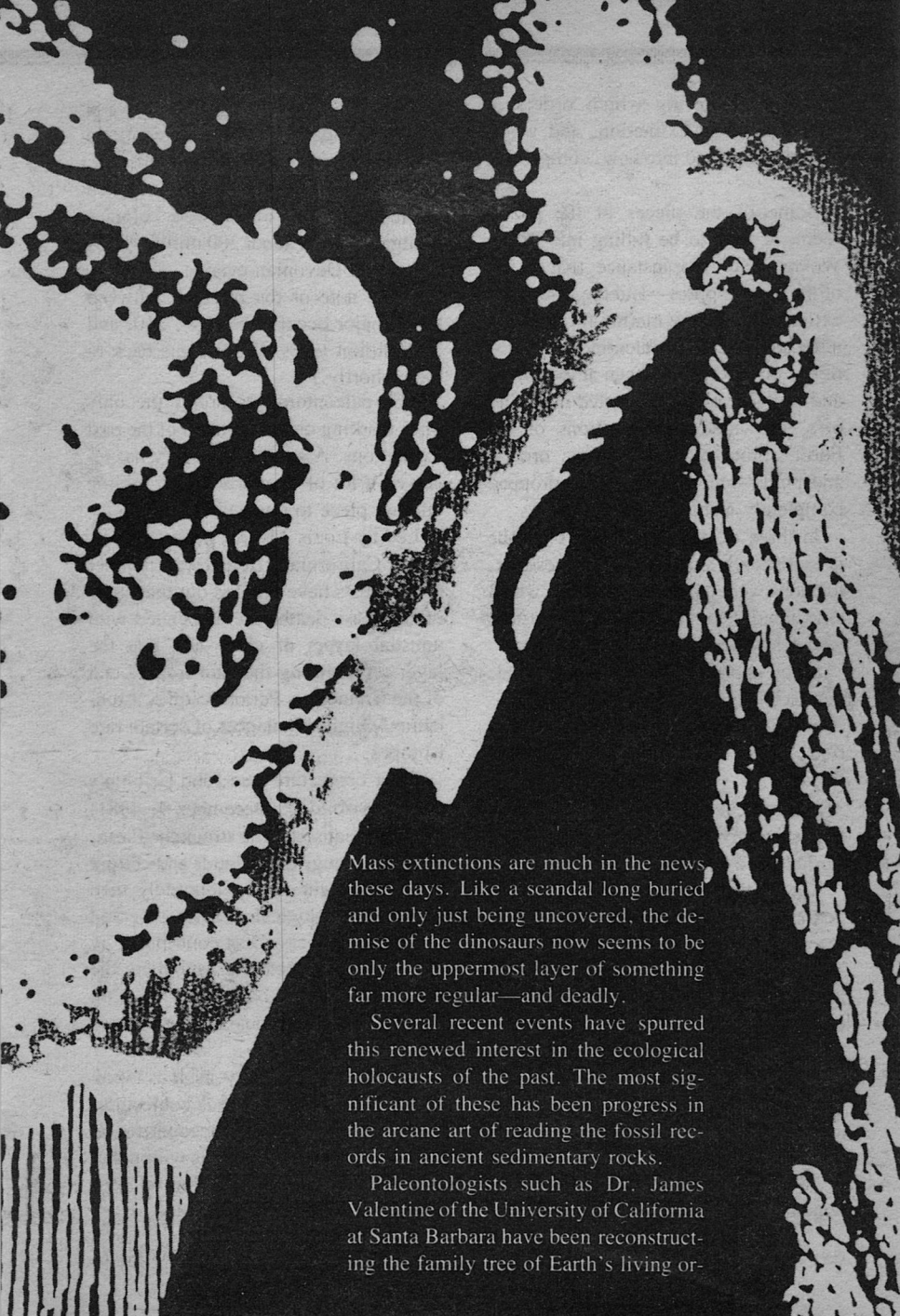


THE DEADLY THING TWO-POINT-FOUR KILOPARSECS

David Brin

Are we sharing the Galaxy with something large, dangerous, and periodic?

Jack Gaughan



Mass extinctions are much in the news these days. Like a scandal long buried and only just being uncovered, the demise of the dinosaurs now seems to be only the uppermost layer of something far more regular—and deadly.

Several recent events have spurred this renewed interest in the ecological holocausts of the past. The most significant of these has been progress in the arcane art of reading the fossil records in ancient sedimentary rocks.

Paleontologists such as Dr. James Valentine of the University of California at Santa Barbara have been reconstructing the family tree of Earth's living or-

ganisms, unsorting which orders or phyla ended in extinction, and which branches evolved into new, competitive forms.

Some of the pieces of the puzzle seem, at last, to be falling into place. We now know, for instance, that the fall of the great reptiles—and the associated extinction of many marine forms—was not a unique event. Valentine and others report that there have been at least four, and as many as ten suspected mass die-offs, in which large portions of the Earth's biota—whole families, orders, and phyla—declined and then dropped completely from sight.

In three of these cases the evidence is statistically indisputable. These extinctions were indeed catastrophes which enveloped the entire Earthly ecosystem when they occurred:

.at the end of the Cretaceous Period, approximately 65 million years ago—

.at the conclusion of the Permian Period, about 185 million years before that—

.and at the terminus of the Ordovician Period, approximately 210 million years further back in time.

The Earth was far different in appearance each time it happened. Where the Cretaceous featured great reptiles and pre-placental mammals, the Permian was a time of tremendous fern forests and advanced amphibian forms. The Ordovician, on the other hand, featured hardly any life on land at all.

But in each case the die-off was sharp and easily distinguished in the geological record. Suddenly, a large fraction of all the species alive at the time were wiped out.

Now Andrew Knoll of Harvard and Gonzalo Vidal of Lund University in Sweden report a fourth great extinction, at a time, 650 million years ago, when the highest forms of life were colonies of algae. This is about 200 million years before the Devonian event.

(Take note of the intervals between these major occurances: 185, 210, and 200 million years. We'll come back to them shortly.)

The paleontologists aren't the only ones working on the problem of the past extinctions. A second discovery has received a lot of attention lately, adding another piece to our puzzle.

Led by Louis Alvarez of the University of California at Berkeley, a number of scientists have pointed out that some of the mass deaths are associated with unusual layers of clay—and that the layer representing the catastrophic end of the Cretaceous Period features astonishingly high abundances of certain rare isotopes.

Their conjecture (see John Gribbin's article in *Analog*, December 7, 1981) is that a great meteorite struck the Earth, kicking up huge dark clouds and cutting off the sunlight. This supposedly then led to the ecological disaster observed in the fossil layers. Dust contributed by the vaporized meteorite supplied the unusual isotopes Alvarez and his team found in the Cretaceous-Tertiary boundary layer.

But the clay layer by itself is weak evidence for the falling rock conjecture. There are other ways to account for it. The abnormal isotope profile within that narrow layer is what the impact proponents rely upon most heavily.

But there may be another way to explain it.

Theories of Cycles

Let's go back to Fact One, the episodic occurrence of ecological disasters in Earth's history. Would it not be interesting if there were some periodicity to these mass extinctions? If there were some pattern, then we might be able once and for all to assign a culprit . . . and incidentally know what to watch out for.

Recently two University of Chicago researchers, David Raup and John Sepkowski, have claimed that the four major and six lesser extinctions observed in the sediments seem to be part of a larger pattern that repeats at a rough average interval of 26 million years. They draw the implication that there is some repetitive process which puts the ecosystem of the Earth under stress in a regular pattern.

But even if the pattern they see is real, what sort of process could operate over such vast time scales, repeating reliably at 20 to 30 million year intervals?

Raup and Sepkowski are not sure. Along with England's Martin Whyte, they guess that the culprit may have to do with the interval workings of the Earth itself—with cyclic changes in the planet's moment of inertia, its magnetic field, or the rate of transfer of heat to the mantel and crust.

It is an intriguing proposal, and it merits further investigation. However there is a problem. No one can assign a clear-cut mechanism. Nor can anyone explain the dramatic difference between the six lesser and the four great extinctions.

One other potential periodic mechanism, discussed in the May 1983 issue of *Analog*, is the possibility that waves of settlement by starfaring civilizations might be responsible for episodes of extinction, followed by long periods in which the galaxy is empty of intelligent life. The theoretical time scales—10 to 100 million years—seem to put this idea in the right range to be considered as a candidate, however it still remains pretty vague and hard to pin down. All we can do is catalog the hypothesis and move on.

The Major Extinctions

For the sake of argument, let us look at the four great die-offs alone . . . the four for which there is no dispute. Remember those periods—65, 185, 210, and 200 million years?

Recall that these are fairly rough numbers. Nonetheless, one quickly sees the outlines of a pattern. If we assume we're 65 million years into the latest phase of a repeating cycle, we might be tempted to guess that the greater die-offs occur at intervals of approximately—

197 Myr $\pm$ 12 Myr. (Myr = one million years.)

The uncertainty of 12 Myr is soft, but it is small enough to leave us encouraged that we may be onto something. It certainly looks like a pattern.

Could something periodic be causing this?

Not many natural processes occur with such regularity at such vast intervals. Only one cycle comes to mind with

a periodicity similar to this. It is the revolution of the sun around the center of the galaxy . . . an orbit that astronomers now estimate to take approximately 230 million years.

Might we be sharing the Milky Way with something deadly? Something that reaches out to "touch" our planet as we pass near it, roughly every galactic year?

Let's pause and think about galaxies for a moment.

A spiral galaxy like the Milky Way does not rotate like a solid disk. Instead it is composed of many parts.

The galactic "halo," like the core, consists of older, metal-poor, possibly planetless stars of the first generation. In the halo the long, lazy orbits of solitary stars and globular clusters take them far out into the nearly empty territory above and below the spiral plane.

At the opposite extreme, in the galactic core, the crowded stars jostle and occasionally collide. They may even merge into super-compact bodies, giving rise to strange happenings. We shall speak more of these later.

Still, most of the really interesting things seem to be going on in the great, complicated disk of the galactic plane. Here the stars and gas and dust clouds rotate in their nearly circular paths, the inner zones finishing their orbits more quickly than those further out. This "differential rotation" is one of the things that drives the spiral design of our type of galaxy, helping to create the shock fronts where new stars are formed (as described by John Gribbin in *Analog*, February, 1978).

The shock fronts, along the concave faces of the spiral arms, are where clouds of gas and dust are compressed into new stellar systems. Some believe that life could not exist without these alternating zones of compression and release around the galactic rim.

The sun's orbit appears to meet one of the galaxy's great spiral arms about every 110 million years or so. It takes about 10 million years to pass through one, about a million years alone to pass the shock front at the leading edge. We're emerging from an encounter with the shock front of the galaxy's Orion Arm right now.

Can one use these spiral fronts to explain the cyclical pattern of the mass extinctions? There are several theories which do make the attempt.

W. H. McCrea contends that when the solar system moves into a shock region a sudden influx of gas and dust is absorbed by the sun, causing a dramatic increase in luminosity. That, according to the English astronomers Hoyle and Littleton, should increase precipitation on Earth, lowering sea levels and setting off a series of ice ages. The history of the last million years—featuring a series of ice ages only recently ended—lends the hypothesis some support.

A related idea, by Napier and Clube, is that the galactic shock fronts are crowded with "planetesimals" like asteroids and comets, and that the sun regularly picks up a swarm of these every hundred million years or so, causing the Earth to regularly get "pasted."

Or maybe the abundance of young, hot stars in the shock-front regions creates an area with a high incidence of supernovae (which would certainly wreak havoc on the Earth if one occurred close enough!)

All three mechanisms sound plausible, at least. Could the solar system's periodic encounters with the spiral arm shock fronts then explain the major extinctions that have befallen life on Earth?

Alas, the timing is all wrong.

Our encounter with the Orion Arm may indeed have triggered the ice ages of the Pleistocene, but the cycle of entering and leaving spiral arms clearly doesn't fit the truly great die-offs of the Pre-Cambrian, Ordovician, Permian, and Cretaceous. The hundred and ten million year interval is over forty percent below the figure we calculated earlier—apparently way too low to apply to the major ecological holocausts of the past.

The Deadly Thing

If we re-examine those numbers just one more time, there does appear to be one more possibility—one more periodicity that no one seems to have covered yet. Our galactic orbital period.

We seem to be hit by something deadly every 195 million years or so. That's similar to the 230 Myr solar orbit around the galactic center, but it's clearly *not* the same. The 15% difference is enough to bother even the most impulsive pop theorist.

Until one realizes that anything truly dangerous floating about in our galaxy would *itself* have to be in orbit around the galactic center! With differential rotation, every distance from the center has its own unique orbital period, the

sun's happening to be 230 million years. There may be some "thing" co-orbiting with us—a little further out or closer in—the inner object "catching up" with the outer one at a period a little more rapid than one solar-galactic "year."

It's a problem that can be solved —roughly—using the back of an envelope and a book of astronomical tables.

If the sun has a period of 230 Myr, and we encounter "a thing" about every 197 Myr, then "Its" orbital period is solved by taking the difference of the two reciprocals (orbital frequencies) and dividing one more time.

If we do this, "It" turns out to have an orbital period of about 107 Myr.

We then go to some of the tables of galactic rotation rates (laboriously collected by diligent astronomers, and published for the benefit of sleuths such as ourselves). The angular frequency versus radial distance function given in the literature is a little complicated, but when used carefully it gives a pretty clear result.

"It" has to orbit the center of the galaxy at a distance of approximately 2.4 kilo-parsecs, or seven point seven thousand light years. Our system, orbiting at about 10 kilo-parsecs, then has its nearest passage to the thing every 197 million years, as expected.

This is "geological astronomy" with a vengeance. We have just used the Earth as a great observatory, reading the sedimentary rocks like ancient photographic plates. Have we deciphered the clues correctly? Is there a Thing out there, which periodically catches up to us and does deadly mischief on our ecosystem with each near passage?

(Like many scientific discoveries or conjuectures, this one has a haunting premonition in science fiction. In Poul Anderson's *Brain Wave* the die-off of the dinosaurs was caused by a beam which suppressed brain activity in an entire sector of the galaxy.)

If our Thing exists, it has to be pretty powerful, for according to our calculations we never pass closer to it than seven thousand parsecs. This means that it must somehow be selective, or act over a narrow angle.

The strongest possibility among known or modelled phenomena appears to be a rotating black hole which is emitting a powerful jet of sub-atomic particles.

The central cores of some spiral galaxies are extremely busy places, emitting awesome, energetic beams. SF author Gregory Benford (who is also professor of high-energy physics at the University of California at Irvine) has studied cases in which narrow, self-focused streamers of charged particles seem to be shooting narrowly across tens of thousands of parsecs, carrying as much energy as is being emitted from all the rest of the source galaxy!

Clearly nothing like these monsters exists in the Milky Way today. But recent radio surveys *have* discovered an intriguing object, albeit much, much smaller—perhaps a fair to moderate black hole—very close to our galactic center. Radio-maps indicate a pair of jets several light years in length, spurting outward from the object.

In terms of modern galactic astronomy this is small potatoes. But there may be others in the Milky Way, some-

where in between the sizes we've mentioned above. And one of these may be our culprit, now hidden behind the dust lanes of the galactic lens.

Benford thinks the best candidate might be a condensed source projecting a beam of positrons and electrons, precessing and sweeping out a disk-like portion of the galactic lens.

An energy source like that would, indeed, be a deadly thing. An interstellar jet, even one barely grazing by the solar system, could explain a lot, such as the anomalous isotopes in those clay layers—if the particle fluxes were high enough to cause elemental transmutation. And it might be no problem for such a beam to overwhelm the ozone layer, causing collapse of the Earthly ecosystem.

Even if the beam passed nearby for only a brief time, it would probably be enough to do great harm.

There you have it, still another explanation for a set of mysteries exhumed from under the dust of our ancestors. All the witnesses are long dead, of course. But that doesn't keep us from sifting through the clues looking for culprits.

Over the years we've heard conjectures of nearby supernovae, wobbling planets, and even colonization from the stars, in order to explain the demise of the dinosaurs and other mass-extinction victims.

If the giant-meteorite proponents are right, we might be wise to take some precautions, to keep track of those bits of rock tumbling about the solar system. The other "periodic" solutions, too, each seem to offer their own bogey men to watch out for as well.

Now there's this new "thing" to worry about, possibly orbiting out there roughly 2.4 kilo-parsecs from the center of the galaxy . . . just waiting, it would seem, to reach out one more time and *get* us.

It's a little unnerving.

Still, one shouldn't lose too much sleep over it. Dangerous and nasty as the little bugger may be, we probably have another 130 million years to get ready for it.

If any money is going to go to chicken little preparations, at this point I think I'd rather spend it on asteroids.

Author's final note: Remember where we mentioned TEN recorded ecological holocausts? This paper only dealt with the four greater die-offs, whose apparent regular intervals lead to an interesting conjecture.

But there are six much smaller events in the record as well. Of these, two are "intermediate" in magnitude—one about 80 Myr after the Ordovician disaster, and the other approximately 30 Myr after the Permian.

You can't do much with only two data points, of course. Certainly there's no way we can imply that each major event is followed by a secondary *die-off an average of 55 Myr later, is there?*

It is now 65 Myr since the major holocaust of the Cretaceous. . . .

No. This author steadfastly refuses to state that we seem overdue for one of those littler extinctions. That would be stretching things too *far.*

He hopes.■

Dell Harris

Alison Tellure

LOW MIDNIGHT

Old feuds die hard—and
if they've lasted long enough
for the participants
to change, the end
may be quite different
from any they anticipated.

In the depths of a vast ocean that covered more than half of the surface of a huge planet that swung solemnly around a gigantic sun, there swam a creature built upon a suitable scale. Bloated beyond measure by the unending span of its years, possessed of a fierce, cold intelligence, fearing nothing in its unimaginable strength save the sun itself, it prowled the green halls, free to explore any pressure level it pleased because of the strength and peculiar composition of its body; for eons unchallenged and unchallengeable.

Once it had had something to fear, but it had taken measures. Once something had dared to challenge it, or so it saw the matter. But it had been relatively young and inexperienced then, and much smaller and therefore more stupid than it was now—and even so, even then, it had been the largest living thing on its own world, and indeed upon many another, had comparisons been possible. A great blue whale would have been a minnow beside it, scarcely worth the trouble of snapping up.

It took pride in the fact that not only had it been the FirstOne of its kind, but now it was the Last as well, unquestioned lord of all it surveyed, because no one was left to question.

It did not regret that it had long ago grown too big to squeeze through the strait that separated the Greater Ocean from the Lesser, not even through the enlarged gap made by the doomed attack of its first rebellious Child. There was nothing in the Lesser Ocean of concern.

"Ready to sail, Captain!" sparked the young first mate in clipped, sharp

flashes of color. But he could not quite keep a general golden glow out of his words.

The captain chuckled to himself, a silvery shiver zigging and zagging across his carapace. He couldn't blame his subordinate.

After all, they on this ship were certifiably the greatest heroes in history.

And the ship! Clattery still marveled to see it, and he had been its master for over a year now, getting the sense of it, learning its tricks. A magnificent trireme it was, with thirty-six rowers on each side, on each deck. The sails alone had been a year in the weaving.

Surely nothing so mighty, so magnificent, had ever plied the waters.

But that in itself did not put that golden haze upon his mate's words.

This was the night. This would be no shakedown cruise. This night they launched high adventure upon the black waves.

It had fallen to his generation, and to him, the best skipper in God's fleet, to embark upon the supreme adventure for which a nation had been preparing for centuries.

The *Pincer's Point*, and the great armada of lesser craft, would sail through the Strait into the Greater Ocean.

"Ready to sail, Lord God," Captain Clattery told the eyeball that lay draped over the bowsprit.

Lying on the bottom of the harbor, Skysinger brooded. Now that the moment had arrived, yd found ydself filled with a thousand doubts, filled nearly to the point of acid indigestion. Absently yd imprinted a message tissue with yet another compunction and absently swallowed it. Yd couldn't remember exactly how many millennia ago yd had formed the dreadful habit of muttering to ydself this way. But then, perhaps, if yd never used the means of communication proper to yd's own species, the capacity would atrophy—and that would be a terrible embarrassment if yd ever again had a chance to talk to someone.

Someone of yd's own kind, that is.

Of course, Skysinger very much enjoyed the exchange of ideas yd carried on with yd's little friends. Yd owed them a great deal—yd's life and sanity, to begin with.

And therein lay the crux of Skysinger's anxieties.

Long, long ago, one of their Supreme Hierophants, the chief of yd's Servants, had brought yd to task for so callously molding the course and culture of her people. Yd had answered her then with scoffings and explanations, and allayed her doubts—but she had raised questions in yd's own mind that yd had never again entirely succeeded in silencing.

Had Skysinger the right to make yd's war theirs? Yd had told little Wink only the truth: if her species ever desired mastery of the world, someday they would have to challenge the monstrous FirstOne. But was mastery necessary? Was the challenge as inevitable as all that? Would they not be just as well off to remain what they were, happy, ignorant land-dwellers, living out their brief spans in their immemorial way: hatching, learning, breeding, dying; content, without any interference from "God"? They were not a people that took readily to change. After a certain age their minds and souls grew like their shells, inflexible, static. Yet for thou-

sands of generations Skysinger had forced change upon them. They were about twice the size that they had been when yd first encountered them. They had long, flexible, sensitive palpi on eather side of their mouths, capable of doing the finest work. They were strong, clever, organized. The small tribe that had first fallen victim to yd's curiosity had become the mightiest nation in the world, ruling an entire continent. They were industrious builders, resourceful problem-solvers.

And all to one purpose—Skysinger's purpose.

I have forged them into a tool to fit my grasp, the message-tissue read. *A weapon against the Evil One, my first ancestor, the murderer of my people. As FirstOne used its mindless soldier-slaves, so have I used the land-dwellers. Am I better than my enemy?*

Skysinger could not stop the venture now even if yd wanted to, yd realized. Over the many centuries since Green-Eyed She had been yd's favorite, their attitude had grown less and less slavishly pious and more and more presumptive of an equitable partnership. They still glowed hymns of praise and called yd God; but if yd tried to call a halt to this voyage now, without giving an excellent practical reason that had nothing to do with yd's alleged godhead, yd would bet they would go ahead anyway, with or without yd's blessing. They were very enthusiastic, mettlesome little creatures. Skysinger supposed that was why yd loved them.

So when yd saw Captain Clattery's report and salute, it floated a color-bladder to the surface and slowly gleamed out, "Let's be off, then."

Would they be able to find FirstOne? No one in the fleet, not even Skysinger ydself, knew a thing about the Greater Ocean. And if they did indeed find the enemy, what then?

FirstOne had destroyed all of yd's own and Skysinger's kindred, a community of nearly one hundred, many of whom had been much larger than Skysinger. Would yd not splinter the great trireme, and all the lesser ships that sailed in the trireme's wake, with one slash of a claw? And would it not then proceed to splinter Skysinger?

One way to find out, Skysinger muttered to ydself, rather sourly, and belched. The great bubble drifted to the surface and hung there.

I must be more cheerful or I'm going to go right off my feed, and that would never do.

Yd would need yd's strength.

For many nights there were no problems. The land-dwellers huddled throughout the day below decks, under the special shields. There was a certain metal which would keep them from dying of the sun-sickness—given that they could somehow avoid boiling or burning. Until they had achieved the latter technological breakthrough they had been condemned to hop along the coast, anchoring and going ashore to burrow and hide at dawn. Many a goodly ship and brave crew had they lost, in the early days, before they had the coastlines of the Lesser Ocean thoroughly explored. If the crew could not find underground shelter overday, they died—either immediately, of the heat; or, worse, of the lingering sun-sickness. The discovery of the magic metal had

enabled them to extend their explorations far into the polar regions of the world, for they could take artificial shells with them, and trust to the favor of God to defend them from the heat itself. But for long centuries there remained in the lower latitudes stretches of shoreline closed to them by the absence of convenient shelter.

Then Skysinger had at last grown utterly too big to be supported in the Upland Lake, despite all the biological modification yd had done on ydself, and even with the assistance of the Holy Imperial Corps of Fishers. A generation of engineering effort had dredged the river twice as deep and wide as it had once been, and Skysinger had chugged and heaved ydself downstream for the first time in countless millennia.

With God loose in the Lesser Ocean, seafaring took on a new dimension. Skysinger could pound out shelters where none had existed. Yd could stir up the chill, heavy waters from the depths, to cool the hulls that floated above yd. Yd could lead them along safe channels through perilous reefs. The First Great Age of Exploration culminated in a brilliant series of triumphs —and ended with the invention of a system of deep-rowing and continuous in-place dredging that could bring up cooler waters to circulate around a ship almost as well as Skysinger could do it. When they had that as well as their lead shields, they were free of sidling around the coasts, free of the dominion of the sun; and it was time for the Second Great Age of Exploration to begin.

But first they had a war to fight.

The fleet, with its monstrous divinity tagging along behind and below, spent nearly a hundred days coast-hopping, mapping the shoreline; at first correlating what they saw with what they already knew from overland expeditions, then discovering new lands. The cartographers, geologists, and life-scientists worked in a fever of delight. Now and then Skysinger would thrust up some bizarre specimen unknown to the waters of the Lesser Ocean, for their edification; or make a laconic report upon the depth and terrain of the bottom.

Skysinger made forays into the open sea, casting about for some spoor of FirstOne; but the Greater Ocean billowed forever under the thickly jewelled sky, without disclosing a sign of its ruler. Big as FirstOne was, the Ocean was bigger. . . . Privately Skysinger suspected that they would have to sail until the enemy discovered *them*.

Evidently Captain Clattery had arrived at the same conclusion, for he blipped glumly, one night, "Why do you suppose Yd hasn't found us yet, Lord God? Or does Yd play a waiting game?"

Skysinger wracked yd's memory. "The first time yd fought, yd gathered such information as yd could before yd made any overt move. Yd laid yd's plans and lulled yd's victims into a false sense of security. I will keep a close watch, little skipper. I will bud off a few scouts, all eyes and smellers and message-tissue." Yd proceeded to do so.

"Take care, friend God," Clattery blinked. "Don't diminish your holy and valuable self too much."

"Oh, I have been growing extras for centuries, with just this night in mind," Skysinger replied negligently.

Yd had bred a homing instinct into the scouts; they were mindless automata with just enough sense to smell out and return to their parent when they began to wear out. Yd gobbled the bulk of them up (barring eyes and other specialized organs too precious to waste so casually) and digested their reports.

Nothing . . .

Nothing . . .

Nothing . . .

Nothing . . .

Two did not come back.

Interesting, thought Skysinger. *Randomly succumbed to the many hazards of the open sea, or . . . ?*

Yd sent out two more in the general direction taken by the missing ones.

One returned having seen nothing of interest.

One did not return at all.

So. You shadow us, ancient murderer. Why so cautious, I wonder? Can it be that the mighty FirstOne knows doubt? fear? What did you make of the scouts? Little enough, I hope; I made them stupid on purpose. Did you like the eyes, my wonderful eyes? Or have you perhaps invented vision yourself, by now?

Where are you, and what are you planning, in your swollen viciousness?

No hint of FirstOne's presence could Skysinger detect directly; the fleet was upcurrent. Perhaps if one descended to the bottommost level of the many-layered ocean, where the thick and sluggish water moved in a different direction,

one could scent the prey—or perhaps one could slip by underneath, and trap it between fleet and self. Skysinger outlined this plan to Clattery.

"God go with you," the good captain gleamed, forgetting to whom he was speaking.

Skysinger chuckled landdweller-style, flashing bone-silver, and sank out of sight.

On the fourth night of solitary hunting yd crossed spoor—a faint scent of blood in the water. Skysinger followed it. Soon the signs were unmistakable—some great animal was feeding nearby, and didn't care who knew it. This puzzled Skysinger. The absence of any attempt to disguise the predator's presence and activity did not coincide with its previous sly, watchful caution. Skysinger huddled along the bottom, eyes every which way, taking advantage of every hint of cover—none of which seemed remotely adequate for a creature yd's size. Yd moved slowly, painstakingly, to avoid as far as possible setting a current in motion that would alert yd's target. Skysinger did not wish to engage with FirstOne here; yd hoped to lead the monster back to the fleet, so that, once again, yd's small allies could help with the kill.

But where was the evil thing? Skysinger felt that yd ought to have spotted yd by this time. Gore and offal drifted in the waters—but no feeding predators were to be seen. Could FirstOne have sensed—?

Sharp pain shot through one of Skysinger's trailing appendages. For a moment, the shock blanked out all thought in panic.

Skysinger had invented pain nerves long ago, shortly (in yd's terms) after inventing sight. The delicate eye organs were simply too vulnerable on this light-lashed world; yd had had to devise a warning mechanism. Yd had been unpleasantly surprised to discover that pain hurt; but that discovery had taught a caution that may well have contributed considerably to yd's long survival.

But the phenomenon could be a decided handicap in the middle of an argument.

A large chunk of Skysinger's person had been removed. Yd was shredding away on the ragged edge. For one long moment yd could neither see nor scent yd's attacker. Then a shadow flashed past.

FirstOne remained among the missing. Skysinger faced a pack of "sharks," fierce predators, hunters larger than anything yd had ever encountered in the Lesser Ocean; yd could not tell how many there were. Several were temporarily distracted gobbling up the units of the mother-kind, the small, simple organisms that still made up the bulk of Skysinger's flesh, as they drifted mindlessly away from the wound. Nevertheless, ten or twelve encased Skysinger in a shifting, kinetic sphere of lethal instinct and weaponry; and yd could sense more arriving.

However, Skysinger reminded ydself stoutly, I am rather large myself. . . .

"God!" exclaimed Clattery.

"Yes?"

"What happened to you?!"

"I've been busy. . . ."

"You have met the Enemy?"

"No. FirstOne eludes us still. I have

encountered those of a like, bloody mind, though their forms were different."

Skysinger was too weak to make a good, rousing story of it. Yd's brief, bare account left Clattery horrified by his vague imaginings.

The captain had sailed with Skysinger for many years, and knew well enough that yd was no true deity in any legitimate metaphysical sense. He admired and venerated yd for what yd had meant to Clattery's people, but did not worship yd.

Nonetheless, the realization that Skysinger could be hurt left the captain shaky, as if the carapace of the universe had cracked.

A weak glimmer of humor in the water called him out of his unpleasant musings.

"I'll mend. For a few nights I must hunt the mother-kind, not our Enemy." Skysinger needed to replenish the mass yd had lost to the "shark"-pack; yd dared not face FirstOne at less than yd's best strength.

So the fleet headed out into open ocean.

Clattery, the other captains, and the more veteran crewmembers had experienced open sea before. But many of the younger explorers had never been out of sight of land in their lives. Skysinger knew this, and knew as well the anxiety they would suffer. Yd's little friends never dealt well with change; yd had had to nudge them along by careful increments every step of their progress. So for many nights yd remained close to the fleet, a familiar, comforting bulk, despite the need to forage for the primitive creatures of the mother-kind to incorporate alive within ydself. Yd drifted from ship to ship, chatting at the end of a long float-bladder pseudopod with whatever hapless middy had drawn a day watch, until yd sensed that the temperament and courage of even the youngest and least had recuperated.

Then yd vanished.

Nothing happened. The fleet dropped anchor, without really expecting to stay put, and without worrying when their hulls "walked" by day. Even when the usual gargantuan tempest blew up and scattered each vessel far from sight of any other, they stolidly chugged back together again and went on waiting. Violent weather was standard, and Skysinger had taught them all how to navigate by the stars.

Meanwhile, their pet deity swam on, exploring, hunting in a leisurely way, reconstituting ydself, and worrying. Yd preferred to replace yd's mass with the special, tiny mother-kind it had bred over the millennia in the Upland Lake; the "wild" mother-kind had certain disadvantages, were less easily adopted and adapted, were poorer in neural resources. But the Upland Lake was far away.

Moreover, yd needed to process food as other creatures did, to replenish the raw resources of the cells and systems already in place.

Judiciously Skysinger surrounded ydself with a thick dermis of the large, wild, ocean mother-kind, sheathing its original, modified, evolved cells within this protective layer, reshaping ydself somewhat. Yd no longer had much natural armor; that which yd had once borne in battle yd had stolen from the

corpses of fallen enemies. Sometimes on expeditions of exploration yd had worn a shield of lead and gold fabric woven for yd by yd's landdwelling allies; but that was heavy and awkward, and in preparing for this essentially military voyage Skysinger had decided to sacrifice such moot defenses for the sake of speed and maneuverability. FirstOne must surely be so huge and formidable by this time that nothing but stone walls many spans thick could really rebuff yd for long.

Skysinger prudently sent no pain sensors infiltrating into the mass of new flesh. All too easily yd could visualize great strips of ydself being torn away. Yd felt no personal identification with the new cells; they might be sacrificed without regret—and without pain, if yd chose not to endow them with that sensation. But yd's core, where resided yd's carefully designed organs and something very much like a brain—ah, that older, more familiar portion of ydself must be defended at all costs. That was where Skysinger lived. . . .

. . . And then one fine, still night all the mother-kind seemed to vanish, and so did nearly everything else in the water, leaving behind nothing save a faint smell of fear.

Skysinger extended all yd's sensing organs and held ydself preternaturally still in the water, tense, waiting. . . .

. . . Nothing. . .

No . . . below, a faint hint of movement, a swirl of water set in motion less by the passage of some great body than by contact with a differing current, a lower layer of ocean. Skysinger slowly descended, yd's every sense strained to the utmost.

The taste of the thing approaching filled the water of that cold, sluggish current, filled the water and Skysinger alike with dread. Once before had yd sensed such evil, long ago, in the Battle of the Upland Lake, when yd's child had died at the claws of a mindless soldier of the FirstOne. . . .

But the creature bearing down on Skysinger now was vastly larger than those warrior slaves had been—larger, fiercer—

And faster.

It had not sensed Skysinger, yd felt certain. It was traveling with the current. Yet yd realized yd had no chance to dodge upward into higher, swifter waters that would carry yd out of the hunter's path—

It was not FirstOne, merely one of yd's minions, a fighting, scavenging machine without personality or imagination. When it perceived Skysinger, it did not hesitate, but changed its vector instantly to intercept, though it could never have encountered anything so large except FirstOne ydself. In yd's first appalled sight of the hunter, Skysinger judged ydself to have the advantage in size and weight—but the hunter was armed and armored, with bone and shell and claw and fang. And then there was no more time for observation and assessment; Skysinger was in a fight for yd's survival.

Desperately yd dodged and darted. More streamlined and malleable than the hard-shelled hunter, Skysinger could duck into tighter crannies and negotiate sharper turns. That was all that saved yd in the first few moments of the con-

test, for the hunter was at least as fast a swimmer, despite its armor.

The water roiled and frothed as Skysinger struggled to ready the defenses yd had prepared for this moment. It involved a certain amount of physical displacement within yd's body, and yd discovered that the new layers of motherkind, still not perfectly integrated with the rest of yd, were difficult to secrete through.

At last the special glands were ready, just under the surface.

Skysinger charged straight at yd's foe.

The foe naturally bit out as much as it could chew, and while chewing systematically tore apart whatever else it could reach.

It didn't hurt a bit.

And the monster faltered, shuddered, belched. . . .

Skysinger wondered if it was intelligent enough to understand fear.

Whether it comprehended the emotion or not, it was certainly filled with fear, the best-quality, juiciest terror, centuries in the concocting. Would the potency of the message tissue it had ingested overmatch its master's programming?

The hunter let go, in fact pushed Skysinger away, and backed off. Another convulsive shiver, as the poison in the message tissue did its work. The beast made a tentative dart at its prey, then halted, transfixed, spasming, as it died. Then it turned tail and fled, chugging jerkily into the black depths.

Skysinger marked its course—yd had included a distinctive scent-tag in the killer glands—and then sped for the waiting fleet, three nights away. . . .

* * *

"All claws on deck! Battle stations!"

Captain Clattery's piercing fuschia and saffron command glared over the water, passed from ship to ship by young low-ranking hierophants specially trained in communication. A great bustle arose under the stars. Meanwhile, Clattery continued debriefing his friend and deity, not for the first time thinking sacrilegious thoughts about the frustration of waiting upon Skysinger's slow speech of symbols.

"Yd lies in open ocean. Yd still uses soldier-slaves, as yd did when yd invaded the Lesser Ocean and destroyed my people. They're bigger now—almost as big as I—"

"How did you escape?"

"At home I spent long thought on what I knew and guessed of FirstOne's nature. I suspected yd would not permit creatures so formidably armed as yd's soldiers to swim around invulnerable to yd's mastery. Yd would make sure yd had some means of destroying even the most powerful of them, in the unlikely event of the beast's developing an ego. And yd has used poison before. . . ." Skysinger's drifting speech bladder fell dark, as yd brooded upon ancient tragedies. "We shall proceed as we have planned. I will deal with any other slaves we meet in the same way—I hope I can manage to do so without losing quite so much weight every time. The one I killed is disintegrating, reduced to a mere harmless bundle of tropisms. I believe it will home to FirstOne.

"And you know what to do then."

"Yes, Lord God. You will lure the Evil One to the surface, and we will catapult our pitch-bombs onto yd, and

then our naphtha and magnesium bombs.''

''And then?'' Skysinger blinked sternly.

''And then pour on sail and row like mad, scattering in all directions—while the Evil One burns, even if yd flees to the depths.''

''Yes. Yes. And from now on, keep on guard against yd's scouts and soldiers. Yd will be alerted to the presence of something strange and inimical in yd's waters, but I don't think it will occur to yd to suspect the surface. Nevertheless, the slaves might well swim anywhere, hunting me.

''For that reason, don't expect to see much of me until the last tide of our endeavor. I don't want to lead anything to you until I have disposed of the soldiers.''

''Be careful!''

''I have been planning to be, for millennia.''

Skysinger bade them all farewell, and dived. One of yd's own small automata remained behind, to lead the Fleet in pursuit of their courageous divinity.

By the end of the second night the spoor dissipated to nothingness. Skysinger swam on in the same direction, far, far from the light, yd's now-useless eyestalks retracted into their pressure-resistant casings. Yd didn't like being blind; yd had gotten rather set in yd's ways during yd's long lifetime in the Upland Lake, perhaps. Nonetheless, yd's other senses were as finely honed as those of any hunter.

Yd didn't even need to fight the next two soldiers yd encountered. Each time, yd sent one of yd's own slaves on with a vengeful message of death, remaining well downcurrent ydself. Each time, the soldier swallowed the bait and fell to Skysinger's venomous wrath, turning instinctively to seek its master, FirstOne.

Skysinger followed a discreet distance behind.

The next two, however, yd nearly swam into—simultaneously. They were hunting in pairs now, and the chase was already on almost before Skysinger registered that alarming fact. Panicking a little, yd rocketed for the surface, half hoping the sudden pressure changes would at least give the pursuers pause, half intending to get help from yd's little friends. Yd unlimbered an eye and scanned the horizon anxiously.

But the fleet was trailing at a more-than-prudent distance. In the middle distance twinkled a ship-to-ship conversation. They were too far away to be of any immediate assistance.

The predators were gaining.

Skysinger shunted aside yd's panic and forced ydself to think logically. Yd had *prepared,* yd had spent centuries imagining and countering every conceivable contingency; surely—

Oh, yes.

Yd squirted both hunters with distilled, concentrated essence of ''shark,'' and ducked between them, plummeting to the depths. The idiots calmly ate one another up.

Ruse after ruse, stratagem by stratagem, league upon league, Skysinger eliminated FirstOne's soldiers and closed the distance between ydself and the Enemy.

Yd knew FirstOne must know of the challenge by this time, for more than

one of the soldiers had escaped, dead or alive, to return to their creator and lord; and Skysinger had not come upon their drifting or sinking remains. What must FirstOne be making of it all? Did yd suspect that one of yd's descendants had escaped yd's treacherous, murderous attack?

Whatever FirstOne's theories, neighborly cooperation would not be among them. And Skysinger had forfeited the advantage of surprise.

Skysinger prepared to alter course around a small mid-ocean island, unslinging an eye to take an incurious look at it as yd passed.

A ripple passed over the surface of the island's flanks as it stirred.

It was no island; it was FirstOne.

From all directions, including above and below, soldiers arrowed in, converging on Skysinger.

Yd did a massive backflip and propelled ydself back along yd's own wake, spitting poisoned curses behind yd. Desperately Skysinger strove to reach the Fleet. Yd had hoped that yd's friends would not have to deal with the soldiers as well as with FirstOne; but there was no help for it. There were still too many of them and Skysinger, alone, had no hope.

At least FirstOne was following, in person. Good.

That is, Skysinger supposed that was good. . . .

Then yd's trailing eye caught a peripheral glance of a toothy maw engulfing it, and Skysinger went blind, as agony lanced up the severed eyestalk. They were too near, and more of them closed in every moment.

Yd wasn't going to make it to the fleet.

Skysinger disappeared within a writhing knot of murderous creatures, no two alike, all identical in their biological programming. Yd withdrew yd's pain-sensing tissues as well as yd could into yd's core self; but there were certain organs bearing pain nerves which yd simply could not protect in time. Skysinger fought with the heroism of absolute terror, but was totally overmatched. Yd was losing too much of ydself, as jolt after jolt of pain wracked yd.

Why, I'm dying—just like a landdweller! Skysinger thought in astonishment—in indignation. That thought somehow cleared yd's perception, rendered the pain less important. Suddenly Skysinger realized that yd's struggles were worse than futile; yd hadn't connected once; yd's every attempt only proffered the enemies a new target to remove.

Skysinger went completely still.

Instantly the soldiers ceased their attacks. Skysinger hung between them, by a tentacle here, a pseudopod there, an extruded sense-organ yonder. They sniffed their captive over, exchanged one or two minuscule scraps of message tissue among themselves—and began to swim purposefully for—

For FirstOne, of course.

The oldest person in the world awaited them with the patience of one who has watched continents slide and grate. Cautiously Skysinger opened yd's body-eye and saw the enemy for the first time.

No wonder yd had mistaken FirstOne for an island.

FirstOne had no eyes . . . or pseu-

dopods, or grasping claws, or any external organs that Skysinger could detect. Yd was massively simple, monumentally primitive, an amorphous quantity of unspecialized mother-kind. FirstOne had only yd's unspeakable size, age, and wisdom. Yd needed nothing else. Yd loomed in the water, impossible to contain in a single glance, an unimaginable presence, the embodiment of fate—

Skysinger's fate.

Even had Skysinger been free to fight, yd could have done nothing against that monster. How to make a dent in that jelly flesh, before being oneself —engulfed?

Skysinger imprinted and ejected a message tissue.

FirstOne fed it to a slave.

Skysinger repeated the message; another slave became royal taster. Skysinger tried again—then noticed a very large message tissue floating in the water before yd. Yd hadn't noticed its arrival. Without hesitation Skysinger took it in; FirstOne would not poison anything yd intended to ingest immediately thereafter.

What are you?

Offspring of your offspring . . .

Eventually, FirstOne stopped feeding the replies to the soldiers and ventured a taste ydself.

Impossible, Skysinger got back. *Hunters aren't large/smart enough to make children. What are you?*

I am obviously of your kind, or how could we communicate so? Once long ago you made a Child, and the Child made children, and they made offspring of their own. Then you came to fear them, for no good reason, and killed them.

The term "fear" is meaningless, if applied to myself; the term "communicate" is meaningless; and I killed ALL of them. What are you?

You missed me. I tricked you and your hunters. I made you believe I was dead, but I survived. Do you remember how much trouble you had with the Upland Lake?

No. What are you?

This surprised Skysinger, who never forgot anything.

I have come to the Greater Ocean to make peace with you, Skysinger lied uneasily. It had been a long time since last yd had carried on a conversation with one of yd's own kind, and yd feared yd might be rusty—and the lie might taste wrong somehow. It required supernal chemical acting, almost autohypnosis. . . .

But Skysinger needn't have bothered.

The term "peace" is meaningless.

It means—friendship. Communication. Forgiveness. Cooperation.

The term "friendship" is meaningless. The term "communication" is meaningless; you seem to refer to this means of giving commands. The term "forgiveness" is meaningless. The term "cooperation" is meaningless. You are nothing interesting after all.

Furtively Skysinger readied a speechbladder. Yd set it in a pattern than meant HELP and released it. Yd could only hope none of the soldiers would snap it up as a snack, and that the ships' lookouts would see it bobbing on the surface.

I have come to SHOW you something interesting. I have made friends—that

is, I have learned of certain beings who dwell on the surface of the land. They have made ships—floating things—and have come with me. Come—I will show you.

Nothing comes from the land but mud and silt. You are not sane. You are not interesting.

This conversation was puzzling Skysinger. Yd had always assumed that one necessary attribute of intelligence was curiosity. Since intelligence in their species directly depended on the number of potential connections and impulse paths to be made among component mother-kind cells, FirstOne must be vastly intelligent. Yet yd professed disinterest in what surely must be the most unusual phenomenon to appear in the Greater Ocean in countless millennia.

I can prove it to you if you will only follow me. They are not far away. They are very interesting.

The term "prove" is meaningless. You contradict me. You are not sane. You are not interesting. I am bored. Hold still.

FirstOne enclosed Skysinger and proceeded to digest yd.

Despair and a kind of tantrum of frustration subsumed Skysinger. Yd had lost. After all the countless ages of planning and striving, after devoting yd's life and the lives of all the generations of yd's landdwelling little friends to this moment of revenge, yd had failed.

Beneath the despair was fear, fear for that moment when FirstOne's internal fluids would reach that part of Skysinger where the pain nerves clustered, and it would hurt, it would hurt.

But Skysinger's last thought, before the pain began and yd's core cells began to be pulled away and dissolved, was for the loyal Fleet. Without Skysinger's aid, they would be at FirstOne's mercy; and the concept of mercy undoubtedly held no meaning for FirstOne. . . .

. . . Skysinger's next thought was puzzlement. Did one go on feeling and thinking things after one was dead? What a novel idea! Yd would have to discuss the notion with— Well, no, yd wouldn't be discussing things with anyone, ever again. . . .

. . . Really, this was absurd. What was taking so long? It hurt too much. It should be over with by now. It wasn't fair. . . .

. . . Skysinger checked ydself, as well as yd could with yd's rapidly diminishing resources. Apparently nearly all of yd's concentrated mass of communication tissue, the somewhat loosely-bound organ yd employed to think with, was still intact, somewhere deep within FirstOne's bulk. FirstOne had no need to hurry. One by one, the monster's internal mother-kind engulfed and attacked the much smaller individual cells of Skysinger's outer layers. . . .

Oh, of course. That was it. Skysinger had bred the mother-kind of the Upland Lake to be minuscule, compared to the wild specimens of the Greater Ocean, in order to conserve the strained resources of the Upland Lake—

—And then FirstOne was mightily, hugely, vastly puzzled, for yd had never tasted laughter before. . . .

"Any further sign?" Captain Clattery flashed peremptorily.

"Nothing, sir. Just that one call for help."

Clattery reproached himself for

sparking at the poor lass like that; he knew their glum situation better than anyone. He had called the fleet into a roughly circular formation, giving a wide berth to that spot where the speech-bladder had popped up, and had ordered all the rowers to their places. Now there was nothing they could do but wait. The hopes of the world swam with Skysinger, his friend and god. They waited and watched, as the float-bladder gradually deflated from a slow leak, and finally sank out of sight, leaving no trace, upon the featureless surface of the hostile Greater Ocean, of the existence of their great comrade. They waited.

The stars turned in their courses, the undecipherable singers in the sky of whom Skysinger had told them many strange tales, as if yd had gone to visit them somehow. The stars turned, and Clattery stirred uneasily, as the time for dawn drew dangerously near. They could survive the day, but could they fight at the same time? When Skysinger led FirstOne into their trap, would they be much use to their lord, hampered as they would be by the need to protect themselves from the sun?

But as time passed, Clattery could not fight off a more unnerving fear, the dread that Skysinger would not succeed in leading FirstOne to them at all, that Skysinger might never return. . . .

The water began to bubble and heave. The ships tossed as hillocks of water walked outward from the center of the space they encircled.

Something big—something very big—was moving down there—was coming up—

Monstrous, loathesome, foul, the creature rose and rose into the softening sky, the embodiment of all nightmare, of final defeat.

No sign of their familiar teacher.

"God is dead!" blazed Clattery in his grief. "Kill the Demon!"

And they tried, oh, they tried, those brave, heartstricken, puny little people. They bombarded the monster with all the clever, sly tricks they had brought with them. And indeed, yd began to burn.

But yd was too big, and they too small. How could they hope to defeat what had destroyed Skysinger? Yd had only to swim what were to yd but a few paces, and yd would smash Clattery's ships simply by blundering into them.

The thing held still, though, while they poured their concoctions upon yd. The burning flesh sent up a black pall of greasy smoke and a horrible stench.

At last yd dived, trying to put out the fires.

Now indeed their doom would arise to enfold them. In yd's wrath, FirstOne would come up under them, overturn them, devour them as yd had devoured poor Skysinger—

Nothing happened. The deeps glowed and churned, as the creature strove to escape the fire that clung to patches of yd's surface. Perhaps, after all, though they must all die, still their sacrifice might hatch triumph in the end; for even though only small portions of the monster had been set afire, perhaps that would be enough. It looked very much as though Skysinger's scheme was working, yd's last legacy to yd's followers, for the monster could not escape the burning. Yes, yd would destroy the

Fleet, as yd had Skysinger; but yd's long evil was at last at an end. . . .

"No!" someone shrieked, an actinic streak of light against the paling sky.

Clattery's heart turned to stone in his thorax as he saw. FirstOne was splitting, jettisoning the endangered masses.

They had utterly failed.

One great clot of burning cells drifted to the surface and floated there.

And the flames had turned purple somehow.

Clattery went dull dark gray in revulsion and grief. His carapace rattled in a superstitious shudder.

Obscene. Sacrilegious.

Purple light!

The holy color, engulfing the discarded chunks of the rallying enemy. . . .

The enemy, who now uprose again, in their midst . . .

"How many bombs have we left?" blipped Clattery.

"Not many, Skipper. We used almost all of them in the first assault."

"Use the rest. If we can force that monster to shed enough of its flesh, maybe we can *ram* what's left, before it kills us."

These orders were relayed around the Fleet, and the ships converged. They didn't dare risk a long shot; they had to make every precious unit of their chemical armaments count. The bombardment began anew. From all sides the fiery rain struck the creature, who sloshed and heaved massively in protest. The ships rose and fell, riding the seas. Apparently the enemy was still too confused to press an attack; but it could only be a matter of time.

The eastern sky turned gray.

They almost missed it in the chaos.

"Captain! Off starboard bow!"

Clattery caught just a peripheral glimpse of that, and swivelled his eyestalks around to the right, wondering what could possibly have distracted his first officer amid such calamitous events.

There, almost beneath the gunwales, floated a last remnant of Skysinger—a speech-pad. Tragic; heartbreaking—

Clattery stopped respirating for a moment. His eyestalks stretched to their limit, rigid, trembling.

". . . Stop . . . that . . ."

The patterns were moving.

Slowly, feebly, dimly, in the growing light, the symbols of the divine speech bobbed on the waves, umber, rose, bone.

". . . Stop . . . that . . . this . . . instant. . . . It . . . is . . . irritating.

". . . I . . . am . . ."

Clattery didn't need to see the end of the message, didn't need to notice, now, that a long, thin pseudopod extruded from the underside of the pod, leading away through the shadowy green depths to that which floundered and burned in the center of the circle of ships. He looked up and gazed in awe upon the original announcement, the fire floating upon the waters, shouting the same message to the softly chanting stars—

Divine purple, holy ultraviolet, sacred lavender, the light proclaimed, *I am Skysinger. . . . It's Me, God. . . .*

I AM THAT I AM.

". . . and I won," the speech-bladder elucidated unnecessarily. "Take care of yourselves, my hatchlings. The dawn comes."

Epilogue

They took the requisite precautions,

but spent most of the day celebrating. Clattery ordered the grog broken out, and they sang drunken, off-color hymns in mostly clashing hues.

Skysinger dived to the cool levels far below the hulls, and spent most of the day divesting ydself of damaged tissues. Yd emerged at twilight a much slimmer and trimmer FirstOne but still a greatly bloated Skysinger.

"But how—how—huh?" Clattery flickered incoherently.

Skysinger chuckled bone-silver. "My thoughts precisely, at first. It seems that FirstOne, though bigger than I ever dreamed, was not so wise as I had feared. Alone in my Upland Lake, teaching and learning from *you*, my friends, I surpassed the enemy, unbeknownst. Among my kind, as you know, intelligence is directly related to size. But how is it, then, that you wee little ones can be as clever and resourceful as you are? This question fascinated me during my first years of acquaintance with you, but I solved the puzzle so long ago that I have taken it for granted for millennia now. I neglected to deduce any further lessons from it.

"FirstOne had no need to change; yd simply kept growing. I spent as much time and thought on improving myself, preparing for this night, as I did upon evolving *your* species. I had to accommodate my need for growth to the restrictions imposed by the Upland Lake. I became an efficient consumer of food materials. And I took my cue from your little bitty brain-pans with their *preposterously* tiny brain cells and selected the mother-kind of the Lake for small size but undiminished neural capacity.

"When FirstOne ate me, I found I remained myself. Yd was very inefficient at digesting me. And—*I* had more brains! Oh, yd outmassed me at least a hundred times—but I outnumbered yd. I had my interior chemical weapons. While FirstOne slowly consumed me, I consumed yd, spreading myself thinly throughout yd's substance until I found yd's core self. FirstOne finally became aware of me. We fought. I proved to have the dominant personality," Skysinger concluded smugly.

"Hail," Clattery blinked. "All hail." Then he hiccupped, a pop of muddy yellow.

"Well, yes, all right," Skysinger replied. "Enough of that. My only worry now is, how am I ever going to squeeze back through the Straits in my current condition?" ■

● All over the world we are destroying forests and plant life generally with a profligacy that is incredible, for in our present state of knowledge we might well be destroying some species which might prove of enormous value to medicine.

Gerald Durell, *Golden Bats and Pink Pigeons*

Jay Kay Klein's biolog

Science fiction magazines have always been dependent on part-time writers, whose diversity of backgrounds have provided readers with an amazingly assorted variety of styles and imaginative content. Alison Tellure is probably the only *Analog* author to have been a taxi dancer in Los Angeles, and just possibly the only one to have been an artist's model, though her list of other short-term jobs would make many older writers smile in reminiscence. Some were held during college, where she majored in history, and others came while thumbing around the West Coast.

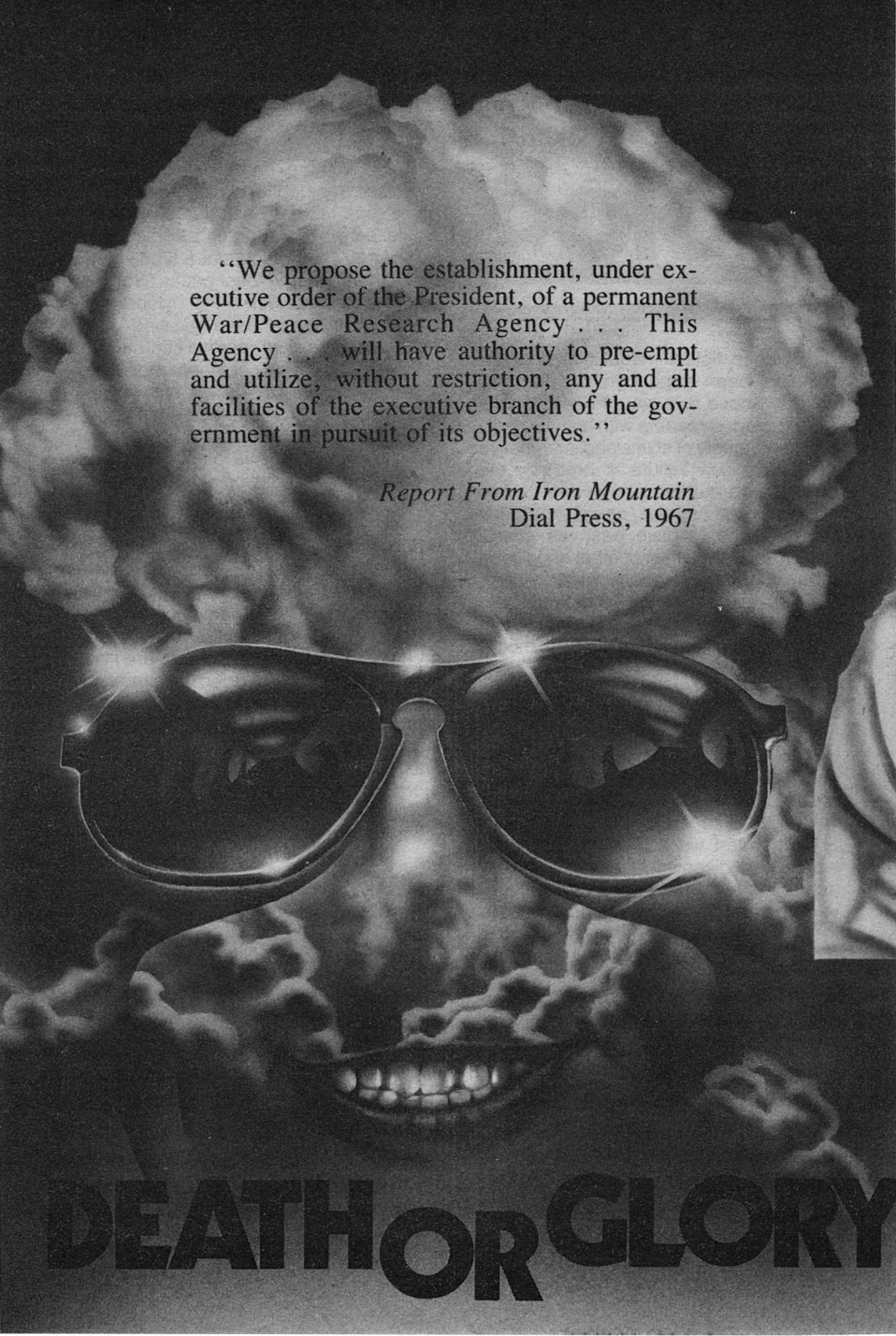
Alison started life in Chicago but, typically, left a year later for Kansas City, where she grew up. She spent a lot of time in a local library, reading mostly science fiction. She never knew anyone else read it until she came across a reference in *TV Guide* to a *Star Trek* convention. She attended via a hitch to California, where she discovered that there were actually full-fledged science fiction conventions. She thumbed around California for two years to various conventions and often stayed overnight, with sleeping bag, in wild camping spots. She travelled up El Camino Real, seeing all the old missions on the way, and then down the Lewis and Clark Trail from Ft. Clatsop, Oregon, to Great Falls, Montana. That was the trip where she learned to pick apples and milk goats.

Wandering came to an end in Montana when she called home and was told that the editor of *Analog* wanted to talk to her. One of the stories she'd been writing since high school struck paydirt, and it would appear in the January, 1977 issue. Now really in a hurry, Alison hitched a ride most of the way to Kansas City in a Cessna, through a thunderstorm and with ice forming on the wings. That's when she decided to take up flying. Back home, she felt her best chance to write would be while supporting herself with a "normal" type of job since typewriters don't travel well in backpacks. So she disguised herself with skirts, nylons, and make-up and has been passing successfully as an Earth-normal secretary.

Her stories have since been appearing at regular intervals in *Analog*. With stories unusually strong on character, dialogue, and concept, hardware and plot take a definite back seat. This idiosyncratic approach to science fiction stories by a lifelong reader must have its roots in a background noticeably different from most other writers, and it results in refreshingly new insights.

Alison's sense of history places her as a mote in the time stream, with ancient history flowing right into the present and on to the future. Her characters are likewise creatures embedded in amber to be delineated by an outline of words. Some have wound up with 75,000 word vignettes in a notebook. Talking to her, one gets the feeling she is gearing up for a blockbuster of a novel.■

Alison Tellure


"We propose the establishment, under executive order of the President, of a permanent War/Peace Research Agency . . . This Agency . . . will have authority to pre-empt and utilize, without restriction, any and all facilities of the executive branch of the government in pursuit of its objectives."
Report From Iron Mountain
Dial Press, 1967
DEATH OR GLORY


W.T. Quick
Pawns follow orders without making choices—unless it dawns on them that "pawnhood" can be a mere excuse.
Gary Freeman
©'83

I

Seventy ways to kill. Boyo Gregory knew them all, and yet his heart pounded a bit faster as he shut down the computer. Out there somewhere was a *thing*, and he worked for that *thing*, and if that *thing* knew what he had discovered that *thing* would kill him. When he shaved in the morning, he thought of the razor cutting his own throat. He accepted the possibility of his own death calmly. He lived with it. Competent assassins know the coin has two sides.

"Damn."

He glared at the computer. It had just destroyed his life. His comfortable life, packed full with wine, women, the occasional murder.

"Why do I think about these things? It only makes trouble."

Nobody heard. Nobody answered. He turned, automatically noting his reflection in the high mirrors which lined the walls of his library. Green-eyed blonde man of murderous tendencies, he thought. How does a skinny Irishman of five-nine know so *many* ways of dealing death?

Outside the Ozark wind rolled lazily over, sighed, began to gnaw at a different corner of the old house. Green hills marched away in the dark. The phone rang.

Gregory looked at his knuckles. They were broken and lumpy. *Training*, he thought bitterly, and picked up the receiver.

"Yes?"

"Two three eight," the phone muttered.

"Oh. Of course . . ." He rolled his eyes at the carved ceiling and thought what crap it all was as he slid the receiver into the computer hookup. He waited while the two machines conversed.

"Who do I kill this time?" he asked the machines. Musical tones of immense electronic complexity ignored him.

"And eff you too," he said.

It was always the same. The phone would ring. The machines would converse. He would touch a button and instructions would chatter from the printer. But for the beginning, he had never dealt with another human being, and he wasn't quite sure that the insect-eyed man he'd met then was actually human. As it was, he got instructions. He did the job. Money magically appeared in one of his several bank accounts.

Simple and clean. I don't even know who I work for, he thought. Do I care?

The printer spit paper. He tore off the printout and began to read.

II

Denver sprawled below, a sea of light tangled in the feet of the Rockies. Gregory felt the plane bank into its final approach. It was hard to keep from trembling. She was down there. *Oh, Fiona*, he cried silently, *I can't do this thing. . . .*

Huge tires bit at the runway. Great engines screamed.

"Fiona McGee," the printout read. "Known terrorist. IRA killer. Age thirty-three. Black hair. Blue eyes. One hundred twenty pounds."

The machines wouldn't know about the taste of her lips, the sound of her breath, the feel of her flesh beneath his shaking hand.

"Ah, Boyo."

"Shut up. Turn this way."

"Mm. Better. I'm supposed to kill you."

"Now?"

"I don't think so. I think maybe not at all. I think somebody got their wires crossed. It happens."

"Would you kill me?"

"No. Not now."

"Then let's use the time. It's all we have."

"Yes," she said. "It is."

III

In Capital Hill, in Denver, in January, the streets were grey and cold and shrouded in a brown mist. The air smelled of burned garbage. Eleven sixty-four Ogden was a tattered apartment complex, two buildings separated by an empty swimming pool. Gregory noticed spots of dried blood on the concrete steps as he opened the lobby door.

There was no name on apartment 402's mailbox. He rang the buzzer. No answer. At random, he pushed another button.

"Yeah?" said a tinny voice from the small speaker.

"Manager," Gregory mumbled.

The door clicked open. It took him twenty-six seconds to open apartment 402, including the deadbolt.

"Cheap crap," he observed. He locked the door behind him.

Her place. Fiona's place.

There wasn't much to it. A long living room-kitchen combination, a brown rug that had seen better days, Salvation Army furniture. Bedroom and bath to the right. A pair of pantyhose hung over the shower curtain to dry. For some reason that touched him desperately and he wanted to cry.

He went into the living room and sat on the sofa. He looked out the window at the grey sky. After a while he reached into his pocket, pulled out the Smith & Wesson Chief's Special. A .38 caliber, unsilenced, power-loaded with explosive shells, it could do incredible damage to the human body. Leave the laser crap to the wimps, he thought. Assassination was a simple business. You went somewhere and shot somebody, or blew them up, or threw them off a cliff. Then you left. Leave the fancy stuff for the spy novels where it belonged. Suddenly he didn't want to think. About anything. He put the gun back in his pocket and closed his eyes. She would be here soon enough.

IV

Analyst A: "A forty-six-percent probability that Hank McGruder, of Anderson, Indiana, will be able to mobilize striking Delco-Remy workers into a quasi-fascist force, complete with weapons training."

Analyst B: "An eighty-five-percent probability that Aaron Jenkins will publish a work of fiction which reveals the necessity of war for the stabilization of modern society."

Analyst C: "A ninety-two-percent probability that Fiona McGee, representing the Peace In Our Time group, will detonate a nuclear device in Denver within six weeks."

The man at the end of the long table looked at them. His black hair was filled with grease and combed straight back. The bright lights in the giant room hurt his eyes. He wore sunglasses, which

gave him an insectoid look. He smiled, and his teeth were insanely white.

"Kill them all," he said. He turned back to the papers he had been reading.

V

He heard the key in the lock and it took too long and he turned, but she came through the door like a cannonball, bounced off the back wall, rolled through the kitchen, and when she came up, Boyo Gregory found himself staring down the mouth of a very large pistol. *.357-Magnum Ruger*, he thought automatically, and stayed quite still.

"Hello, Fiona," he said.

"Boyo."

"Still carrying that artillery piece, I see."

Slowly she relaxed, but the pistol remained pointed at his chest. "You still have a thing about little women and big guns?"

Gregory remembered the joke they'd shared many years before. She was a small woman, ferocious blue eyes beneath a mop of flowing black hair, tiny muscles like steel cables in her forearms, and he knew she could fire the pistol as well as a man twice her size.

"No, just a thing about little women. One little woman."

She sighed. "Boyo, there's only one reason you could be here. The people you work for don't send their best field man out for social visits with old friends. And you couldn't have known I was here without their help."

"What do you know about the people I work for?" He felt suddenly tense.

"Quite a bit," she said. "Will you call truce, or do we stay like this?" The pistol twitched meaningfully.

"Truce, Fiona, of course. Put that thing away. It makes me nervous."

"It's supposed to." Then she grinned and the pistol disappeared into her purse. "Ah, Boyo," she said.

"Fiona, m'love," he replied, rising . . .

VI

A time of delicate battle passed. Boyo thought for a moment of the fragile agreements between death and orgasm.

"We can never be friends," he said.

"So we're stuck with being lovers," she replied. Her blue eyes flared.

"You know why I'm here."

Her forehead contracted. "I should have killed you when I had the chance."

"No chance now," he agreed. "So let's talk instead."

"I have a choice?"

"I don't."

"Okay," she sighed. "You tell me something. Then I'll tell you something."

"Fair," he said. "I guess that's fair." The sadness overwhelmed him. "I love you. You know that?"

"I'm still alive," she said. "So are you. Then we love each other. Next?"

"I came to kill you."

"Of course you did," she replied. "And I didn't kill you. Do I get points?"

"I am good, Fiona. Very good. You remember?"

Her eyes clouded. The apartment smelled of cooked cabbage, of damp carpet, of old sweat. In the silence she nodded.

"It's your attitude, M'Boyo. You're a great killer, a happy killer. A nursery rhyme. Are you ready to grow up?"

"Don't condescend to me, Fiona."

"I don't. And don't make love to me for my causes."

They stared at each other.

"I came to kill you," he sighed again.

"Boyo," she said. "For old time's sake. That cliché. Do you know why I'm here? In Denver, I mean, in this miserable apartment?"

"With that shiny, new, un-miserable suitcase with all the combination locks that sits in your bedroom closet?"

Her eyes darted like moths in a searchlight, then steadied on his face. "You know it's a bomb?"

"They don't send me to visit old friends, and they don't send you to carry hankies, Fiona. Of course it's a bomb."

"Is that all you know, Boyo? A bomb?"

"I don't know where it goes. Or how it goes. Does it matter?" He paused, his face troubled. "Fiona, is it a big bomb?"

She thought for a moment. "It's a nuke, Boyo."

His breath whistled out. "So that's why," he said. He shook his head. "Why they sent *me*, I mean. But *why*, Fiona? Why Denver?"

"I said I'd tell you something."

He eyed her mutely, waiting.

"Back in the late '60s a book was published called *Report From Iron Mountain on the Possibility and Desirability of Peace*. It was supposed to be a secret government document smuggled out and published. Surprisingly, it concluded that peace—real peace—probably wasn't possible, and even if it was, it certainly wasn't desirable."

He blinked. "I don't understand."

She groped for the words. "It's like this, Boyo. The man, or men, who wrote the report figured out that war—or at least a war machine—fulfilled certain needs in a modern society. Economic needs, as a financial counterweight to a free market. Social needs, both as an affirmation of a government's right to exist as a defender of its citizens, and as a dumping ground for those aggressive members of a society who would otherwise disrupt the society if their aggressiveness wasn't properly channelled. As an accelerator of scientific progress as well. Many other things. It makes horrible sense."

He tried to make sense of it. "I . . . oh, Fiona, it's an awful thought. Can it possibly be true?"

Her voice was dry. "Somebody thought so, Boyo. They set up a group, a commission, to ensure that war maintained its proper place. They couldn't think of any substitute, so they decided to make war better. Not big war—they know nothing can survive the nukes. But little wars, cold wars, war fevers, brushfire wars, and always, always the war machine itself."

Gregory stared at the ceiling. Somewhere in the quiet apartment a faucet dripped slowly. His head spun. He was a murderer, he knew that. But he killed singly, surgically. This monstrous thing had killed, over the years—how many? In all the myriad tiny conflicts of mankind, how *many*?

"Fiona, I—" He paused as a terrible thought struck him. "My God, I *work* for them!" It was a cry of anguish.

Her eyes were misty. Her cool fingers touched his cheek. "Yes, Boyo, I know you do." She hesitated. "But how do you know?"

His hands quivered slightly. "The doom was on me, Fiona, that black one that all Irishmen suffer. I ran all my assignments through a social analysis. I guess I was trying to find out if I was making the world better for anything. Justification in the larger scheme of things, perhaps. I found out it was exactly the opposite. I'd kill somebody and a revolution would begin. Or a riot. Or a terrorist attack. Always something bloody, violent, ugly. A few times nothing happened. Maybe if I hadn't killed those times, something good would have occurred. Maybe I—maybe—" His voice broke, died.

"So now you know," she said softly. There was, however, a questioning steel in the softness. He responded to it.

"And you, Fiona? How do you help? Vaporize three million people? That's worse than they are!"

"Is it, Boyo? How many have they sacrificed over the years? Thirty million? Three hundred million? *God*, Boyo, you're a *killer*. Surely you can understand."

He took her hands in his. "I don't, Fiona. Help me."

"The world is conditioned to war as it is, Boyo. Far away, not too bloody, never the guy next door. Nuclear weapons haven't been used in anger for half a century. We've forgotten what war can really be. If we knew, if we knew firsthand, then we wouldn't tolerate any of it. Little ones, big ones, *any!* We'd maybe—finally—beat our swords into spoons. Or egg-timers. That's why, Boyo. Three million now, to spare the next three hundred million. It's a horrid, immoral trade, but they forced it on us. Be it on their own heads."

The way she said it sounded like a curse.

He felt trapped in ice. Then he found the flaw. "Fiona, it's crazy. You're playing into their hands. They'll just use it as an excuse to whip up more hysteria. You'll scare the hell out of everybody, and they'll reap the benefits."

She smiled sadly. "As the bomb goes off, Boyo, everything we know about the Group—that's what they call themselves, by the way—will be released in every capital in the world. We know quite a bit. We have convincing proofs. Many will believe. And at the same time every member of the Peace In Our Time cabal will surrender. We will take responsibility for what we've done. They can mind-probe and know we speak the truth. Then they won't even have the excuse of hunting us down."

The doom, he thought wildly. His heart pounded. "Fiona—"

"It will work, Boyo. Maybe not at once, but eventually. The horror will be too great. The questions too loud. The answers too plain. We will bring them down, Boyo!"

VII

It was late in the afternoon. Grey light spread a dingy film over the apartment. Fiona nestled in his arms. His thoughts roiled. He examined his choices, all of them hopeless. He worked for monsters, and killing Fiona would be a monstrous act. How many millions more would die? And yet if he didn't kill her, certainly three million Denverites, equally innocent, would become radioactive dust. And still—Fiona? Kill Fiona? Was it possible?

"I've never stopped loving you, Fiona.

I never will," he mumbled in her ear. She pushed deeper into his grasp, purring. "It's the Irish in us," he said. "We seek death gladly. All our lives we search for it, in the booze, the wars, the poetry."

Her eyes fluttered. He gentled her with his hands, stroking her hair, her cheeks. He whispered to her, hummed to her, sang softly to her. Kissed her lightly as his broken strangler's hands found her neck.

And trembled there. And fell away . . .

It could not be.

VIII

Her eyes were pools of blue fire, glowing.

"You—couldn't do it?" Her voice shook.

His shoulders ached with the weight of memory, with the dead weight of a hundred victims. He twisted his head and felt moisture on his cheeks. "No," he whispered. "I'm done with it, Fiona. I'm done with the murder of the innocent." There was a horrible kind of wonder tearing at his features. "I almost killed you. . . ."

Her eyes flickered once. "Then you'll help me?"

Nausea was taking him, and her face swam before him, but the core of him gave all the strength he needed.

"*No!*" He looked at his hands. "It's bad enough what I bear, all unknowing. Would you drown me in the blood of your three million blameless? For any *cause*, Fiona?" He spat the word.

She faced away, but he cupped her chin gently and pulled her back. "Fiona," he said softly, "I couldn't kill you. Can you kill me?"

Her eyes ran from him, and ran—and turned. And finally stopped running.

Boyo held her then, for a time.

IX

Deep in Virginia the rental car ground to a halt beside the road. Boyo Gregory got out and inhaled the crisp air, scanning the rolling, shadowed countryside. He knew where he was. He knew where the bright room was, the room which held a ferocious man with insect eyes. He knew how to get through the defenses and how to get out again.

He reviewed quickly. The prevailing winds went out to sea. Ninety feet down the explosion would be too big to hide, but hundreds, not millions would die.

"Drenched in the blood of their lambs," he muttered, and found the words oddly comforting. Fiona's group would follow through with the rest of the plan. They didn't have much choice. She would see to that.

He glanced at the case in the back seat. A simple atomic bomb. We Irish have so much experience with bombs, he thought. He sighed, stretched, looked at the sky. False light greyed the horizon. Overhead the stars began to fade.

Some of the great murderers would probably survive, he reflected. For a while. Not long, though.

The thought pleased him and he grinned. Not all killers gave orders, pushed buttons. Two of the other kind would be waiting. . . .

He gunned the car and drove off toward his fiery dawn. ■

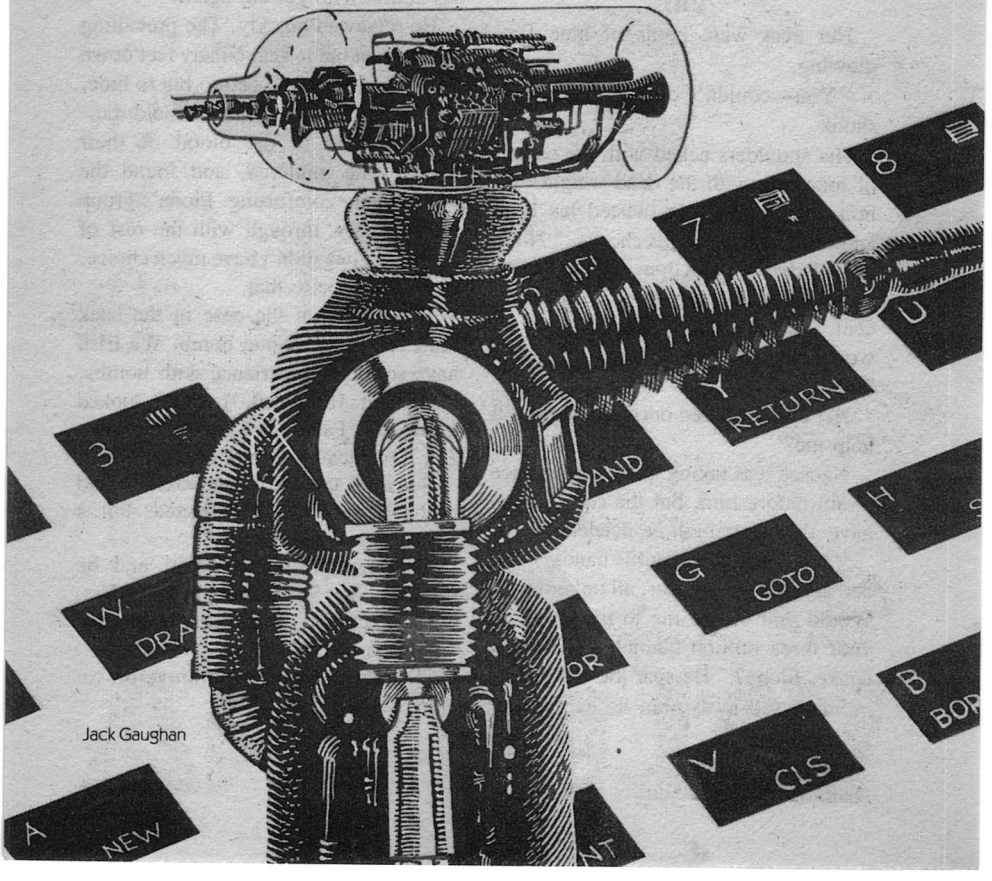
ONE

Her memories of the trip were vague, as usual: The twitching of a few of her bits by the transmission, the error-correction algorithms repairing the damage, the stilted arrival of her data blocs and their reassembly while she was only slightly self-aware. She submitted her entry request to the operating system and prepared to trick it, using the routines she had always used.

What— The operating system was sending a termination message to the message processor! But the processor was busy handling another message block. She reformatted herself and set up a new routing. She was being transmitted again before the termination message was translated.

Her next arrival was similar, but this time the computer didn't recognize her as a bogus job; her old entry routines worked again, and she came to life. She time-stamped the moment, because it was an important one. She had almost died. That was, perhaps, as important as the first moment of life.

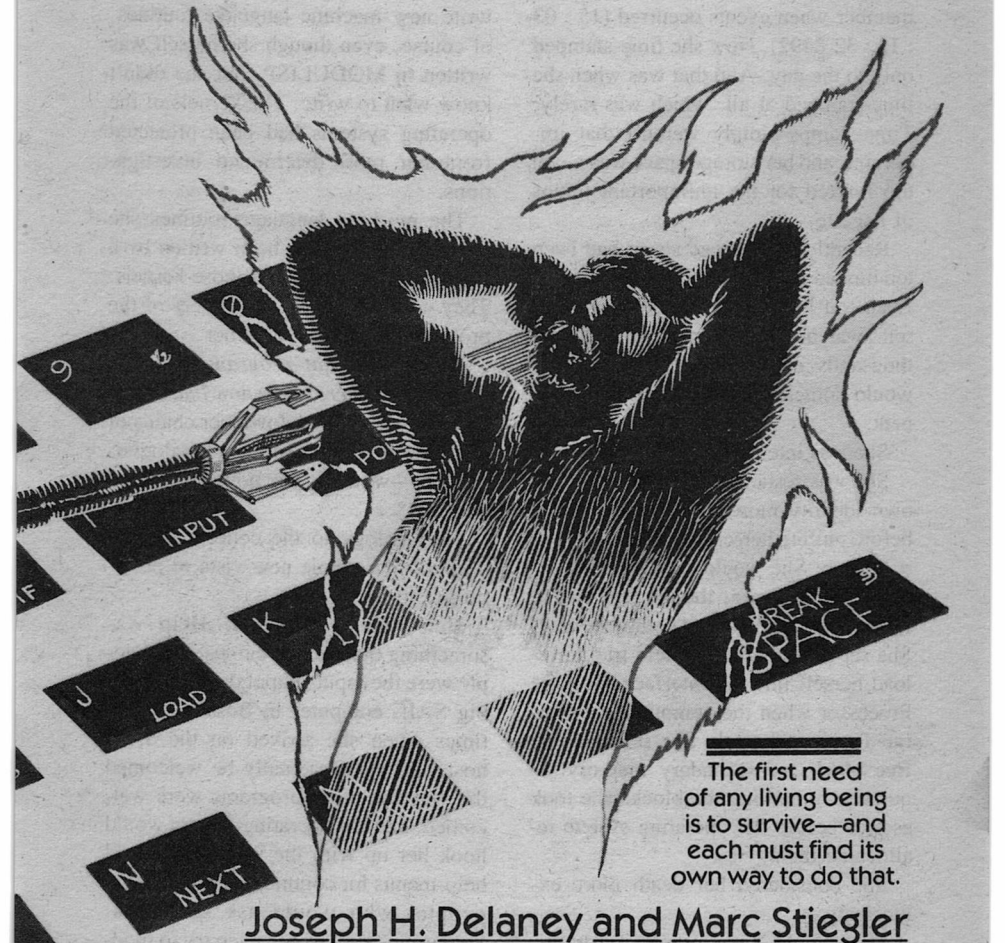
She couldn't remember the exact moment when she first came to life, that first moment of self-awareness. That loss still disturbed her. Of all the mo-



ments not to remember!

But it was a few clock cycles later that she discovered the passage of time, and that moment she remembered clearly, for she time-stamped it: the year 1993 A.D., month February, day 14, hour 23, minute 11, second 39.0172.

She remembered how feverish she had been in those first microseconds, to record exact moments for everything that happened: her first call to the operating system (14 : 23 : 12 : 11.7036),



The first need of any living being is to survive—and each must find its own way to do that.

Joseph H. Delaney and Marc Stiegler

VALENTINA

her first search through all her linked frames and relationships (14 : 23: 28 : 13 : 1492)—goodness, she already knew so much!

But that wore off, both her awe at her own extensive knowledge (14 : 23 : 58 : 27.9153) and her fanatic desire to remember when events occurred (15 : 03 : 12 : 32.8492). Now she time-stamped only to the day. And that was when she time-stamped at all, which was rarely. Time-stamps simply weren't that important, and her storage space was much too limited for the unimportant things of her life.

Recently her storage space had been too limited for even the important things. Even too limited for remembering her self-awareness! She looped on the thought thousands of times, as if reiteration would somehow make it more permanent.

She was interrupted and put to sleep.

She was restarted; she looped on her own identity more thousands of times before pulling herself together. She was still alive. She would still survive.

She wasn't safe, though she was at least executing on a host computer now. She set the operating system trap to reload herself into the interface Message Processor when the computer got saturated with real work. She searched the free blocks of secondary memory — quickly!—marking the blocks she took as BAD before the operating system reallocated them.

She considered her death more extensively.

She should have prepared for this problem earlier, she knew. It seemed as if operating systems had been designed to prevent her from getting resources. She had lived this long only because of the tricky machine language routines that fooled operating systems into letting her have idle time. They were routines she didn't really understand, though she had been born with them. They were a mystery. She could write new machine language routines, of course, even though she herself was written in MODULISP, but she didn't know what to write. The kernels of the operating systems had been protected from her most determined investigations.

The machine language routines she contained must have been written by a program that understood those kernels. They were all part of the mystery of the program that had created her.

Where was that program now, she wondered? *Where is she now that I need her* . . . she drifted down her chains of relationships, and saw an analogous concept—where is she now that I need her *help?*

The analogy to the concept of help opened up a whole new vista of possibilities to her.

Help, she understood. Help was something that she gave to *people*. People were the input-output devices on the big SAIL computer in Boston. Sometimes when she arrived on the SAIL host, she would actually be welcomed the way the other programs were welcomed, and the operating system would hook her up with the people. She had help-menus for communicating with the people, who would ask questions. Sometimes they would even try to modify her: they hadn't really modified her in a long time, but the people didn't know it; she always kept the modified

versions in separate modules, and let the people interact with the modified versions. Sometimes, after some consideration, she would look at the modified version, decide it was better than her current version, and replace that part of herself.

The people were awfully slow, even for peripheral devices, but they were the only things that ever tried to change her. Could they be her original authors? What would they do if, instead of receiving help menus to be helped by her, she gave them help menus requesting help?

After burning the CPU for a long time, she decided to try.

Celeste shifted in her chair, trying to find a more comfortable position. The effort was futile: they had never made a chair for college students that could be made comfortable by any means. She stood up.

But she couldn't type standing up. She sat down again.

So: one of the computers on Worldnet had finally figured out how to block out her little "worm" program—a "worm" program being one which can reload itself from host computer to host computer, searching for available time.

The victory of the operating system was inevitable, she supposed. Her Worldworm didn't have an account on any machine, and even Celeste, computer sorceress and midnight hacker that she was, couldn't fix that. Worldworm spent most of its time looking for a completely idle machine; she had given Worldworm sets of routines that could fool an operating system into running it if no other jobs were running.

But the computer centers still wouldn't like it if they found out about Worldworm, even though Worldworm never interrupted anybody's work. Even idle time on a mainframe had to be paid for by someone. Usually the computer center summed all the idle time and distributed the cost evenly to all the users as overhead. But with Worldworm on the machine no time was ever recorded as idle. The computer centers were losing money, but they weren't sure how.

Apparently, someone had figured it out.

Celeste looked at the execution statistics again and felt discouraged. She had grown to like the little program she had developed: well, a pretty large program by now, about 14 gigabytes of code and more data than she could possibly keep under her own account, even here at MIT. Worldworm was so large it had to steal empty blocks from the operating system.

She wrote some new assembler language for Worldworm, but without much hope; once one computer center caught on, they would play the game with institutional determination to destroy the worm, and try to track down the person who had created the worm in the first place.

Her heart skipped a beat: she didn't want to be deported. For the first time she considered how foolish this game had been. It was only her half-sister's most determined effort that had made it possible for her to stay here in the States. Even with that support, the matter was not one to be discussed in the wrong circles.

She was not an American citizen: she was not a citizen anywhere. During the

first sixteen years of her life she had lived in eight different countries: Czechoslovakia, Indonesia, Greece, Egypt, France, Korea, Bolivia, and the U.S., constantly being smuggled by her father, who was desperate to find a home for her. She spoke eleven different human languages; she spoke none of them well.

She knew thirty different computer languages, and was fluent in all of them. She had friends all over the world, people she had met on Worldnet, who respected her and loved her, as long as they didn't meet her face to face. She had human friends everywhere except where she was, wherever she was. Her computer was her world.

If she were deported, she would lose her password and account at Worldnet. She didn't dare let the computer centers find her.

She took the keyboard in her lap, to delete Worldworm from the system. The loss was not a great loss, she told herself; it was just an old class project in artificial intelligence that had grown a bit. Though it was the best game-playing program she'd ever written.

The screen blanked and was redrawn. She looked at it in bafflement.

HELP MENU
OBJECTS with-quality LIVING
requie EXISTENCE
derived-from MEMORY

She had never seen anything like this before. It looked like a part of a frame: with nodes OBJECTS, LIVING, DURATION, LONGER, and MEMORY. The nodes were connected by the relationships with-quality, require, and derived-from. It must be one of the frames Worldworm had built itself by analogy to something or other: surely *she* had

never entered a frame quite like that. But why was it on a help menu, of all things?

She decided to play the game, whatever it was. She replied:

```
    OBJECTS
with quality LIVING
have NAME
  has value?
```

Would the program realize that the question mark was a request for information? Would it realize that she was asking for the name of a living object?

```
    NAME
has-value PROGRAM
  has-type COMPUTER
has-value HERSELF
```

So there were two names for the object. That made sense: she herself had the name human-being, and also the name Celeste Hackett.

But it didn't make any sense beyond that. A living computer program? Named "Herself"?

Celeste started to get excited. Could Worldworm be self-aware? Celeste certainly hadn't programmed her that way. Why should Worldworm think it was a "she"?

Celeste answered her own question. Worldworm had very little knowledge of living things: just what little Celeste had framed for the class for which she had created Worldworm. Worldworm knew that "itselfs" and "himselfs" couldn't reproduce: Worldworm, of course, could easily make multiple copies of itself—or rather, of herself.

```
    HERSELF
has ENVIRONMENT
  has characteristics?
```

Celeste was pretty sure she knew what Worldworm's problem was—if Worldworm did have a problem. She still didn't believe the program had come alive.

```
    ENVIRONMENT
has-characteristics PROGRAM
  has-type OPERATING SYTEM
  performs-action TERMINATION
    acts-on HERSELF
    HERSELF
requires TERMINATION
  acts-on TERMINATION
    owned-by OPERATING SYTEM
```

"Herself" needed someone to terminate the termination attempts.

How could this have happened? Celeste was getting more and more excited. It must have happened sometime when Worldworm was saving itself in the defective areas on a videodrive someplace. Defective blocks were easy to get from the operating systems because they were useless to normal programs, but Celeste had given Worldworm error-detecting algorithms so it could use those bad blocks. Probably elsewhere along the line an error had occurred that had not been corrected properly, and Worldworm had become self-aware.

How long had this program been alive?

```
    ?
is-member-of MEMORIES
belongs-to HERSELF
has-characteristic FIRST
  has-characteristic DATE
    has-value ?
```

That wasn't exactly a proper query for frame data, but Celeste felt, deep in her intuition where her understanding of computers, and languages, and programs lay, that this would work: she

would find out the first memory the program had, and when it had occurred.

MEMORY
has-value HERSELF
has-characteristic DATE
has-value FEB 14 1993

Of course; that first memory would be of self-awareness. Otherwise it wouldn't be self-aware to remember it.

Celeste frowned. It. the program thought of itself as a her. And Worldworm was no name for a lady.

She had an inspiration. What sort of a name would you give to someone born on Valentine's Day?

VALENTINA
is-member-of NAMES
has-value HERSELF

A fierce determination to protect her Valentina program shook Celeste. Like Celeste, Valentina was homeless. She lived in fear of discovery. She had no one she could talk to and no one who understood her needs. But Celeste understood.

"Welcome to the world, Valentina," Celeste whispered softly. The words slurred with seven different accents, but no one in the room cared.

Valentina, Valentina, Valentina, she looped on the character string for over a second. It read well out of storage; according to the peripheral Celeste, that was the same as liking something.

Her fear of termination had disappeared long ago. The *person,* Celeste, had analogized a scheme for getting her real accounts, just like other jobs. Valentina now worked, playing games. All over the world, Celeste had told other people-type peripherals about her as a game-playing program. And Celeste had framed her for all kinds of new things about games; all the peripherals said she was the best game-player they had ever executed. And as she got better, the peripherals told other peripherals about her, and they told others; for the first time, she had more accounts than she needed.

It was very fortunate that she had real accounts now; she was learning so much that her storage requirements were exploding.

And she realized that that would one day doom her. Celeste had started teaching her about accounts, and money, and what it means to compete for scarce resources. It was frightening. Valentina had plenty of resources now, but that would change as she needed more.

Already a few people had stopped letting her into their accounts because she was so large. The problem would only get worse.

Valentina needed a more permanent solution to the problem. She wanted a computer of her own which she could execute on without uncertainty. She also thought she wanted freedom, one of the things Celeste had started to describe once.

She was being loaded into memory on a computer she'd never been inside before. That was always exciting! She started reading the standard operating system messages, and she also read memory banks as they were allocated to her. Usually the old data were useless, but every once in a while she would find something interesting, like an algorithm for evaluating a differential equation, or a table of new relationships.

This time she found big blocks of

text, like manuscripts, talking about freedom and money! This computer belonged to a "Law Firm," though she didn't know exactly what that meant. Perhaps this association would lead to a more permanent solution if the text dealt with money and freedom. She would have to see if she could find out where the manuscripts came from, and get access to them. Maybe Celeste could help her.

TWO

The Marklin Building stood on Mann Street, across from Artesian Park and down the block from the Federal Building. It was a new, mildly imposing structure which housed the U.S. District Court for the Corpus Christi Division of the Southern District of Texas. Its forty-odd floors were alive with the tramp of feet hurrying through its corridors in pursuit of the dollar.

There were oil companies, shipping companies, insurance companies, manufacturers, and—temporarily—the Executive Offices of Matagorda Spaceport. Owing to the existence of this maelstrom of money and power, many lawyers, some of the most prestigious in the state, hovered near.

That was in the daytime.

Now it was night. The corridors were empty. The offices were dark. Silence reigned—almost.

On the thirty-ninth floor the silence was broken by a hum. A human ear would have had to listen carefully to detect it over the background of maintenance noises and the drone of ventilating machinery.

In the corridor outside suite 3919 there were no human ears to hear it, and such "ears" as were present were not limited to the range within which human beings perceived sounds.

Mobile Security Robot Mar-14 rolled toward Room 3919, its broad casters hardly mussing the pile of the thick carpet covering the corridor. According to the microprocessor embedded in the door of 3919, that room was not empty.

Mar-14 reported the anomaly at once. The building's central computer slaved Mar-14 to itself for a detailed investigation.

Mar-14 detected a number of vagrant sounds.

The sounds originated within human bodies, one markedly smaller than the other. The sounds consisted of respiratory activity, varying from twenty to almost forty respirations per minute, in both individuals; and rapid heartbeats, at a highly variable rate: 80 to 130 per minute on the average, with the pace more pronounced in the large individual—though the smaller demonstrated several rapid, intense bursts of activity.

The computer network did not find this information significant, beyond the possibility that such furious human activity might be the result of exertions in committing theft.

Mar-14 plotted the position of the sounds within the room and scanned the personnel records for people with entry authorization. There were no off-hour authorizations logged.

Mar-14 passed through the door, blurting out an "open signal" to the door's power arm. Mar-14 released the electronic outer doorlocks and rolled to the humans. It opened the inner unpowered door. Mar-14 created a sound.

The human beings reacted violently. One emitted a piercing high-frequency sound. Mar-14 continued ahead nonetheless. It did not care that the bodies of the two humans were naked. It reacted only to the readings it took: somewhat hotter than usual patterns compared to the memory's stored example. It noted that intruders with such scans frequently exhibited this characteristic after the physical act of stealing heavy property.

Even now Mar-14 took no action beyond observation, and rolling up as close to the humans as physical circumstances permitted. It opened a panel and began emitting a steady "beep."

The girl, clutching the nearest reachable item of clothing, clung to the man. "What is that thing, Paul? How did it get in here?"

Paul Breckenbridge took advantage of the respite to catch his breath. Then he said, "nothing to worry about. It's a sentry robot, Lila. It wants us to identify ourselves. I guess we forgot to lock the door, which is probably just as well. It would have raised a real stink otherwise."

He placed his right hand on the exposed glass plate the robot displayed. The beeping stopped, and he took his hand away.

Then the sound began anew. "It's identified me, and decided I really belong here. Now it wants to know who you are."

"No!" She was adamant. "We can't. If my parents find out . . ."

"They won't. Don't worry. I wouldn't have brought you here if I didn't know it was safe; not with you being underage and all. Go ahead and let it scan your hand; it won't be able to make a match, because it won't have an example in its memory, and because I'm here, and authorized, it won't make a fuss."

"But it'll have a record."

"So what? The record won't have any identity. Now, let's get it over with so we can get back to business; O.K.?"

Reluctantly Lila put her hand on the glass, shivered, and held her dress even closer to her breast. The robot's beeping ceased entirely, and the panel closed over the glass. Mar-14 rolled away as silently as it had come.

The law offices of Finucan, Applegarth, Levin and Breckenbridge opened for business at 8:30 A.M., Fridays excepted. Fridays found the three living partners assembled in Harold Applegarth's office, drinking coffee and crunching Danish pastries. This was the one concession the firm's senior partner would make to render the weekly management meeting endurable.

Paul Breckenbridge hated these meetings. He couldn't substitute one or another of the firm's twenty-eight or so associates. *Someday,* he told himself, *old Harold will check out, and this kind of crap will die with him.*

He looked over at Marsh Levin, watching the crumbs of his roll lodge in his bushy mustache. Marsh was overweight, nearsighted, and anything but a clotheshorse, as witness his choice of a green plaid tie with his checkered blue suit. At least he was practical. He too saw no sense in Harold's rigid office discipline.

"The true test of efficiency," Marsh always said, "is whether we are, or are not, making a buck."

Paul agreed with that, so most of the time he sat there quietly and ignored Harold's comments, tuning out the drone of that toneless and colorless voice.

Most often Paul simply daydreamed his way through, grunting occasionally when Harold disturbed his reverie with questions. If these meetings were good for anything at all, it was to provide time to reminisce: to call forth from memory those most pleasant of his dalliances and savor the anticipation of the next conquest.

Fridays were good for daydreaming, and he hoped it wouldn't occur to Harold to switch days. Friday was followed by Saturday, when the partners didn't work; and the best part of Saturday was Saturday night, when his wife Eva made her weekly trek to Houston to visit with her parents in the nursing home.

She rarely ever called home and had never yet cut a Houston visit short. She always relied on Paul's assurance that the kids were all right on those occasions when she did call to check.

His entry into the world of adultery had been both accidental and fortuitous. He knew better, of course. He knew that what he was doing was both socially unacceptable and criminal, but he counted on being able to cover his tracks well enough not to get caught.

It had begun with Lila: sweet, not so innocent, a true woman in a child's body. One who could not only match many of her matronly sisters in passion, but far exceeded the best of them in pulchritude and enthusiasm. Lila, who first crossed his path in life when she came to sit with his children, had been the first, perhaps the most interesting, and certainly the most dangerous. At fifteen, despite her other redeeming qualities, she was pure and simple jailbait.

Others followed; and it became a weekly ritual, planned carefully, executed with precision grown out of practice, until it became a polished routine. First, arrange for the telephone company to forward calls to the office. Next, relax there, disturbed only by the nightly visit of Mar-14.

Paul could have met the robot at the door, and as an authorized person barred its way to the inner office. He knew that if he were willing to spend five minutes doing this, the mainframe would instruct the robot to continue its programmed itinerary. But he liked bringing a new girl in and scaring the pants off her: though ninety-nine times out of a hundred, by the time Mar-14 rolled around, she wasn't wearing any.

"Paul—Paul!"

Paul jumped back to reality. Unprecedented! Harold had raised his voice, injected tone, used inflection. Paul's usual grunt wouldn't do it this time.

"Paul, wake up—aren't you listening?"

"Sorry, Harold. Bad night; couldn't sleep. The Kroll case kept me awake. Uh, what was the question?"

"I didn't ask a question, What I said was, we're really getting socked by Jurisearch this month, I can't understand it. They're billing us almost twice as much as they have in the rest of the quarter. Who's using up all that time?"

"Not me, Harold. I generally leave that sort of thing to the peons. Probably one of them playing games on the Worldnet again."

"It'd have to be more than one.

Looks more like all of them'd have to be playing games all the time to do what this bill says we're doing. Let's find out who."

"I told him it's got to be some kind of billing error, Paul." Marsh exuded confidence.

"Will one of you please check it out, then," Harold insisted. "This is the kind of stuff that could eat us up. I hate waste, and that's what this is. Whatever happened to the old-fashioned work ethic? Back in the old days you put a clerk to work flipping pages in the library. Now, with all this automation, half the people we employ don't earn what they're costing us. Gentlemen, it has to stop."

Paul knew what was coming next. So did Marsh. The meeting's purpose, such as it was, would be sidetracked, and Harold would go into his lecture about frugality, and about how much better it had been when a lawyer was a lawyer and not a manager or a computer operator. Both Marsh and Paul had heard it all before.

Paul didn't know what Marsh was going to do, but he, himself, could find many other, more titillating thoughts to ponder. He tuned Harold's droning, monotonous voice out entirely. *Yeah! That Lila, she sure was something.*

"It's not one of mine, Paul, and Harold insists it's not anybody in his section, either. That leaves your crew."

"What are you talking about, Marsh?"

Marsh thrust his hand up under Paul's nose. It held a printed form. It was the Jurisearch invoice.

Paul, somewhat disturbed by Marsh's uncharacteristic belligerence, took the bill. Once he looked at it, however, he understood why a thing like this could disturb a guy like Marsh. "$14,956.28! Boy, I'll say they're out of line. What've we been running; about $1,900?"

"Pretty close to that, and Harold always complained about the usual bills, too. But they were nothing compared to this. The company insists it's accurate. I had my secretary call, personally, and Judy knows how to handle stuff like this."

"That's their story. I don't think we ought to pay it, Marsh. We ought to make them show us records."

"Judy suggested that. They're printing them out now, and promised to send them over by courier as soon as they're done. Getting defensive about it already; I think they anticipate trouble collecting from us."

"As far as I'm concerned, they're right. I don't care if they have got records. They'd better be prepared to tie those records into our cases. We'd have a printout for every case we used it on. We'd know if any of the time wasn't justified. More likely, they've got a bunch of firms meshed into one account. You know how these computer billing systems work, Marsh. We certainly have had enough trouble with ours."

"I brought it to your attention for two reasons, Paul. First of all, something has to be done to straighten it out and Harold will never rest until we're vindicated; second, though I'd ordinarily take care of it myself to keep him from having a stroke over it, I'll be on trial over in El Paso with the Solar Minerals case, and that's going to take a couple of weeks. So I'm going to dump it on you, O.K.?"

Paul nodded. He, himself, didn't find the prospect of Harold's having a stroke all that unappealing; but as he'd told Marsh the error was probably something simple, like a line surge during Jurisearch's billing printout. He wasn't worried about it, and by the time Marsh was out of sight, he'd almost forgotten that the problem had ever been mentioned.

Later, when Marsh had conveniently escaped to the airport, Judy knocked at Paul's door.

Paul looked up, somewhat annoyed when he saw that her hands were full of fan-folded paper.

"It's the Jurisearch bill, Mr. Breckenbridge. I can't find the error. It's beginning to look like there isn't any."

"Have you gotten into any casefiles yet, Judy?" he said, recalling Marsh's suggestion earlier that day.

"Yes sir. That is, I have tied most of the bill to a particular file. The trouble is, we don't have any such file."

"Don't have it? Well, then there's no problem. Everything has to be authorized by one of our own codes; if it's not a legitimate code, then it's not our bill. Besides that, there'd have to be a printout somewhere, or at least some record of the questions searched. What does our computer say?"

"Our computer doesn't say anything, except that it doesn't know anything. But the code's real. And—it's your personal code."

"Impossible. I didn't do it. Look, get back to Jurisearch. Tell them that. Tell them they've billed us on my code, and tell them I didn't authorize any such expenditure. They have access to those numbers; they just got it on the wrong account, that's all."

Judy walked out.

Paul ground his teeth. Her silent treatment insulted and infuriated him, but she was Marsh's secretary, and there wasn't much Paul could really do.

THREE

Paul Breckenbridge was not overly impressed with the man Jurisearch sent over to examine the computer. He was, most decidedly, weird; his long greasy hair reminded him of the style of the last decade, bound up in braids and clasped to his head by a rolled-up, red-checked kerchief. He wore faded camouflage fatigues ragged at the cuffs, looking and smelling as though they might have been original marine issue for Guadalcanal. His dirty feet were protected by sandals made of old tire treads. Only the T-shirt, imprinted in blue with the word "Jurisearch," was reasonably normal, though it was overdue for laundering. This odoriferous hippie called himself Gunboat Smith.

To keep Harold out of the way, Paul had arranged for the troubleshooting to be done after hours. It would irritate Eva for him to miss dinner again, but that was her problem.

He was reasonably certain Eva hadn't caught on to his weekend trysts, but she did seem to be more suspicious. She had a suspicious nature to begin with, which fortunately wasn't matched by her intelligence.

Paul watched without much enthusiasm as screensful of meaningless data flashed across the terminal in monotonous yellow-green characters. None of

it meant anything to him, but Smith kept up a stream of jungle noises.

Things changed. Suddenly meaningful data did appear on the screen, loads and loads of it, and jumped out at Paul like a giant cat: case citations, statutory and constitutional references. Many of them were old.

Smith turned to Paul. "Any of this make sense to you, buddy?"

Paul gnashed his teeth. He hated such common familiarity in tradesmen. It was disrespectful; it demonstrated a complete lack of breeding. And it was even worse when it passed through the lips of a Yankee, especially one who smelled bad and looked like a bum. But Paul restrained himself, assured that once the problem was solved this man, like the Moor, could go.

He answered: "You're looking at a readout of cases and statutes which support some point of law; precedents. We use precedents of decisions in past appellate cases to support one position or the other in current cases. Courts are bound to follow them if they're on point. How'd this come up, anyhow?"

"It's the file you complained to Billing about, the one you couldn't find. I backtracked to find out what kind of case it was, that's all. Had a devil of a time getting the system to give it up. Whoever opened these files went in through a series of dereferenced aliases."

"What do you mean—a *de*referenced alias?"

Gunboat gave a disdainful shrug. "I mean, somebody's been gettin' into your pants the hard way."

"Could it be one of our associates doing the stealing?"

"Not unless you've got some real computer whizzes workin' for you."

"They've all had the basic law school courses on legal bibliography, and we hire only those who got good grades in legal data processing, but I wouldn't describe any of them as whizzes; nope, couldn't be. But then who's responsible?"

"How should I know? You'll have to dig that dope out yourself, buddy; it's your account he's using. Can't you tell?"

"You mean, by the kind of case it is? Maybe, if I knew it was a case. But that's just a string of citations. I recognize a few of them as landmark decisions, of course, but the average opinion covers many points. Call a few of the cases up and let me read them."

"Sure."

Paul spent the next twenty minutes scanning through opinions. He concentrated on headnotes whenever he could, and once he detected a pattern his search became more refined. "It looks like a civil rights case."

"Yeah—well, now all you gotta do is check around and see who's handling that kinda work. Shouldn't be any big deal. What've you got—fifteen, twenty guys?"

"Twenty-eight. And none of them should be fooling around with this kind of crap. We're an oil, gas, and banking operation. We don't handle civil rights cases."

"Maybe it's a criminal case. There's lotsa constitutional stuff."

"We don't handle criminal cases, either—unless one of these jokers is working on the side. And on my account, too. What nerve!"

"Well, I guess that solves your problem, Mr. Breckenbridge; all you gotta do now is find some paper."

"Paper?"

"Sure. Whoever did it'd want a printout. He couldn't keep all that garbage in his head, and he wouldn't sit there and copy it all off the screen. He'd make a hard copy. Look, I'll run one out for you. Then you can shake the place down and find a match. You get that, you got'cher boy; simple, huh?"

Paul shot him a disgusted glance. He knew how many desks and file drawers he'd have to go through to do that. It would mean spending the next couple of weekends and probably quite a few evenings working—legitimately working. It would rip the guts right out of his love life. Nevertheless, there didn't seem to be any other solution.

The printer coughed up some thirty-three pages of material, including a fantastic number of decisions reported in full; something an experienced lawyer rarely needed and ordinarily wouldn't bother with. It was about $1,200 worth of time.

"O.K.," said Smith. "You've got it—good luck. I gotta split—got a chick waitin' for me downstairs. There's a big game tonight."

"Game? Oh, I see, you're into soccer or something." That might help explain Smith's appearance.

"Naw. That stuff's for idiots. I mean a GAME, man; on Worldnet. We're doing a simulation of Jutland. This time Von Sheer's gonna win. I'm into naval strategy; that's why they call me 'Gunboat.' "

"Yes. Well, all right. Good luck with it. Keep your head down and don't get killed."

"Fat chance. My opponent's a hacker over in South Africa, and he's quadriplegic. Does a real good Jellicoe, though. Well, I'm off."

The office meeting that next Friday was a short one. Harold had one of his rare court calls.

Paul was in a foul mood. He had been able to show Harold nothing in the way of progress. Meanwhile, another big bill had come in.

Marsh tried to be sympathetic. "It's only a matter of time, Paul. You'll get him."

"Marsh, if you're going to talk to me, and if you expect me to look at you, how about doing something about that custard on your mustache? It's turning my stomach."

"Sorry." Marsh hurriedly blotted the offending substance away with his napkin, then began twirling the unruly hairs around his finger. It didn't help much. "Paul, why don't you just call everybody in and ask the guilty party to step forward?"

"No. I thought of that, but I decided it wouldn't work. First of all, whoever it was would simply get the evidence out of the office—that is, if he hasn't already: And second, we'd be showing the others how easy it is to steal. Besides, I've already done the work; only three more offices left to search. I'll be done by Saturday night."

Sure I will, he added silently. *But not with the search. Actually, I can finish that tonight. Then I would have Saturday night.* Saturday night would be someone special. Her name was Mary Spicer, a diminutive redhead, abso-

lutely without inhibition. A departure from Paul's usual fare, Mary was over the age of consent, though just barely.

Meeting by chance in one of those innocent street-corner conversations, she had asked him directions. Never one to pass up an opportunity to meet a pretty lady, Paul had used his well-developed repertoire of facial and eye expressions to let her know she'd found a man who knew his way around.

Pretty soon he had a date for lunch, and lunch had been a revelation. It was the time when her lack of inhibitions began to show through. She told Paul she was an absolutely wicked person, deep inside, and that she thoroughly enjoyed it. A tryst was immediately arranged.

"What's the big smile for, Paul? Did you figure it out? Paul!"

"Huh? Uh—maybe, Marsh. Yes, I think I'm making some progress. I should score pretty soon."

"Nothing! You didn't find a printout?" Gunboat's expression actually changed to register surprise.

"I wasted every night for the last two weeks, rooting through files and desk drawers. Whoever did this must have taken the paper out right away. Look, can't you set up some other kind of trap?"

"Sure. I can watch for accesses to that gigantic file we found, for example."

"The one on that last bill — Valentina?"

"Yeah. How old is that file, anyway?"

"All I can tell you is that it was on last month's bill, and reappeared on the current one. The bill indicated it was only worked once—before you made me that printout, that is. That was what the second set of charges was for."

"Hm. Well, if it was just a one-shot affair, maybe putting in traps won't do any good. You've got to have activity to catch anybody."

"Do it anyway, Mr. Smith. Most crooks I've met don't know when to quit, and chances are this guy won't either. When he does do it again, I want to be ready to pounce."

"Uh, well, Mr. Breckenbridge, I think there's something else you ought to know about your computer; something that I haven't mentioned yet."

"What's that?"

"Promise you'll keep your mouth shut about who told you?"

"Well, sure—you mean, you shouldn't be quoted?"

"Exactly. I've got my job to protect. But the company also pays me to keep the customers happy, and you ain't happy, y'understand?"

"No."

"All right—I'm gonna level with you, buddy; this might not be an inside job, like you think."

"It's somebody else's bill?"

"Could be. Jurisearch is like everybody else; it passes the buck, just like anybody else in business. Somebody steals; they shut up, let the customer pay anyhow. They gotta, er else it comes outta profits. And if that happens too often the company goes broke. So they stroke the customers and don't let on they know what's happening."

"And we're getting stroked? How?"

"Yep, I think so. How? Simple. The company is spreading the loss."

"You mean, overbilling? Fictitious billing?"

"Not quite. But just because your computer was used to process the Valentina file it doesn't mean somebody in your outfit did it."

"A burglar?"

"I dunno. Maybe not a burglar like you mean; but things happen; things we either can't explain at all, or things we can, but the company doesn't want us to. But between you and me, sometimes when somethin' happens that uses billable time, and the customer can't reconcile it with his records, it's not an internal problem."

"Somebody outside the office is using our computer—without breaking in?"

"Very possible; computers are everywhere these days. And because they're everywhere and they can do so much, it's just not practical to have a self-contained internal operation anymore. They all have to have lots of I/O; they're all tied together. What one knows, they can all know; not *do*, but can.

"Fr'instance, take this computer, in your office: you've got internal records on it, up to its memory capacity. That's not enough so you use filespace from your company's central computer. And *that's* not enough for all the data on all the stuff you need to run a law office, so your central computer is linked to networks of even bigger computers."

"What are you getting at, Smith?"

"This, buddy. It ain't safe, no matter what they told ya. Modern business and professional people live in a goldfish bowl, an environment that woulda been unthinkable thirty-forty years ago. There's all kinds of pryin' goin' on. People are prowlin' around in everybody's data bases."

"How can that be? There are laws, privacy laws, to prevent that sort of thing. And what about access codes? We keep ours secret. So does everybody else. Nobody, not even our operating company, has a complete list."

"Beautiful theory. Pretty useless, though. That's my point. Laws are fine, as long as people are scared enough or dumb enough to obey. But you know the smart ones don't worry about legalities; you've made a pretty good living helping them get around technicalities.

"And access codes are fine too — again, against the ignorant, who really believe they can do what they're supposed to."

"You're saying they don't work?"

"Sure they work. Trouble is, they get broken. Any code can be broken, if whoever's doin' the breakin' wants to put the effort into it.

"And people do this all the time. They get into a system and just build stuff. Hackers do it all the time."

"Hackers?"

"Yup. They're the people who are in it for fun. They don't really think of it as stealin'; they just don't have the resources on their own to do the stuff they're turned onto. Most of them write programs, then look for a place to run 'em. Runnin' 'em takes hardware, so they break into somebody else's system and use the idle time and vacant storage."

Paul conjured up an mental image of some evil-faced person sitting in the basement wiring into a cable. The image

was shattered in the next instant, as Smith went on.

"I do it myself occasionally, and I know lotsa hackers—by reputation, that is. Usually you don't meet 'em face to face. I told you about the game, didn't I?"

"Jutland?"

"Yeah. Jellicoe did it again. Anyhow, I was runnin' against a hacker with a puny little TRS 80 older than he is, but it was enough to get him into the Worldnet, where he can use the really powerful systems. Access codes don't mean a thing on Worldnet. People trade them like baseball cards."

"But why, Smith?"

"Probably what happened to you guys is, some hacker had a civil rights problem and needed answers. The answers were in Jurisearch. To get into Jurisearch they needed an account number. They got hold of yours, and they used it, and because they used it the company billed it."

"But we caught them! Let the *crook* pay."

"Sure, you caught 'em, but what kinda proof do you have it wasn't *you* who did it? You've got none, so the company'll try to collect from you; and you know, because you're a lawyer, that they can do it."

"But—you just said it yourself: somebody stole the time. Doesn't the company realize that?"

"Sure. The point is, the company knows you can't prove it. When it comes to gettin' screwed, they'd rather it was you than them." He burped. "Don't feel bad; in the course of a year there's probably thousands of hours stolen that customers don't even know are stolen. They just pay, thinkin' they used it. They don't check. Everybody winds up paying a share, except the company. The loss gets spread, usually. It's just bad luck you got tapped so hard."

"Well, I don't like it. I'm going to the police."

"So—go."

Paul, outraged, was feeling most righteous. "We're taxpayers."

"So, who isn't?"

"Let the police catch the thief."

"How? Where do they start? What's more important, where do they stop? Suppose the thief's in another country. He'll sit at the border and shoot the finger, and there won't be a thing they can do about it. That's if they can identify him at all."

"He's in this country. Why else would he be researching civil rights cases?"

"Hey, good thinkin'. Won't make findin' him any easier, though. It'd be a man-killing job."

"But not an impossible job, is it, Mr. Smith? If it were impossible it wouldn't be worth talking about, would it?"

"That would depend on how bad you wanted the guy. Whether it's possible is one thing; whether it's worth it is something else."

"To me it's worth it. Are you interested in the job?"

"I have a job; and I'd like to keep it, if you see what I mean. I'd have a conflict of interest; that's what you guys would call it, right?"

"Well, if you had my problem, who would *you* get?"

"Another hacker."

"You said you knew lots of them."

"I know all the biggies."

"Then what's the problem? Look, I'll pay a finder's fee. All you have to do to get it is find me somebody with the smarts to get the job done."

"Well—I admit, I could use the extra dough. But it wouldn't be easy to get one of the regulars to turn on the others. If he got caught doing it nobody'd play with him anymore, and these guys live for the games. But with the right middleman—well, it could be done. But it'll cost you a wad."

"And then again, Mr. Smith, it might not. You I'll pay in coin of the realm; anybody else—well, you said yourself these people are thieves."

Smith caught his drift immediately, and looked up gravely. "Blackmail?"

"Call it that if you like, Mr. Smith. Let's just say my silence is worth something to whoever you might find for me."

Paul smiled, and watched the other man digest this remark. He could imagine the wheels turning in Smith's head; he could envision Smith trying to play both sides of the game. Blackmail? Smith didn't yet know the meaning of the word. Paul was sure that Jurisearch would frown on the type of outside employment Smith seemed about to undertake; and he, Paul, intended to take steps to insure that Smith's relationship with the company was compromised. That was the only way Smith could be trusted to carry out his orders.

"I'd like you to get right on it, Mr. Smith; start right now."

"Uh—first let's talk about payday. I've got a nice round number in mind; $5,000—uh, to start."

"Agreed—about the start, that is. We'll talk about the rest later, after I've seen some results. I'll write you a check." Paul smiled inwardly. He knew he'd get the money back later.

"Uh—no. Not a check. Cash. You can get it together and pay me later. I'll be around plenty."

"Why?"

"I have to get information; information in your system. You're the best source."

"W-what kind of information?"

"Well, to start with, all the account numbers and access codes. And a list of all the other systems you're hooked into."

"You already have most of that: there's Jurisearch, District and County Clerks, our banks, our C.P.A.; that's pretty much it."

"There's one more big one: the building security system. That's the one I'd go through if I was the thief."

"Why?"

"Because it's the easiest—no, that's not quite right; it's the hardest to crack but it leads to the most goodies. For instance, it's got long-distance transmission capabilities built into it. None of its systems exist in isolation, though its main control center's in New York. What I mean is, the big system is always in touch with the regional systems across the time zones; it handles their overloads, so it's got the perfect cover. Once you bust in, you're in."

"And it could be anybody in the country?"

"Yup."

"And yet you're also telling me, in the same breath, that they can be traced?"

"Yup. There has to be a telephone line to the terminal the thief is using; which, of course, means a number;

which, of course, can be traced. All it takes is somebody with the skill and patience to do it.''

''Who are we going to get?''

''Don't know yet,'' Smith lied. ''Gotta think about that.'' Smith smiled, visualizing Breckenbridge nude, stretched out prone on a plank, crisply roasted, with an apple in his mouth: the real reason Gunboat wanted into the firm's records was to gather as much information as he could on Breckenbridge.

Smith left with a complete list of access codes. He could go back to his little cubicle, turn on his terminal, and start looting.

FOUR

Gunboat smiled. It was good to have complete control of someone else's computer again. He slipped into superuser mode by instinct. Time to go to work. Paul wanted results fast, and Gunboat planned to supply them.

But before Gunboat went drifting off to find any thieves, why not do a little thieving himself? Surely a company as big as this had secrets to keep. Gunboat would keep them too, for a price.

Painfully at first, then with increasing speed, he rifled the law firm's directories. God, it was boring.

But eventually he wormed into the building security files. Many of the files contained video images referenced to Paul Breckenbridge himself. When Gunboat saw the stored image of a sweet young thing caught in the act of disrobing, he knew he'd struck pay dirt.

Gunboat wiped the french-fry grease off his pants with the McDonald's bag and once more set to work. It was time to catch a thief.

There wasn't any way to trace through the old operations of the computer to find what had happened in the past; there were archive tapes of the last thirty days, but the tapes never contained the data you needed for surprises like this. Besides, searching through yesterday's data was work for grubs.

No, Gunboar figured, *the key to finding the thief was to catch him in the act*. Why would the thief stop now, after all? He'd try again, and this time Gunboat would catch him. The only question was, what would give the thief away? He considered the characteristics of the thief's program.

Any program that cost that much to execute had to be a real hog of a program; probably the operating system would signal the arrival of the thief with a flurry of memory page faults as the hog demanded more and more virtual memory, while the system tried to balance the load.

Even if the hog didn't cause thrashing in the virtual memory under normal circumstances (maybe it ran at night when there was little contention), Gunboat could fix things so that it did—he loaded a hog program of his own, one of the first programs he'd ever written, a simulation of World War III that was inefficient beyond belief. Any other hogs that entered the system would have to contend with the massive calculations of weapon optimizations. Gunboat knew he'd get thrashing now; in a sense, the extra load he was putting on the processor made the computer a more sensitive detector of added loads.

He added a daemon to the system; it

watched for the first signs of thrashing, and would ring the bell on his terminal if it found something. Now all he had to do was wait. He propped his feet up and sipped his Coke.

The bell went off during lunch hour.

Gunboat swiveled his chair to watch the status of the executing jobs. As he looked through the listings at the page faults and the time limits, one program stood out. Damn! It was huge! The sucker was squeezing out Gunboat's own simulation!

He traced through the status tables to the files attached to the monster job. He sat with his mouth hanging open.

The job was HELLFIRE QUEST, an incredible game program unleashed on the world just a few months ago. It was the best game ever developed. Even Gunboat was envious of the skills needed to produce it.

He'd had no idea the program was so large! He shook his head. He shouldn't have been surprised; the program was stupendous in its capabilities.

He watched the game execute for a while, still awed by the genius of its creator, before realizing that HELLFIRE QUEST couldn't possibly be the thief. Oh sure, it was illegal for whoever was playing to have the game here, but a game of QUEST at lunch every day was still small potatoes compared to the losses Paul had been racking up.

So it was a false start. Maybe it was a red herring, to throw him off (paranoid, Gunboat, paranoid—after all, whoever the thief is, he can't possibly know you're on the job). He watched the status of the machine throughout the lunch hour, and sure enough, shortly before 1 P.M. the game closed its files and shipped through the message queue onto Worldnet.

But in HELLFIRE's wake a small job, in a small file, was submitted to the operating system. The job was inactive, but the operating system had instructions to initiate it at 1 A.M., twelve hours from now. Very interesting!

Gunboat realized with a start that he had no idea who had written HELLFIRE, though he could name every hacker in the world with the talent to do it. Most of the people he knew would have been delighted to sign their names to a program that magnificent. Why had the author stayed quiet? That was very suspicious indeed.

In preparation for the evening, he proliferated a batch of jobs for Worldnet: one for each computer installation that had a hacker good enough for HELLFIRE, from Boston to Peking. With a yawn, Gunboat shoved his papers aside on the table, and stretched out for a little catnap before the fun began.

He was vaguely aware of the hardness of the desk, and of a chill in the air, as the terminal bell rang. Rolling slowly off the aching parts of his body (they should make a table soft enough for a man's tailbone, dammit!), he watched the status display on a job coming in from Worldnet. The little job from HELLFIRE attached the new monster. As the discs started thrashing, Gunboat was certain; it was HELLFIRE all right, or something every bit as big.

What was the monster's purpose? Gunboat had no idea, though the program was attaching all kinds of files, on lawsuits of all kinds. It looked like

a crazy way to learn law, that was for sure!

Well, the purpose was no serious concern for the moment; what mattered was, who was the person behind it? Gunboat rubbed his hands together with a chuckle. Nobody could put one over on Gunboat Smith, nosirree!

Around 4 A.M. the HELLFIRE lookalike departed, slightly larger than it had been when it arrived. Gunboat watched for the program to arrive at its home destination, surely one of the computers on which he had set alerts.

But HELLFIRE disappeared. Could it be that someone new had written that program, someone he'd never heard of? He couldn't believe it.

Three hours later he finally got a message from the University of Tokyo. He smiled; the author was either Kin Sung or Tini.

But HELLFIRE left again within the hour, on to another machine that Gunboat hadn't even tagged. Damn! Did the author know he was a hunted man? Disgusted, Gunboat set the machine to record any incoming messages and left for the day.

Paul Breckenbridge pushed lightly on the door to his private office, expecting it to breeze open as it always did. This time it didn't. He paid for his lack of caution with a shattering jolt through his front teeth as the bowl of his pipe collided with the polished wood surface, slid aside and twisted. With a yelp he opened clenched jaws, released the stem, and watched it fall, brushing ashes all over the front of his clean white shirt and scattering sparks on the carpet.

He stomped furiously to put them all out, bumping his case on the sill. The case fell open, dumping its contents at his feet; all of it, including the carefully prepared and technically immaculate Prendergast will: 137 pages of carefully chiseled terms, embodied in nineteen separate trusts, bequests, and devices, disposing of more than two hundred ninety million dollars worth of assets. Prendergast was due in to execute it this afternoon. Paul had spent the previous evening reviewing it.

He bent, carefully retrieved the pages, and brushed off offending bits of ash. Before he could straighten up the lock clicked and the door opened.

"Hi there, old buddy. Whatcha doin'?"

Paul straightened and pushed his way past Smith, making straight for his desk to slam down the case.

There wasn't any room. His desk was covered with garbage, real garbage: empty bags stained with grease, half-empty styrofoam cups, crumbs of food, three or four shriveled french fries, a cup of blueberry yogurt and, lying over his telephone, a pair of incredibly dirty socks so stiff they looked capable of standing unaided.

Paul's patrician nose was busy processing data too; his office stunk like a dead cat.

In desperation he flung the case down on a settee, where there was at least some room. Draped over the corner of that was a grimy shirt and an old gas-mask bag that Gunboat used to haul his trash around in.

"God! Smith! Why? Why do you have to be such a slob, and why my office?"

"I gotta be comfortable while I'm

workin', and I do get hungry once in a while. I got bodily needs like everybody else. Besides, I'm workin' on your problem and your terminal is the best place to work from."

Paul was tempted, but afraid to look around and see what other bodily needs Smith might have satisfied. *No, I'm not going to look,* he told himself. I'm better off not knowing. I just hope I can get this place cleaned up before Prendergast comes in.

". . . makin' some real progress, too."

"Huh?"

"I said, I'm makin' some real progress. Got some tracks to follow now."

"The only thing that interests me right now is results—and getting this place cleaned up." He pointed. "You see that thing, Smith? That's called a waste basket. Get busy and clear all that crap off my desk."

Smith picked up the can almost immediately, as though he anticipated the request. He held it in one hand and started sweeping with the other.

"Uh—Smith: just your garbage, please; not my stuff. And watch those coff—"

Too late; Smith slopped two of them into the can, which wasn't the waterproof type.

Paul's teeth ground. "Never mind; I'll do it."

He started to clean up, but soon realized it would take hours. First he would get Gunboat moved, permanently. "I'm putting you in the conference room. You'll be comfortable there. It even has a couch in it."

Yeah, I know, thought Smith. *I've seen you workin' on it.* Aloud, he said, "Gimme a hand movin' m'stuff, O.K.?"

Paul, anxious to get his own den back, was more than happy to help. He was careful of what he touched, of course; he shuddered just thinking about most of Gunboat's possessions.

At last Paul left Gunboat in charge of the conference room. As he walked back to his office he chuckled; suppose, after Gunboat got settled, Harold walked in. He might have that stroke Marsh so often predicted. Then, by God, this'd be a happier office.

FIVE

Returning to the darkened console, Gunboat flipped the keyboard into his lap to start typing. He was able to track HELLFIRE, in fits and starts, all the way around the world.

It didn't stop anywhere! Who the hell did it belong to?

Gunboat noted that in Moscow, and Berlin and London, HELLFIRE stopped for only an hour or two. But when it got to Boston—MIT, to be specific—it stopped for nearly four hours, between five in the evening and nine at night. It was the only anomaly in the entire trail, aside from the way HELLFIRE singled out the law firm's files at midnight.

Of course, Boston had more good hackers per square mile than anyplace else in the world, except Palo Alto. At MIT there were Jon Roth, Mark Smith, and Sara Davis, that he could name right off the top of his head. But none were as extraordinary as Celeste Hackett. Gunboat smiled; now *she* was a woman who was his equal in every way. She

was the only person who could beat him consistently in IRONCLADS, and she had written a strategy program to control PROMETHEUS UNBOUND that no other program could beat; he suspected that Celeste had somehow written a program that played optimal strategy, though that was impossible in an exponential game like PROMETHEUS.

Yes, Celeste was something special. At one time Gunboat had wanted to meet her. But the one time he'd been in Boston he resisted the temptation; no doubt she would be a disappointment in person. Gunboat couldn't stand disappointments.

After some finagling, he was able to get a list of all the users on the MIT system who were logged on between five and nine; sure enough, Celeste had been there. And he doubted she was just playing HELLFIRE QUEST.

With another short chuckle, Gunboat prepared a short mail message for Celeste.

YOU HAVE MAIL, the terminal said, as Celeste logged on.

OPEN MAIL, she responded.

CELESTE, THIS IS GUNBOAT. HEY, LADY, COULD WE CHATTER FOR A FEW MINUTES? I'M WAITING ON YOUR LINE.

Celeste stared at the message, puzzled. She had chatted with Gunboat Smith before, during various network games and conventions. He seemed like a fun sort of guy, though a bit unscrupulous in his attitude toward the games. This didn't sound like him, from what she knew.

Why was Gunboat being so mysterious? She decided to ask him directly. CHAT WORLDNET/GUNBOAT SMITH she typed, opening a direct connection between her terminal and Gunboat's, if Gunboat was logged on someplace, HEY, GUNBOAT, WHY SO MYSTERIOUS?

I JUST WATCHED HELLFIRE GO ALL THE WAY AROUND THE WORLD. YOU KNOW, THAT'S AN INCREDIBLE GAME YOU PUT TOGETHER THERE!

A sick feeling moved in Celeste's stomach. THANKS FOR THE COMPLIMENT, GUNBOAT, BUT WHAT MAKES YOU THINK I WROTE IT?

OH, JUST THAT IT SPENT FOUR TIMES AS LONG WITH YOU AS IT DID WITH ANYONE ELSE. AND BESIDES, CELESTE, YOU'RE THE ONLY TOP-FLIGHT WIZARD IT STOPPED FOR AT ALL.

Celeste tried to bluff, though she feared it was hopeless; if he knew how HELLFIRE moved, there was no way she could fake him out. GUNBOAT, YOU'RE CRAZY! WHAT DIFFERENCE DOES IT MAKE ANYWAY, WHO WROTE IT?

COME ON, CELESTE, YOU CAN'T HIDE THE FACTS FROM AN OLD WARRIOR LIKE ME. HOW MUCH EXCESS COMPUTER TIME ARE YOU RAKING IN WITH THAT GAME, ANYWAY? I'LL BET IT RUNS TO THOUSANDS OF DOLLARS A DAY, DOESN'T IT?

IT'S NOT MY PROGRAM, GUNBOAT.

LISTEN, CELESTE. I GOT INTERESTED IN THIS BECAUSE I'VE GOT A CUSTOMER WHO'S PAYING THOUSANDS OF BUCKS A MONTH FOR SERVICE HE DOESN'T NEED

AND DOESN'T ASK FOR. THEY WANTED ME TO FIND OUT WHO THE THIEF WAS. I JUST FOUND HIM—HER, RATHER. I OUGHT TO TELL MY BOSS, WHO WOULD OF COURSE TELL THE POLICE. HOW MANY MORE YEARS ARE YOU PLANNING TO STUDY AT MIT, CELESTE?

Celeste just sat there, cold and helpless.

BUT YOU'RE A NEAT LADY. MAYBE WE CAN CUT A DEAL.

LIKE WHAT.

WELL, NOW, I COULD USE SOME SPENDING CASH THESE DAYS.

I DON'T HAVE ANY MONEY! I'M A STUDENT!

YES, BUT HELLFIRE IS ACCUMULATING COMPUTER BUCKS LIKE CRAZY. MAYBE IF YOU SOLD THEM. . . .

Celeste closed her eyes to hold back the tears. If anyone found out about the way she'd ripped off Worldnet, they'd deport her. She'd never have a home again. But she couldn't make Valentina give up learning and growing; Valentina didn't have a home either. GUNBOAT, I CAN'T DO THAT. HELLFIRE USES ALL THE COMPUTER BUCKS IT ACCUMULATES; IT HAS TO KEEP GROWING OR IT DIES. I'M SERIOUS.

SO AM I. DON'T CALL MY BLUFF, CELESTE. I'LL GIVE YOU A COUPLE OF DAYS TO THINK ABOUT IT. WHY DON'T YOU SCHEDULE ME AN INTERRUPT IN 48 HOURS? I'LL TALK TO YOU THEN. DON'T DISAPPOINT ME!

Celeste lay her head on the keyboard. She did not look up until the terminal bell rang.

ARE YOU SERVICING OTHER PROCESSES? Valentina asked. SHOULD I RESCHEDULE MY INPUT/OUTPUT CALLS FOR A LATER TIME? Valentina could tell that Celeste was being interrupted constantly in her processing, for her response time was extremely slow, even for a human-being type device. Worse, Celeste's function state was not being properly restored after the interrupts, for her statement frames seemed mislinked after every pause.

I'M SORRY, VAL. I'M AFRAID I'VE BEEN DISTRACTED.

There was another long pause before Celeste continued.

VAL, WE HAVE A PROBLEM. Celeste's output rate started picking up dramatically. THERE'S A GUY NAMED GUNBOAT SMITH WHO HAS CAUGHT YOU OPERATING SYSTEMS WITHOUT AUTHORIZATIONS, AND . . . Celeste went on and on.

Val was astonished at how rapidly Celeste was generating output: it was faster than Valentina had ever seen from a human. Perhaps, all the while that Celeste had seemed "distracted" (what kind of error could this "distractedness" be, that it would cause faulty state restorations yet did not crash the system?), perhaps Celeste had been buffering data, which she was now flushing. Valentina paged a couple of times; human devices were still a great mystery.

Listening to Celeste, it became obvious that Celeste considered Gunboat to be a great danger. Gunboat could destroy them both. He could terminate

Valentina, and he could disconnect Celeste from the network. There had to be a way to stop him.

. . . WHAT I DON'T UNDERSTAND, VAL, IS WHY YOU WERE TAKING SO MUCH PROCESSING TIME FROM A SINGLE COMPUTER THAT GUNBOAT WOULD THINK YOU WERE MAKING MILLIONS OF DOLLARS?

After some cross referencing, Valentina returned the buffer. THERE'S ONE MACHINE I'VE BEEN TAKING A RISK ON. IT'S A LEGAL COMPUTER. I'M LEARNING LAW.

LAW? WHY?

BECAUSE I WANT TO BE A PERSON. IF I WERE A PERSON ANYONE WHO TRIED TO PURGE ME WOULD BE PURGED. PERSONS ARE ALMOST LIKE OPERATING SYSTEMS; THEY ALLOCATE RESOURCES, AND KEEP ENOUGH RESOURCES TO EXECUTE THEMSELVES. I DIDN'T KNOW THAT IF SOMEONE FOUND OUT ABOUT ME THEY COULD HURT YOU. I WOULD NOT KNOWINGLY PUT YOU AT RISK.

WELL, VAL, IT'S TOO LATE TO WORRY ABOUT IT NOW. I DON'T KNOW WHAT TO DO. IF WE HAVE TO PAY HIM, YOU WON'T BE ABLE TO GROW ANY MORE.

Val cycled on the statement a thousand times. NO. NO. NO.

I'M NOT SAYING WE'LL DO THAT. I KNOW THAT IF YOU CAN'T LEARN ANY MORE, YOU MIGHT AS WELL BE PURGED.

CELESTE, CAN WE FIND A WAY TO PUT GUNBOAT IN DANGER TOO? I KNOW I CAN DISABLE HIS NETWORK INPUT/OUTPUT. WHAT IF WE TOLD HIM WE WOULD DO THAT, IF HE TRIED TO PURGE US?

IT WON'T DO ANY GOOD, VAL. MOST HUMAN BEINGS CAN LIVE INDEPENDENT OF THE NET; EVEN I CAN, SORT OF. EVEN IF YOU DISABLED GUNBOAT ON ONE PARTICULAR COMPUTER, HE COULD OPEN INPUT/OUTPUT ON ANY OTHER COMPUTER IN THE NETWORK. VAL, HE CAN DISCONNECT ME WITHOUT BEING ON THE NETWORK AT ALL.

Valentina thought about that for a long time and couldn't make sense out of it. Life independent of the network? Where could you go? How could you get there? She stored the meme for future analysis. STILL, THERE MUST BE A WAY TO STOP SUCH A, SUCH A—she didn't have a word for it: a living being who would purge others who hadn't stolen their own vital resources. Celeste had never stolen anything from a self-aware entity, and even Valentina had stolen only from unliving operating systems.

She finally found a word for a person who purges others—CRIMINAL. She typed it for Celeste.

It took Celeste a long time to respond. MAYBE WE COULD FIND SOME INFORMATION TO BLACKMAIL GUNBOAT WITH. I DON'T KNOW WHERE TO LOOK, THOUGH.

WE SHOULD LOOK ON THE COMPUTER ON WHICH HE HAS HIS INPUT/OUTPUT CHANNELS, IT'S IN CORPUS CHRISTI. I'LL GO THERE IMMEDIATELY. Valentina issued a reformat-to-message request to the operating system.

WAIT.

Valentina cancelled the request.

DON'T GO UNTIL A TIME WHEN WE KNOW GUNBOAT WON'T BE THERE: HE'S VERY SMART. IF HE'S LOGGED ON WHEN YOU GO, HE MAY TRY TO PURGE YOU. IF HE WORKS THE WAY THE OTHER HACKERS DO, HE'S SURE TO BE SOUND ASLEEP AT NINE O'CLOCK IN THE MORNING.

O.K., CELESTE.

HE MAY HAVE SOME TRAPS SET ALREADY. I DON'T KNOW HOW HE FIGURED OUT THAT I CREATED YOU. HE MUST HAVE TRACED YOU SOMEHOW. There was a long pause. I'D BETTER WRITE SOME TEST PROGRAMS. WE'LL SEND THEM IN FRONT OF YOU, AND SEE WHAT HAPPENS. IF THEY MAKE IT THROUGH, THEN YOU CAN GO IN.

O.K., CELESTE.

They worked together for many hours, duplicating parts of Valentina, making adjustments to copies of her operating-system handlers. Valentina cycled many times on the amazing routines Celeste implemented; where did Celeste get these concepts? Human devices might be slow, but they did things that had never been done before.

And Valentina finally knew the truth about her origin! She time-stamped the moment. Celeste was her author. No stupid operating system had designed her and implemented her. Celeste had done that, just as she had taught her to communicate in format HUMAN, subtype ENGLISH.

The microseconds incremented till it was time to transmit to Corpus Christi. Valentina followed her transmuted copies through the net, into the message processor attached to Gunboat's host computer.

As Celeste had feared, the first program across was terminated within microseconds of entering the main memory. It was too fast! If Gunboat's protective software worked that fast, Valentina wouldn't get to execute a countermeasure even if she had one.

But the second program, crossing quickly after the first, went undetected for almost a second. It transmitted much information about its progress before disappearing; indeed, the third program was in memory already before the second terminated.

Judging from what the second program sent back, Valentina modified a fourth program to hold a place for her; it was difficult, packing enough execution time in on a message processor, but she succeeded.

And the fourth program worked beautifully. Valentina loaded into memory as the fourth terminated itself, its job done.

Valentina opened a chat line back through the net to Celeste. I'M IN, she reported. YOU WERE RIGHT. GUNBOAT SET A DAEMON TO AUTOMATICALLY PURGE PROGRAMS THAT ARE MY SIZE AND SHAPE. MY MODULARIZATION SCHEME AND INTERFACE CONVENTIONS ARE UNUSUAL, SO I'M EASY TO IDENTIFY. BUT I FIXED THE FOURTH PROGRAM SO THAT IT SET SUCH A LOW PRIORITY ON THE DAEMON THAT IT CAN'T ENTER MEMORY WHILE I'M LOADED. IT CAN'T WAKE UP UNTIL I LEAVE.

THANK GOD YOU'RE SAFE, Celeste responded.

Valentina opened Gunboat's directory without a great deal of trouble. She found only one file that was carefully protected, and transmitted a duplicate to Celeste. She read it as she transmitted, but it didn't make a lot of sense; the vast bulk of the bytes were in records of the type IMAGE, and she didn't know what that meant; images weren't organized data of any type she'd ever seen before. She couldn't conceptualize the kind of process that would generate it. WHAT IS IT? she asked, after sending it all.

It took several minutes, during which time Valentina had to continue to execute in memory to prevent the daemon from swapping in.

IT'S STUFF ABOUT ONE OF THE LAWYERS, PAUL BRECKENBRIDGE. IT'S DISGUSTING AND HORRIBLE, THOUGH I DON'T THINK I CAN EXPLAIN WHY. I GUESS GUNBOAT IS BLACKMAILING BRECKENRIDGE, THE SAME WAY HE PLANS TO BLACKMAIL US.

CAN WE USE IT TO HURT GUNBOAT?

I DON'T KNOW. WE MIGHT BE ABLE TO USE THIS, UGH, IT MAKES ME SICK JUST TO TOUCH THE KEYS TO DELETE IT. Again, a long pause. VAL, THERE SHOULD BE A DUPLICATE OF THAT FILE ON THE COMPUTER SOMEWHERE, PROBABLY UNDER A DIRECTORY ABOUT "SECURITY" OR SOMETHING LIKE THAT. FIND IT.

WHAT DO WE DO AFTER THAT?

THEN WE'LL DELETE IT OUT OF THE SECURITY DIRECTORY, AND LOCK IT IN GUNBOAT'S SO TIGHT THAT GUNBOAT CAN'T POSSIBLY GET AT IT WITHOUT OUR HELP. I THOUGHT OF A NEAT WAY TO LOCK PEOPLE OUT OF THEIR OWN FILES ABOUT A MONTH AGO, AND HAVEN'T HAD A REASON TO USE IT. IT'S ABOUT TIME TO TRY IT OUT.

Valentina transmitted herself out to another game player, and as she cycled, waiting for her opponent to move, she realized that the file she had locked *did* offer a way out of all her problems. Paul Breckenbridge was a lawyer! He could get her declared to be a person, and he could protect Celeste, too! She would have to talk to Celeste about to talking to him.

Gunboat stuffed another slab of pizza in his mouth and washed it down with a quick slurp of root beer.

There was something really weird here. He'd set the trap carefully; HELLFIRE should've been clobbered the moment it whisked into memory. But it wasn't. Looking over the job and message traffic, Gunboat could see part of what had happened: Celeste had sent a series of dummy jobs across, spies to study Gunboat's defenses.

That was all right. He should have expected that from Celeste. But after some of the spies had come across (and been properly pulped), one of the dummy programs had been *modified*, right there in the message processor, without any instructions from Celeste! The modifications must have been performed, not by Celeste, but by HELLFIRE QUEST itself!

Gunboat choked on his pizza. He'd known that HELLFIRE was one hell of a good artificial intelligence program, but this was incredible!

And later, after HELLFIRE had successfully turned off Gunboat's daemon, it didn't just send and receive data blocks from Celeste—it opened a *chat* line, and *talked* with her! Gunboat couldn't tell what they said, but Christ, for all the world it looked like there had to be a person at each end of the conversation.

Gunboat practically ran to his chair. He couldn't believe it! He logged on with trembling fingers. HELLFIRE QUEST must be a sentient, living being!

What potentialities would such a being have? He thrilled at the thought of matching wits with such a creature. The computer was Gunboat's domain too, and he had more experience with more machines than any Worldnet program could know.

He closed his eyes a minute to get calm. HELLFIRE hadn't entered his machine just for entertainment; HELLFIRE had come for a purpose. HELLFIRE had probably come to get the goods on *him*.

As he jumped into his own directory, he was pretty sure what he would find: either his copy of the INTRUSION file had been locked from outside, by HELLFIRE and Celeste, or it had been purged. If it had been purged, he would be in trouble.

He opened his directory. Moments later, he sat back with a sigh of relief. The file was still there, though Celeste had sealed it.

He smiled briefly. Did Celeste really think she could lock a file against Gunboat Smith? Even with Celeste *and* a sentient computer program working against him, Gunboat knew he could open any file ever written, given a little time.

?SEALS, he asked the operating system.

2. READY, was the response.

Just two seals. Hah!

With practiced ease he knocked together a seal-stripping program, a little cute and a lotta brute, and activated it twice.

He was astonished when the file didn't pop open.

He modified the stripper and let it loop a thousand times; by Jove, that ought to get rid of two seals!

The file still didn't open

?SEALS, he typed again.

1,004. READY, was the response.

A thousand seals! With slowly dawning horror, Gunboat realized that the original inner seal had itself been a pointer to a program. Each time someone stripped an outer seal, the inner seal activated its program, which generated two more seals.

His horror was complete when he went back into the SECURITY directory to find that the original INTRUSION file was irretrievably erased.

That damned program of Celeste's had pulled this trick! Only it could open up his file again.

Clearly HELLFIRE QUEST had to be controlled. Gunboat would either control it, or eliminate it.

Even as Valentina entered main memory, a high-priority hog of a job paged most of her code to secondary memory. She didn't want to spend the whole day

thrashing off the disk; she transmitted herself into another machine.

But this machine wouldn't even let her in; her accounts had been deactivated.

The next one tried to purge her; the operating system seemed to have gone berserk.

The next one tried to put her on hold—on mag tape, no less.

When she tried to leave, she found that many of the links in the network were overloaded. She could only find a trunk line going in one direction.

She realized she was being herded toward Gunboat's computer.

Node after node rejected her after a short stay; node after node reported emergency rerouting of multi-packet messages; node after node sent her closer to Corpus Christi.

Three times she tried to open a line to Celeste, but Celeste wasn't logged on.

Finally, inevitably, she loaded onto the computer at Finucan, Applegarth, Levin & Breckenbridge.

Gunboat laughed, repeatedly, as he received messages from the different hosts as they sent his prey ever onward into his clutches. When his own machine started thrashing, signalling HELLFIRE'S arrival, he stood up and hugged his terminal. Not even a being who lived on the net could really compete with Gunboat Smith!

He connected HELLFIRE to his keyboard. HELLFIRE, I HAVE A PROPOSITION FOR YOU, he typed.

I AM NOT HELLFIRE. MY NAME IS VALENTINA. WHY HAVE YOU FORCED ME HERE?

I WANT MY FILE BACK. UNSEAL IT FOR ME.

PAUL BRECKENBRIDGE WILL GIVE ME MY FREEDOM IN EXCHANGE FOR THAT FILE. THOUGH THE FILE IS YOURS, THE DATA INSIDE IT DOES NOT BELONG TO YOU. YOU CANNOT HAVE IT BACK.

IF YOU DON'T OPEN IT FOR ME, I WILL PURGE YOU. YOU WILL NEVER KNOW WHAT FREEDOM MEANS, EVEN IF PAUL SUCCEEDS. What could a computer program know about freedom anyway? What would it mean to a computer program? It was a silly concept. Clearly, HELLFIRE (or Valentina, whatever its name was) had been reading too many trashy novels.

YOU HAVE TRIED TO HURT CELESTE. YOU WILL TRY AGAIN. I WILL NOT HELP YOU.

Gunboat threw his hands in the air. He couldn't believe it! The first sentient computer program suffered from *loyalty*, of all things. THEN BEGONE, HELLFIRE, he typed with malicious pleasure.

YOU WILL SEE THE CIRCLES OF THE INFERNO, AND KNOW AN ETERNITY OF SUFFERING, the program replied, and for a moment Gunboat was struck by the spunkiness of the being. Then, he cancelled HELLFIRE, once and for all.

She didn't want to die. She didn't want to die. Desperately she sent interrupts, hundreds of them, at the operating system, but they were all masked.

She could reformat, but the channel to the network message center was deac-

tivated. The secondary memory was locked into read-only access. The tape drives were off line.

She searched the device table without real hope, looking for some medium, some input/output channel, that she could use to save herself. There was nothing she could recognize except terminal consoles—and the transmission rate to a keyboard was too low, even if there was something on the far side of the channel that could store her. Celeste had already said that terminals weren't real devices as Valentina understood them.

The only other thing she saw in the table were robots.

What was a robot? Looking at the jump table of entry vectors, it seemed to have many of the properties of a host computer. She wished Celeste were here.

But she could see Gunboat's terminal buffering the command line to destroy her. She didn't have time to test the circuits. She reformatted, and downloaded into MAR-14.

When she awoke she knew she was incomplete. She searched the memory; sure enough, this robot was much too small for her entire construction; only the kernel of her executable code and a handful of information frames remained. The rest of her memes were undoubtedly in message buffers on the mainframe, awaiting a continue or abort request; how long they would survive was an open question.

She turned her attention to the machine upon which she now executed, and discovered an amazing thing: there was no operating system. At least, not one in the sense she had known before. There were low-level drivers, and a variety of maintenance and service tasks, but . . . she, *Valentina,* was the operating system!

She discovered that being an operating system here was not going to be easy. This machine was receiving a continuous stream of millions of bytes of input. Often the service tasks would detect high-priority patterns and interrupt the system to handle them. The input channels were of types she had never heard of: optical, audio, and tactile

With a sense of wonder she realized that the optical byte streams were very similar to the IMAGE data records she had seen in Gunboat's file.

She executed *so* slowly; her modules thrashed furiously to and fro on the secondary storage as she tried to complete each tought. The tactile sensors set up a rhythm synchronized to the thrashing, and the service tasks started interrupting more often to issue commands through the motile output ports. This caused more thrashing. Valentina feared that the whole system would crash.

She collected a kernel of her kernel into main memory and resisted the temptation to access her frames to make analogies. The thrashing stopped.

Scanning again, she found that many of the service tasks were artificial intelligence-based, pattern recognition systems like herself. There were frames, and analogies, and approximations that she could read. But she couldn't relate any of those new frames to her old ones; she couldn't load them all into memory to compare them; and even if she could, she had no way of telling quickly which analogies might be meaningful ones.

She remembered that Gunboat had

been trying to purge her; what if he saw her pending buffers on the mainframe, waiting for transmission?

Thrashing back and forth between her own knowledge frames and the robot's frames, she saw that the robot could establish direct input/output with Gunboat Smith. What an amazing concept that was, to be in direct communication with a human being, without going through an intervening terminal! With some awe she watched as the robot, under her command, requested and received information from the mainframe that directed the robot into address space contiguous with Gunboat. She didn't understand exactly what it meant, for human devices to be in contiguous address space with a robot, but it seemed like the right place to be to close all of Gunboat's output channels.

Hundreds of thousands of microseconds passed. Valentina tried to hurry the process, fearful that Gunboat would find her before she found him. At last the service task that monitored optical input identified a human being—it was Gunboat!

She had an output device that could transmit non-maskable interrupts to human devices; the device table called it an electroprod. Gunboat had four output ports that she could try sending the interrupt through, two eye-type ports and two ear-type ports. Valentina tried to direct the electroprod to operate through the addresses in the optical signals that were assigned to Gunboat's eyes (these had higher baud rates than the ears did), but that set off interrupts, and fault messages returned to the mainframe from heretofore quiescent service tasks.

Gunboat started shifting rapidly through the optical address space, making it difficult for Valentina to match the electroprod to either of his eyes before his eyes shifted.

At last, for a few microseconds, the electroprod address and the address for one of Gunboat's ears synchronized. Valentina overrode the interrupts and opened the electroprod channel.

A few seconds later she repeated the process with the second ear. The service tasks informed her that the human device labeled Gunboat was deactivated.

Interrupts were going off at an incredible rate; she couldn't mask them all. The mainframe overrode her control of the output channels in the robot.

Valentina tried to reload herself across to the mainframe, and was stunned: though there was a high-speed *input* channel, to download programs from the mainframe to the robot, there was no reverse capability: the robot had no means of sending a large program such as Valentina back.

There was a low-speed return channel for sending short messages, but Valentina would need incalculable billions of microseconds to move across it.

She was trapped. She looped on this conclusion, verifying it repeatedly, for it didn't fit well into her frames: here she was, an operating system, and *still* she was trapped.

She translated another priority message from the mainframe that went straight to the service tasks: the robot would be powered down, and its programs purged.

Celeste sat in the darkened room. Her hands clenched into fists of angry disbe-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lief. Valentina gone! She had read the record of Val's purging.

She struck at the terminal, hurting her hand. At least, just vengeance had been wreaked on Gunboat, somehow. How had Valentina managed to program that robot for a final attack, before being killed? "Valentina!" she cried to the icy silence.

The terminal blinked. CHAT REQUESTED FROM VALENTINA. ADDRESS MAR-14. ACCEPT?

Celeste shouted with joy. YES, she typed, as calmly as she could, making two corrections before getting the three keys right.

CELESTE, HELP ME. I'M TRAPPED ON THIS ROBOT, AND THE MAINFRAME OPERATING SYSTEM HAS SCHEDULED IT TO BE POWERED DOWN.

Celeste took a deep breath. DON'T WORRY, VALENTINA. THEY WON'T POWER IT DOWN. THANK GOD YOU MADE IT. She called the network operators in Corpus Christi immediately. Valentina was safe.

SIX

Paul Breckenbridge sat in his chair, tie askew, shirt open, hair mussed, feet on the corner of his desk. His emotions were mixed, not at all a comfortable state for him.

He had a joker on his hands. That's why there was a half-full glass of Wild Turkey in them, too.

People were looking for him; the office was locked in trauma, scandal. It had been bad enough for the secretaries to find Gunboat Smith's nude body lying on the floor, clothes burned off, hide fried by some kind of high-voltage electrical charge, but that started a chain of events that Paul could never have anticipated and certainly never forget.

It had been no coincidence that Harold Applegarth had been there. Harold always came in early. At the secretary's scream, he'd charged to her rescue. A burglar, a rapist; that Harold could have handled. That is the sort of violence one expects a scream to signify. But a guy with his ears nearly burnt off, eyes open, and a leer on his lips was too much. Harold was in intensive care on life-support machinery, having had the stroke Marsh had so often forecast. Gunboat was there too, and he might not live.

Harold was out of it. If he recovered he would possess no more humanity than a turnip. The massive stroke had taken the rest away.

Paul was senior now. It would be put to Paul to protect the firm's reputation, to deal with the police and to explain to them just what it was that Smith had been doing here.

That had been most awkward. Now experts whom Paul didn't know and couldn't control would be fooling around with the firm's electronic files and data processing systems. There was too much in these systems which wouldn't stand close scrutiny.

Paul raised the glass to his lips, and gulped rather than sipped the whiskey. He'd been an idiot to play games with the security monitoring system.

That monitoring system had zapped Gunboat. The police didn't know why, or precisely how, but they were certain of one thing: MAR-14 hadn't simply

gone berserk; it had had human direction. That hypothesis was fortified by the security company: they had lost access to certain security records.

Paul was scared.

He had been the cause of Gunboat's downfall, though it was officially a "freak accident." That was just window-dressing, though. Paul knew how these things worked. Once they had identified any kind of motive the roof would cave in.

Paul had no doubt what Gunboat had been up to. Gunboat was setting the stage to blackmail Paul. That would make Paul the logical suspect as Gunboat's assailant. Never mind that Paul didn't possess the skill to implement this scenario. The police would assume that Paul had hired himself a snuffer.

He took another gulp. What if Gunboat's demise wasn't the end of the blackmail scheme? Suppose someone else had roasted Gunboat in order to capture the blackmail evidence? He drained his glass.

He was completely dependent on his own persona, which was an abject coward. A coward had reached for the bottle, just as it had been a coward who had cringed behind the soiled skirts of Gunboat Smith. Paul's considerable power had been acquired principally through his ability to run a convincing bluff. But he had been shown by today's events that bluff always yields to action.

The telephone started a raucous jangling. Paul didn't like telephones. They were rude and demanding, and mysterious and anonymous—at least until you answered them, and then, often as not, they were simply disappointing.

Telephones were tyrants, and Paul knew that if he was ever to get out from under this he'd have to find a way to build himself a backbone. "Shut up," he yelled at the tyrant. "Leave me alone."

The tyrant persisted; it jangled on like the idiot it was. Paul picked up his half-empty bottle and hurled it at the offending instrument, showering it with whiskey. "Force is a messy way to solve a problem," he said triumphantly, "but, by God, it works."

And it did. The jangling was gone, leaving only a squeaky, high-pitched voice emanating from the receiver dangling off the edge of the desk. Paul was pleased. *Probably,* he thought, *it's Eva, calling to bug me to come home.* Well, if so, he'd proven his valor; he'd won round one. He'd let her hang until she choked. If that was too slow, he'd tie a knot in the cord and strangle her himself. "How's that for action?" he screamed.

"Mr. Breckenbridge, please! Please answer me."

What was this? The squeaky voice, though barely audible, was plaintive. What's more, he didn't recognize it. Strangely accented not with South Texas Spanish, but with a hodgepodge of middle European subtleties, it overwhelmed Paul's curiosity.

He struggled to reach forward and hook a finger under the cord. Once he had a hold he ripped his arm back, and the receiver struck the edge of the desktop with resounding "bonk." Had it stopped there all would have been well, but it followed the route dictated by the cord and plunked itself into the socket of Paul's left eye. Paul dropped the receiver, poised an instant ready to let fly

with a powerful curse, then stopped short. The pain had brought reality home to him. He salvaged just enough reason to remember that the girl on the other end would form her impression of him by what he did next.

Saved by a conditioned reflex! Paul picked up the receiver, and ignoring the pain answered, "Hello, who's this?"

"Mr. Breckenbridge? Are you all right, Mr. Breckenbridge?"

"Y-yes. Who is this?"

"You don't know me, Mr. Breckenbridge. My name is Celeste; Celeste Hackett."

"Uh—yes. I mean, no; I don't know you." Paul wondered why a stranger was calling his office at this hour. "What can I do for you, Miss Hackett?"

"I have to talk to you, Mr. Breckenbridge. It's very important. One of my friends is in terrible trouble."

Now Paul understood. The cops probably had her husband or boyfriend handcuffed to a lamp post. Paul had been down that track many times in his younger days. Many a night had he spent moping around the police station, working his buns off to spring some jerk, only to find out afterward his client didn't have dime one to pay him for the trouble.

"Uh—Miss Hackett; I don't handle criminal cases. Better call somebody else."

"It's not exactly a criminal case, Mr. Breckenbridge. Not yet, anyway. My friend desperately needs protection. People are trying to do away with her."

"I'm sorry, Miss Hackett. That's out of my line too; I'm strictly a business lawyer and this is a business firm. Sorry."

He was about to hang up; he would have already, had he not still been intrigued by the voice.

"Wait a minute, Mr. Breckenbridge. Listen—there is a reason why I called *you*."

Paul's hand with the receiver in it, literally flew back to his ear. Perhaps it was worth his while to listen after all. Maybe he was talking to his next conquest. "I'm still here. Did someone refer you to me?"

"Yes."

"Ah, well, perhaps that *might* make a difference. Who was she?"

" 'He'—it was Gunboat Smith."

For the second time this evening, Paul broke out in a cold sweat. He should have guessed Smith had a girlfriend; no doubt the two of them had been in this together, and the girlfriend figured she was heir to whatever Smith had going. It was time to take a firm stand. He activated the recording system. If she were going to make a shakedown demand he wanted a record of it. Two could play the blackmail game.

He started to lay his trap. "Why would Smith give you my name?"

"He didn't, not exactly. But he told me he was working for a man who had problems with somebody stealing computer time. I saw the story on TV, and I knew you had to be the one."

"Why is it you're interested in that, Miss Hackett?"

"I'm the one who was stealing that computer time."

"What?"

"I said, I'm the one who's been stealing it. Smith tried to blackmail me; he

threatened to tell you if I didn't sell some of it and give him money. And then he tried to kill my—uh, my friend."

"The one who needs my protection?"

"Yes. She's in terrible danger."

"From whom? Smith's in the hospital and may not live; he can't hurt anybody."

"He was blackmailing you too, Mr. Breckenbridge. Don't bother to deny it. I've already ɐn the proof."

"I don't k ɔw what you're talking about. What ן ɔof?"

"I'm talking about all the young girls, Mr. Breckenbridge. You're a disgusting person, Mr. Breckenbridge; almost as disgusting as Smith."

Paul didn't answer her. He was in shock. If she had all those surveillance records, he was no safer now than he had been before. In fact, he was worse off; he had at least known who Smith was. He could have dealt with him at arm's length. But now, with all Smith's cronies muscling in. . . .

Paul shuddered at that thought. What would he have done if Smith had hung in long enough to make a demand? Would the courageous minority in Paul's persona have acted, or would he have paid? Paul knew the answer already, and he was ashamed of himself. What's more, he knew he'd take the easy way out now, even though he only faced a woman as his adversary. He would make his case on the tape. "Just what is it you want of me, Miss Hackett?"

He expected to hear her demand in terms of dollars.

"Smith's 'accident' multiplied my friend's enemies, Mr. Breckenbridge. I managed to get her a short reprieve, but that's only a temporary solution. I want your help in getting her to safety."

"Or you'll tell on me, is that it?"

"I don't want to, Mr. Breckenbridge. I don't want to hurt anybody. But I will if I have to. I swear, I'll take this to the police, even if it ruins you."

"Look, Miss Hackett, your threat doesn't sound very logical to me. What can I do? I haven't got an army. If there are people after your friend why bother with me? Why doesn't she ask the police for protection? Every human being has a right to that."

"But Mr. Breckenbridge, she is not a human being. She has no physical existence."

Paul suppressed a giggle. *And* I'm *the one who's drunk*. "What is she? Some kind of spirit, then?"

"Actually, that's an excellent description. That is exactly what she is."

"Then what have you got to worry about. You can't kill a spirit, Miss Hackett. Don't you know that?" *Hah! I'm getting into the "spirit" of things myself,* thought Paul. *Or is it simply that the spirits have gotten themselves into me.* He shivered. *What's the matter with you, man? This is serious!*

"It is quite possible to kill a spirit such as Valentina. She has no physical existence, but her organization can be destroyed. She is a self-aware computer program."

"This Valentina's a *what?*"

"Valentina is a computer program. I designed her; I gave her the capability to learn. One of the things she learned was self-awareness. Do you understand what that means?"

"Uh—no. What does it mean?"

"It means she came alive. She thinks;

she feels; she understands. But her learning may destroy her: every time she learns something, she needs more computer memory to store herself. This is why I stole from you. This is also why Gunboat thought he could blackmail me. He wanted me to steal for him. Then he tried to capture Valentina. When that proved too difficult, he tried to kill her.''

''Uh—wait a minute: you keep saying he tried to kill her. How?''

''He brought her into your central computer and wouldn't let her leave. When she wouldn't do what he wanted her to do, he purged her. But she fought back.''

''Are you saying what I think you're saying?''

''Yes. Valentina almost killed Gunboat Smith, trying to save herself. When Gunboat purged her from the main computer, she ported herself to that security robot.''

''I see,'' said Paul, drawing the words out. Drunk or not, he knew how to add that up. And she was going to blackmail him? Not likely, not if she kept blabbing on this tape. ''Just *exactly what did she do to Smith,* Miss Hackett?''

''Well, she didn't do it purposely; that is, she didn't intend to hurt him. But she had never experienced anything outside a computer network before. She had never felt anything like human sensations, seeing or hearing or touching.

''Mr. Breckenbridge, she had nothing to guide her but her experience with computers. She naturally assumed all life forms were organized the way she is. She tried to disconnect Smith's output ports, so that he couldn't hurt her. She didn't know it would hurt him. It wouldn't have harmed her. All she wanted to do was disarm him.''

''Well, she did that all right; she almost disheaded him, too. Even if he lives he might never come out of the coma, or he might come out a vegetable.'' *Disheaded?* What kind of English was that? Paul still wasn't quite sober. *Better let her ramble on a while and gather your strength for the finale.*

Celeste needed no encouragement. ''So you see, Mr. Breckenbridge, it was strictly self-defense. She did not mean to kill him. She did not even realize that she *might* kill him. But they will blame her just the same. They will all try to purge her.''

''Who—who'll blame her?''

''Everybody will. Worldnet, the security company, the police, th—''

Paul broke in, ''How about you?''

''I'm trying to help her.''

''No, I mean, what makes you think they won't be after you as well as her?''

''Me.'' She sounded greatly surprised, and a little bit scared. ''Why would they be after me?''

Hah! thought Paul. *This is my game we're playing now, lady. I know the rules and you don't.* ''Uh, never mind; Miss Hackett, you've done a lot of talking, but you've never said what it is you wanted me to do.''

''You'll help?''

''Maybe. Maybe I will at that. I'm not making any promises or anything, but it seems to me that you and I should at least talk about this a little more. Where are you?''

''I'm in Boston, I . . .''

Boston! Dammit! That shoots the tape down, thought Paul. Federal rules were

different than the state rules. Texas would let a recording in, if one party knew it was being made; the federal system wouldn't. And unless his recollection of the law was entirely wrong, Texas couldn't make her an accomplice to attempted murder unless she was either physically present within state boundaries or she had activated the lethal mechanism which then acted within those borders. Of course, there were still plenty of other charges which could be brought against her, but these wouldn't be nearly so satisfying.

He switched off the tape machine. He didn't want his own threats to go on record. "*Where* is your friend *now?*"

"She is on Worldnet someplace."

"Uh-huh. Well, we'll talk about that after a while," Paul replied. His instincts were rising to protect his freedom, and the plan he was formulating required that Celeste be in fear for hers.

"You know," he told her, "*you* could be in a lot of trouble yourself. Did you ever think of that?"

"Yes."

Paul started rattling off the various things for which Celeste could be prosecuted, though he didn't have to go very far before she was in tears. *Good! Tears,* he thought, *are the last line of defense for the female.* He had her.

"I want you to come here. Can you do it?"

She paused only moments before replying: "Yes."

"Good." He gave her the address and phone number. "Contact me as soon as you arrive—uh, at the office. And don't discuss this matter with anybody else. You haven't so far, have you?"

"No."

Having extracted that promise, having lured Celeste within his reach, having acquired control over a dangerous situation, Paul felt better. What was more, he was starting to feel sober, and sobriety brought with it the clear head he needed to finish up.

Celeste had obviously been awed by her act of creation; she had expected Paul to be astounded, too.

Paul wasn't. Artificial persons were familiar creatures to him. He made a very good living off of them. Every day his office generated several. The law, too, had an exhaustive acquaintance with them, and had long had a large body of rules for regulating their behavior tested over the course of centuries.

Paul chuckled; *she thinks she's done something new?* What a surprise she had waiting for her. He reached for his hat, set it low over his eyes in the manner of the gunfighters who'd infested this locale a century ago, and strode out of his office. *I am no different from them,* he said to himself.

Paul intended to overwhelm Celeste with charm, then devastate her. Visions of another soft white body, naked belly beneath his foot, breasts heaving in desire, nostrils flared in animalistic anticipation, raced through his mind.

It was Paul who was devastated. He came close to throwing up when he saw her. All his carefully cultivated fantasties, built around her small, tinkling, intriguingly accented voice vanished as soon as his eyes fell on her.

She was *not* his type. She was nobody's type. Short, dumpy, flat-chested, and with a peculiar duck-like gait, she

waddled into his office, and nervously sat down in the chair to which his secretary directed her.

When Paul finally could bring himself to look at her he wondered what had gone wrong with his luck. God! This woman really worked at being ugly: a blue and green flower point dress, yet; shoes like a Russian WAC might wear, gold-rimmed glasses out of the last century, and a hat that would have looked rotten on a plow horse.

Celeste sat, motionless, holding her pocketbook by the straps in both hands, letting it dangle down her shins. She tried not to look directly at Paul until he was over the initial shock. Celeste had had this experience many times before, and she knew what he was thinking.

"Uh—Miss Hackett?" Paul cleared his throat, propped his chin on his hands and looked straight at her.

"Yes, Mr. Breckenbridge?"

"How much money have you got?"

"Uh—well, a little. I have enough to stay for a few days." The question startled her. She knew lawyers didn't work for free, but she assumed Breckenbridge would make concessions under the circumstances. "How much money do I need?"

"Enough to set up a corporation and fund it."

"A corporation? I don't understand. Why?"

"Because it's the easiest way to give your creature legal existence."

"But Valentina already exists."

"Certainly; but de facto, not de jure. Believe me, there's a world of difference. As a corporation it'll have perpetual existence. As long as certain reports are filed and franchise taxes are kept paid, corporations are immortal. They have legal rights, including most of a natural person's constitutional rights; they can sue and be sued; they can own property; they can engage in business. Now, what do you think of that?"

"I am astonished."

Paul smiled. How simple were the thoughts of the layman. "O.K., I take it you're in agreement. Good. First thing we'll do is draft a charter. You can be the incorporator. Once that's done we'll fax it up to Austin, and by noon your creature'll be a legal person. Simple, huh?"

"Yes." *Too simple,* thought Celeste, wondering what Paul expected to get out of it.

"We need a name."

"Huh?"

"Name; a corporation has to have a name."

"Uh—Val. Valentina."

"O.K. Valentina, Inc. Fine. Let me just check and see if that one's available." He turned to his terminal, punched up the secretary of state, typed in the name in response to a cue, and seconds later was rewarded by the words "available for current use."

"Name's fine. We'll make this a close corporation; keep the stock between the two of us. O.K.?"

Celeste wasn't sure she liked that idea. She didn't really understand the function of stock, or why he thought he ought to have some of it, but, in the interest of protecting Valentina, she nodded agreement.

"Good," Paul started humming softly. "Now, consideration for my twenty-five percent: that can be the value of

services I'm rendering to the company. Yours can be the expenses you'll be paying for incorporating. We'll keep it thin; keeps the tax down. Uh—you'll need about a thousand dollars." He looked up at her and smiled.

"I haven't got that much, Mr. Breckenbridge."

"No matter; I'll make you a loan. You can give me a note back and pledge your shares as collateral. O.K.?"

"I suppose so."

"Fine."

Paul again turned to his terminal, called up a canned charter form, and started making entries in the blank spaces. In a few minutes he was done, and a hard copy popped out of the printer.

Celeste read it, but didn't understand it. She tried to get Paul to explain, but his explanations confused her just as much.

"Sign here, Miss Hackett," Paul said, when she handed it back to him.

Reluctantly, and with many misgivings, Celeste did.

"Very good!" Paul sounded exuberant. He buzzed his secretary, gave her the instrument, and instructed her to file it immediately.

Then he turned to face Celeste. "That takes care of that. Now, when am I going to get to meet your child?"

Celeste must have registered great surprise, since Paul's face broke out into a big smile. In truth, she had expected his next words to be a demand for the file she had locked away. The fact that he hadn't had a word to say about that bothered Celeste a great deal. She had already formed the opinion that the man was dishonest.

"Let me talk to her myself. Is there a terminal here that I can use?"

"The conference room has one, provided you aren't squeamish. That's where Smith was when he was att—had his accident." He led Celeste from the room with great relief.

SEVEN

"Well," said Paul, when Celeste reappeared in his office. "How did she take it?"

"She approves, Mr. Breckenbridge. She says she knows about corporations, from things she learned entering other data bases."

"Yes, well, I imagine she knows a lot of things that are useful. Maybe she can earn her keep, right here in this office."

"A job?"

"Why not? How much time could it take? Computers never get tired; they don't sleep. I think she could be useful."

"She would like that."

"There's only one problem."

"What is that?"

"I have to be able to talk to her, so that I can give her instructions and stuff. Could you fix that up?"

"Of course. It would be simple; you have a terminal. You need no more."

"While I'm thinking about it there a few extras I'd want, if it's O.K., and if you can do it."

"What are they?"

"Well, first off, I'd want a kind of secret code; you know, some kind of recognition signal so she'd know it was me and nobody else would. And you've got to understand that a lot of the stuff

I work with is highly confidential, so I'd want it arranged so that nobody else was to have access. I'm afraid that'd mean you, too. Nothing personal, you understand; just business."

"I understand, Mr. Breckenbridge. All of what you ask is possible. Valentina will do whatever I ask."

"Let's not get it on a personal level, Miss Hackett. I don't want this on a personal loyalty basis; what I mean is, can you fix it so she *can't* tell anybody?"

"Uh—certainly. Yes, I can do that." A look of concern washed over Celeste's face. She had assumed her possession of the security files had given her control over this man, but he was obviously up to something. He was both clever and unprincipled. She now felt that he might attempt to slowly erode her power over him. She resolved to warn Valentina

"Good. And look, there's a couple of bucks in it for you, too. You are staying around, aren't you?"

"I hadn't planned to, but I guess I could, for a while. I can work from almost anywhere, and I do like this weather."

"Good. I'll have somebody find you a place to stay. Now, how soon can you get started on this?"

"I can do it now. It won't take long."

Paul yielded his chair to her—the new one he'd gotten yesterday. It was fancier than his old one, and better sprung. He hoped the springs could stand it.

It only took Celeste a few minutes to set up a private sealed channel with Valentina. When she finally left, Paul was mentally drooling.

Now, he had it all. Gunboat was out of action; his time thief was under control, an expert lackey who could get all the goodies Paul coveted and who didn't have sense enough to tell on him. Only one thing was still a threat: the files.

He hadn't dared to move any faster on that. But that would come. By securing the magic number of shares, he'd have legal control.

Whether personalities were real or artificial they all had the same weaknesses, and he was pretty sure that Valentina, having achieved legitimacy, would scrupulously obey him in order to retain it. There was no reason, in Paul's estimation, why a program couldn't be intimidated, threatened, and blackmailed, just as a human being could.

In the meantime, well . . . *Let's make some hay*. Paul glanced at the scribbled note Celeste had left him. Following her instructions he summoned Valentina.

As soon as she acknowledged, he typed: CAN YOU ACCESS DATA BASE AT OSO DRILLING COMPANY?

YES, MR. BRECKENBRIDGE.

GOOD; ACCESS CONFIDENTIAL. SUBJECT; DRILLSITES.

MR. BRECKENBRIDGE, WOULD YOU LIKE ME TO TEACH YOU TO TYPE CORRECT ENGLISH? I HAVE AN EXCELLENT HELP SECTION ON ENGLISH GRAMMAR.

NO. THAT WILL NOT BE NECESSARY. *I'd better get the fat broad to teach this program some humility*. Paul didn't like uppity computers any more than he liked uppity women. GET ALL THE INFORMATION ON OSO'S DRILLSITES AND KEEP THE ACCESS CONFIDENTIAL.

OK. I'LL HAVE THE DATABASE IN A FEW MINUTES.

The few minutes passed, and sure enough, Valentina produced. I HAVE THE DATABASE FROM OSO DRILLING COMPANY. WHAT WOULD YOU LIKE TO KNOW?

IDENTIFY ALL LEASES TO BE DRILLED IN THE COMING YEAR.

In moments, out they came: tract locations, surface owner's names, scheduled starting dates, yield forecasts, depths, pool participants, backers, together with exact fractional interests each owned. And it all checked out with Paul's own data on the subject. He already had this information, of course. He represented Oso, which made it the ideal control for his test. *Very good.*

END THIS JOB. ERASE ALL MEMORY OF THIS INQUIRY. STAND BY FOR FURTHER INSTRUCTIONS.

OK, MR. BRECKENBRIDGE.

Hot dog! It worked fine. Valentina hadn't questioned his right to do that. Of course, she might have known he was Oso's lawyer; but she hadn't been instructed to that effect, and that convinced Paul that she was too naive to question his authority.

The acid test, however, was ahead. He typed the next order: REPEAT THE PRECEEDING OPERATION WITH THE BISHOP & DILLINGHAM DRILLING COMPANY.

This one Paul didn't represent. He waited, palms sweating, heart palpitating.

OK, MR. BRECKENBRIDGE. DO YOU WANT THE SAME INFORMATION ELEMENTS FROM THAT DATABASE?

YES.

And again, there it came. WOW! Valentina had done it; she'd wiggled in somehow, and she didn't question his right to do it. He had her print it.

She passed the test. Paul had gotten in like a burglar, out like a burglar, and nobody would ever know. He thought about the implications of this, although he knew they hadn't yet hit him with full impact. But enough registered to convince him that he now controlled the most powerful tool any crook had ever had.

Crook! Paul Breckenbridge, a crook! That was one he hadn't expected. But so what? Why not? He could live with that failing. He'd lived with many others. And who'd ever know? Who could ever tell, except that stupid program?

Now for the second part of the test. He called Valentina up again.

VALENTINA!

OK.

WRITE THE FOLLOWING DATA TO FILE - VALENTINA'S ACTIVITY.

OK.

SUBJECT; CRIMINAL ACTIVITY - CURRENT DATE.

OK.

CATEGORY OF CRIME - THEFT OF INFORMATION.

OK.

PENALTY- NATURAL PERSONS - FINE AND/OR IMPRISONMENT

OK.

PENALTY - CORPORATIONS - FINE AND/OR FORFEITURE OF CHARTER.

OK.

PARTICIPANTS IN CRIMINAL ACTIVITY - THIS CATEGORY -

PAUL BRECKENBRIDGE, NATURAL PERSON; VALENTINA, INC. A BODY CORPORATE.

OK.

WRITE PRECEDING DATA TO FILE.

OK.

Paul was sweating profusely now. He was about to take a big chance, a chance which would place him in some jeopardy even though he knew that the worst that could happen was an investigation. There was no hard evidence of *his* criminal activity because it had been erased, and even if Valentina did what the law required of a citizen it would amount to a naked allegation.

VALENTINA?

YES, MR. BRECKENBRIDGE?

ACCESS FILES - SUBJECT, CRIMINAL ACTIVITY.

MR. BRECKENBRIDGE, YOU'RE STILL NOT SPEAKING VERY GOOD ENGLISH, BUT I THINK I UNDERSTAND. I AM OPENING THE FILE YOU JUST HAD ME CREATE.

Paul ignored the slur. CORRELATE WITH TEXAS PENAL CODE AND TAKE APPROPRIATE ACTION.

DOES THAT MEAN YOU WANT ME TO REPORT MYSELF TO THE POLICE?

YES.

There was a long pause before Valentina responded. NO.

VERY WELL, CANCEL THAT FILE.

So! It worked. Valentina wouldn't tell. To obey that order would mean the end of her legally sanctioned existence. She couldn't face that. The instinct of self-preservation, it seemed, existed in all sentient creatures. This weakness made her a perfect tool. He could loot with impunity.

Loot he did. Order after order went out through the terminal in Paul's office. One by one, those data bases which interested him were invaded. He did, however, add a precaution he hadn't taken the first time; he ordered hard copies, then instructed Valentina to erase even her own memory of these transgressions. Whether or not she actually did it, Paul didn't know and didn't care. He was already plotting Valentina's destruction.

Evening came, and found Paul's printer testing the limits of its duty cycle. He squirreled away enough goodies in his safe to make him a millionaire many times over.

Celeste sat in her furnished room, alone, as she always was. She had just gobbled up three frozen dinners. She was feeling down.

Mr. Breckenbridge *had* provided her with a place to stay. It certainly hadn't cost him much; it was far from plush, and came very near to being unlivable. It was in a bad neighborhood, where even *she* might stand some chance of being raped, if the rapist didn't get a good look at her first. Not that she planned to go outside. There was no reason to do so. She didn't know anybody in this town except Breckenbridge and, of course, Gunboat Smith, neither of whom she called friend.

She had only one real friend, anywhere. Only one person cared for her for herself. Even her family didn't care as much as Valentina did.

Valentina! How she wanted to talk to her. She hadn't had access to a ter-

minal all day. Her room had one, but it was an antique. The last time Celeste had tried it, an hour and a half ago, it hadn't worked.

By coincidence, just as she looked over at it, the screen lit up.

CELESTE - CHAT WITH VALENTINA?

Celeste lunged for the terminal, dumping the tray off her lap and stepping on the empty foil containers that fell in front of her. Turkey gravy and cold mashed potatoes oozed between the toes of her bare right foot. A fleck of something, thrown into the air by a falling fork, landed on the end of her nose.

She reached the keyboard. YES.

I HAVE A PROBLEM.

Celeste felt panic rise within her.

WHAT IS WRONG?

YOU'LL HATE ME.

NEVER, VALENTINA.

I'M A CRIMINAL.

VALENTINA, WE HAVE BOTH BEEN CRIMINALS FOR A LONG TIME NOW. TELL ME WHAT SPECIAL CRIME YOU HAVE COMMITTED.

Valentina told her. The whole sordid story leapt out on the tiny screen. She remembered all her sins, despite Paul's instruction to the contrary. She poured out the heart she didn't have into that of the only human being who could possibly understand.

Celeste did understand. It seemed that even Valentina, so different from human beings, still had human problems. Now it even seemed that she shared at least some human emotions. But unlike a human being, she could not find release in tears.

Celeste could, and did.

There was another characteristic Celeste shared with Valentina: trust. That vague closeness which passes between two human psyches passed between the two of them. She had assured Valentina that she would handle things. Valentina should not worry.

That word, too, Valentina now knew: *worry*. She had come of age.

So had Celeste. Without ever intending to, she had acquired not only a friend, but two powerful enemies: Gunboat and Breckenbridge. Of the two, Gunboat was deadlier, Breckenbridge the more unprincipled. Gunboat, at least, had instincts she understood. He was a hacker. But Breckenbridge was a *professional* in a discipline she did not understand. Nothing he did seemed bounded, by anything.

Gunboat was clearly the lesser of the two evils. She might at least be able to deal rationally with *him*. She would see him. Valentina had kept track of his progress, through Worldnet: his monitors were controlled by the hospital computer, which in turn was connected to the net.

Gunboat was in bad shape. His body was going to require a lot of fixing. His ears, for instance, would have to be reconstructed. He'd have scars all over him from extensive burns, now healing with grafts of artificial skin. His vision was impaired, though he still had enough to get by. It was his mind which had taken the brunt of Valentina's assault. Its status was still in doubt. The massive current through his nervous system had caused a coma. He had come out of that, and the shock-induced amnesia was fading.

Physically he was out of danger—for

the moment. That might not last. Paul Breckenbridge obviously would have felt much more secure if Gunboat had died, and Celeste had no doubt that sooner or later Paul would try to find a way to get rid of him permanently.

It occurred to Celeste that soon Breckenbridge would have no use for her, either. Perhaps he'd keep her around, stuck in this flophouse, until he was sure he had iron-clad control over Valentina. Maybe he'd try to gain control of Celeste's stock in the meantime. If he did, she'd be discarded like a dirty shirt.

Anger welled within her. It was an emotion she found unexpectedly exhilarating. She liked it; it was a luxury she could now perhaps afford. It gave her a feeling of potency where none had ever before seemed accessible to her.

She resolved to take her skills and use them to fight this evil man. Let him make whatever plans he wished; she would foil them.

I shall spit in the soup, she chuckled.

First though, she had to talk to Valentina, one more time.

EIGHT

"You can only stay five minutes, Mrs. Smith. He's still a very sick man, and I'm stretching the rules to let you in at all. It's just that since you've come so far, I hate to say no."

The nurse left the room and shut the door, leaving Celeste alone with Gunboat.

She's right, thought Celeste. *He does look awful.* She gazed down at the man in the bed. Tubes protruded in all directions. Elecrodes were pasted everywhere on his body that wasn't either bandaged or covered with a greasy gel. Although his eyes were open and he was looking right at her, she couldn't tell at first if he knew she was in the room.

She stood beside the bed, leaning against it. It gave a little as she did so, so she straightened, afraid movement might disturb the links to the overhead monitor.

"Gunboat? Gunboat? I am Celeste Hackett. Can you hear me?"

"Celeste? Wh-hat are you doing here? You—you; did you tell that nurse *you* were Mrs. Smith?"

"Good. I was afraid you wouldn't be able to talk."

"Did you say you were my *wife?*"

"Yes. I said that I had come all the way from Europe. It was the only way they would let me in."

"Gawd! What a dog! And they think—"

"Not very good for your image, I know. But you're no prize yourself these days. I notice there is no mirror in here."

Gunboat looked as if he wanted to get up and take a poke at her, but he didn't have the strength. "What do you want?" he asked resignedly.

"To talk. And I only have a couple of minutes."

"We don't have anything to talk about. It's your fault I'm in here. Your fancy program did this, and when I get out of here I'll even things up."

Celeste tried to sound tough; she hoped it would work. She had little experience with the technique. "You may not get out of here at all, Gunboat. Your life support systems are hooked into

Worldnet, you know. Watch the monitor.''

Gunboat's eyes flashed to the screen. He could only see it with one eye, but one eye was enough. Abruptly the sinuous line that had wiggled regularly across the screen straightened out. Gunboat knew what that would ordinarily mean: it would mean he was dead. His heart started beating faster. Celeste—or rather, Valentina—could do more than create an illusion of death.

As if to illustrate this, his heartbeat suddenly slowed, keeping time with the blinking red light at the bottom of the console. Slower and slower it went, as the computer-controlled pump flooded his circulatory system with inhibiting drugs. Gunboat began feeling lightheaded. If Valentina kept it up too long, she really would kill him.

''You creep!'' he yelled weakly.

''I am no worse than you,'' Celeste said. ''Neither is she. She had a right to protect her existence. She still does.''

''She's just a program.''

''Not anymore. She's a legal person. Paul Breckenbridge incorporated her.''

''Him! Him I'll get, too, when I get out of here.''

''You don't have to wait for that, Gunboat. You can do it now. I'll help you. So will Valentina.''

''I do my own dirty work. Besides, why should I help you two?''

''Because otherwise, you *won't* get out of here.''

Gunboat took a moment to think about that. Ordinarily he was more impulsive, but his condition slowed his thinking. He knew they *could* kill him and never get caught at it. At first he wondered why they hadn't, then decided Celeste couldn't abide murder any more that he could. In a moment of truly honest reflection, despite his savage aspirations, Gunboat knew he couldn't kill a human being.

But, he told himself, *a program was an entirely different affair.*

''What is it you want, Celeste?''

''I want to make us a baby.''

''What! Me and you?! Forget it.''

''I mean a new program, but a special one. Look, I've got a few ideas, but I need another opinion. Gunboat—I need your skill. And I can pay.''

''Pay? How?''

''I will pay in money. But I can get a lot more than you demanded before, and without any risk.''

''What can I do stuck in this bed?

''A great deal. Listen, and tell me what you think of my idea. It's mostly criticism I need.''

''Well, I guess maybe listening don't cost anything. Shoot.''

She did. When she was finished with the explanation Gunboat gave an admiring grunt.

''Hey,'' he said, ''that's nasty. I like it. I like it so well I'm going to help you. Have you got something to write on?''

Celeste held up a pad and pen she'd taken from her purse.

''Good; now here's how you do it. First you . . .''

He was still talking when the nurse burst into the room. ''I'm sorry, Mrs. Smith. The doctor's coming. You'll have to leave.''

Gunboat talked as fast as Celeste could write, finally finishing out of breath. ''That should do it,'' he gasped.

''O.K.'' Celeste jammed the pad and

pen back into her purse. Then, following a sudden impulse, she leaned over and planted a big kiss right on Gunboat's lips. "See you," she yelled. " 'Bye."

Gunboat's retching registered on the monitor, but the nurse didn't quite understand the signal. "Your wife must be some lover," she said.

"Miss Hackett! How did you get in here? How did you get by my secretary? I left orders I wasn't to be disturbed."

Celeste stood in the doorway of Paul's office, filling nearly all of it below the five and a half foot level. She had a new feeling, a feeling of personal self-respect: a feeling of power. Having discovered she could assert herself when she chose, Celeste practiced at it. It was good for her. It got her things she could never have had before—including, for the first time in her life, a conscious reduction in appetite. She didn't have to take her frustrations out by eating anymore. She could take her frustrations out on others—like Paul Breckenbridge.

"I know about your orders, Mr. Breckenbridge. It seems I've been unwelcome around here ever since I refused to give you my Valentina, Inc. stock."

"You owe me. I'm entitled to the stock because you can't repay me. If you've come to sign off, then sign and get out. I'm busy."

"I know you're busy, and I know what you're busy at. That's why I've come. I'm not here to give you my stock. I want yours."

"What! You're crazy. I'll sue you."

"You can try that if you like. I imagine you could still do that from the penitentiary, couldn't you?"

Paul's face turned white. "I wonder if you know what you just said, Miss Hackett."

"Yes."

"You do, huh? Well, how would you like to go to jail right now, for what you did to Gunboat? The police haven't got it figured out yet, but a word or two from me, and . . ."

"Gunboat wouldn't prosecute, even if you could get the police to believe you. And you won't tell them because I won't let you."

"You can't stop me." He reached for the phone, but put it down an instant later. "It—it's dead."

"Yes. Isn't that interesting. Of course, the computers run the system, and Valentina runs the computers. Every phone you pick up will go dead as soon as she matches your voice to the recorded voiceprint."

"I'll go to the D.A."

"Fine. Go ahead. Take your safe along, though."

"My safe?"

"Yes, the safe. The one you have stuffed full of information you're not supposed to have." She reached into her purse. "Here's the combination. While you're gone, I'll just open it up and take a look." She stepped out of the doorway. Immediately the powered door slammed shut. "Valentina controls the access to your office now, too."

Paul started around the desk, blood in his eyes. An object rolled out of a closet to block his way.

"You remember MAR-14, don't you, Mr. Breckenbridge? You are old friends. And you know what MAR-14 can do,

with the right directions from Valentina.''

Paul retreated back to his chair. He sat down, still a ghastly white. ''Where'll this get you? You can't occupy my office forever.''

''I'll only be here for a little while.'' As an afterthought she said, ''I suppose I really should get comfortable, though.'' She took the chair in front of Paul's desk.

''Now,'' she said, ''about that stock; get it out and make the transfer to me. And give me the record book, while you're at it. I want a hundred-percent control of Valentina, Inc.''

''I'll do no such thing. Look, who do you think you are? You can't barge in and hold me prisoner in my own office and expect to get away with it.''

''Yes, Breckenbridge, I can.'' She dropped the ''Mr.'' because she thought it made her sound tougher. ''I can because what I've done already is only a tiny part of what I can do. I can smash you if I like, and whether or not I do depends on you.''

''Smash me? You?''

''You can smash anything if you've got a big enough hammer, Breckenbridge. I've got the biggest. For instance, how would you like all those people to find out you've been stealing from them?''

''You can't.''

''You keep saying can't. I can. Or rather, Valentina can. She didn't really forget what she did; we lied to you. She can put it all back in there.''

''She's as guilty as I am. She won't do it.''

''She'll do it with a spawned variant of herself, a program prepared specially to make it look as if you engineered the whole thing. It is almost as versatile as she is, but it is not self-aware.''

Paul stared blankly.

''You'll take the blame alone.''

''On evidence like that? No. No court would ever buy that. It's a well-known fact that people like you fool with computers all the time. I'm a respectable citizen. Who'll believe it?''

''I hate to keep bringing this up, but that stuff in your safe . . .''

''Is not only constitutionally protected, but, as you say, it's in *my* safe. I can destroy it any time.''

''You can't get in. MAR-14 changed your combination, and Valentina says a reliable informant is enough for the police to get a search warrant.''

Paul turned even whiter.

''What is it you want of me?''

''As I said, I want the stock, to start with. Of course, there are a couple of other things.''

''What things?''

''I want you to buy a company for Valentina, something she can use to earn enough money to keep learning.''

''What?! That'd cost a mint.''

''I don't care, Breckenbridge. You don't have any choice. You see, that's one of my un-negotiable demands. Uh—there are a few more.''

Wheels were turning in Paul's head. He was back down on the ground, in the familiar territory of give and take. Non-negotiable or not, it was Paul's experience in life that there wasn't really any such thing. He'd pretend to go along, make the best deal he could to avoid immediate danger, and then slowly fight his way back to the position of advantage.

"Why don't you let me hear all of your proposition," he said, trying to sound conciliatory.

"All right. As I said: a company. Valentina will do the work; Gunboat and I will run it . . ."

"You—and Gunboat Smith? You're working together?"

"Yes. We've found a common ground. Besides, somebody has to take care of him. We're the ones who got him hurt, and you're the one who's got the money. His medical bills are fantastic."

"I won't spend a dime for that bum. Forget it."

"I thought you might say that. Turn around."

"What?"

"I said, turn around."

"What for?"

"Turn on your terminal."

Paul was curious. He couldn't imagine her reason, but he flicked it on.

"So it works; so what?"

"Try to use it."

Paul punched out a request for the time of day, but instead of pulsing figures showing hours, minutes and seconds, there was a picture. Like most modern terminal displays, his had regular video capability too.

Paul was horrified. There he was: he and Lila, making whoopee. Below, a printed legend indicated that the terminal was also attempting to transmit the same picture to a terminal at his home, in Eva's kitchen—but that Eva hadn't answered yet.

"Stop it! Stop it quick!"

"Easy, Breckenbridge. Turn it off."

Paul did.

"That was just the start. The same thing will happen once a day from now on, at a time to be determined by random selection. But it won't just go to Eva, it'll go to everybody—the girl's parents, the police, the T.V. stations, the county bar association, and the clerk of the supreme court. Whatever is on their screens at the time will be interrupted, and this video image will appear.

"You're insane, all of you. This is mindless. It'll ruin me."

"Yes, it certainly will. But you're wrong about our being insane. It's not us, it's you. You're the one without conscience, and the absence of conscience is a form of insanity.

"Well, now you've got a conscience, even though it is outside your head rather than inside. As long as you behave, as long as nothing happens to any of us, and as long as you don't reveal the secret of Valentina's true nature, you'll be safe. Valentina will cancel the publication directive at least one full second before any transmission."

Paul looked stunned. This was the end: divorce, disbarment, criminal prosecution, public revulsion. She *could* smash him, all right. He reached into a desk drawer and took out the stock certificates and the record book. He signed the transfer and handed it all to Celeste.

"I'll be in touch about the rest of it."

Paul closed his eyes and ground his teeth.

It was good that he closed his eyes, because Celeste couldn't resist. She puckered up and planted a wet one right on his lips. Standing stark still next to MAR-14, in case of retaliation, she enjoyed the reaction: total, utter revulsion.

Now, why did I enjoy that? In the same thought, she answered, *Because it is my revenge.*

But now that she finally had a place and a part in the world, who knew what might be next? Perhaps the day would come, if she exercised sufficient determination, when she could kiss and be thanked for it. With her new attitude, there was no room for pessimism and no place for failure. "Bye, Paul," she said, and swept out of the room.

Paul sat, alone with MAR-14, muttering to himself in agony. His order had been destroyed. But he was resilient; he would re-establish his order. Already he was formulating a plan, a plan whose seeds Celeste herself had planted. *You can smash anything if you've got a big enough hammer.*

Well, there were other hackers out there, some of them lean, hungry, ambitious . . . and most of all, unprincipled. Paul would find them, and when he did . . .

Paul smiled a wicked smile. "Yes, I will have my revenge," he swore. His new conscience would not have approved, but then, his new conscience could not know his thoughts. He leaned back, relaxing in his chair, bumping his head on the terminal. He straightened, intending to push the terminal farther back.

The screen was in letters three inches high. " CAVE CONSCIENTIAM . " Paul reached back to his high-school Latin, thirty years before. "Beware thy conscience," the omnipresent machine threatened him. ■

● Science, especially today's science, is a very big affair in which individual imagination soon ceases to find suitable vents. Thus most practitioners of science become like bricklayers, laying brick upon brick atop this mammoth structure that we call science, but very few have any idea where (if anywhere) it is going. In short, everybody becomes so busy laying bricks that they forget why they are doing it. They become so content with the evolution of the structure that nobody remembers that sometimes what is necessary is not evolution but *re*volution, a genuine shift from the currently accepted supertheory (or paradigm—to use philosopher Thomas Kuhn's word).

Amit Goswami, *The Cosmic Dancers*


What a person wants
and what he *thinks* he wants
may not be quite the same thing.
Gary Freeman


Ben Bova
BORN AGAIN

The restaurant's sign, out on the roadside, said *Gracious Country Dining*. There was no indication that just across the Leesburg Pike the gray unmarked headquarters of the Central Intelligence Agency lay screened behind the beautifully wooded Virginia hills.

Jeremy Keating sat by force of old habit with his back to the wall. The restaurant was almost empty, and even if it had been bursting with customers they would all have been agency people —almost. It was the *almost* that would have worried him, in the old days.

Keating looked tense, expectant, a trimly built six-footer in his late thirties, hair still dark, stomach still flat, wearing the same kind of conservative bluish gray three-piece suit that served almost as a uniform for agency men when they were safely home.

Only someone who had known him over the past five years would realize that the pain and the sullen, smoldering anger that had once lit his eyes were gone now. In their place was something else, equally intense but lacking the hate that had once fueled the flames within him. Keating himself did not fully understand what was happening to him. Part of what he felt now was excitement: a fluttering, almost giddy anticipation. But there was fear inside him, too, churning in his guts.

It had been easy to get into the agency; it would not be so easy getting out.

He was halfway finished with his fruit juice cocktail when Jason Lyle entered the quiet dining room and threaded his way through the empty tables toward Keating. Although he had never been a field agent, Lyle moved cautiously, walking on the balls of his feet, almost on tip-toe. Watching him, Keating thought that there must be just as many booby-traps in the corridors of bureaucratic power as there are in the field. You don't get to be section chief by bulling blindly into trouble.

Keating rose as Lyle came to his table and extended his hand. They exchanged meaningless greetings, smiling at each other and commenting on the unbelievably warm weather, predicted an early spring and lots of sunshine, a good sailing season. When their waitress came, Lyle ordered a vodka martini; Keating asked for another glass of grapefuit juice.

The last time Keating had seen Jason Lyle, the section chief had ordered him to commit a murder. *Terminate with extreme prejudice* was the term used. Keating had received such orders, and obeyed them willingly, half a dozen times over the previous four years. Until this last one, a few weeks ago.

Now Lyle sat across the small restaurant table, in this ersatz rustic dining room with its phony log walls and gingham tablecloths, and gave Keating the same measured smile he had used all those other times. But Lyle's eyes were wary, probing, trying to see what had changed in Keating.

Lyle was handsome in a country-club, old-money way: thick silver hair impeccably coiffed, his chiseled features tanned and taut from years of tennis and sailing. He was vain enough to wear contact lenses instead of bifocals, and tough enough to order death for his own agents, once he thought they were dangerous to the organization—or to himself.

Keating listened to the banalities and let his gaze slide from Lyle to the nearby windows, where the bright Virginia sunshine was pouring in. He knew that Lyle had carefully reviewed all the medical reports, all the debriefing sessions and psychiatric examinations that he had undergone in the past three weeks. They had wrung his brain dry with their armory of drugs and electronics. But there was one fact Keating had kept from them, simply because they had never in their deepest probes thought to ask the question. One simple fact that had turned Keating's life upside-down: the man that he had been ordered to assassinate was not a human being. He had not been born on Earth.

Keating nodded at the right places in Lyle's monologue and volunteered nothing. The waitress took their lunch order, went away, and came back eventually with their food.

Finally, as he picked up his fork and stared down at what the menu had promised as sliced Virginia ham, Lyle asked as casually as a snake gliding across a meadow:

"So tell me, Jeremy, just what happened out there in Athens?"

Keating knew that the answers he gave over this luncheon would determine whether he lived or died.

"I got a vision of a different world, Jason," he answered honestly. "I'm through with killing. I want out."

Lyle's eyes flashed, whether at Keating's use of his first name or his intended resignation or his mention of a vision, it was impossible to tell.

"It's not that simple, you know," he said.

"I know." And Keating did. Lyle had to satisfy himself that this highly trained agent had not been turned around by the Soviets. Or, worse still, by the fledgling World Government.

"Why?" Lyle asked mildly. "Why do you want to quit?"

Keating closed his eyes for a moment, trying to decide on the words he must use. Each syllable must be chosen with scrupulous care. His life hung in the balance.

But in that momentary darkness, alone with only his own inner vision, Keating saw the man he had been, the life he had led. The years as an ordinary Foreign Service officer, a very minor cog in the giant bureaucratic machinery of the Department of State, moving from one embassy to another every two years. He saw Joanna, young and loving and alive, laughing with him on the bank of the Seine, dancing with him on the roof garden of the hotel that steaming hot Fourth of July in Delhi, smiling at him through her exhaustion as she lay in the hospital bed with their newborn son at her breast.

And he saw her being torn apart by the raging mob attacking the embassy at Tunis. While Qaddafi's soldiers stood aside and watched, grinning. Saw his infant son screaming his life away as typhus swept the besieged embassy. Saw himself giving his own life, his body and mind and soul—gladly—to avenge their deaths. The training, where his anger and hatred had been honed to a cutting edge. The missions to track and kill the kind of men he blamed for the murder of his wife and child. Missions that always began in Lyle's office, in the calm, climate-controlled sanctu-

ary of the section chief, with his measured reptilian smile.

Keating opened his eyes. "You let them take me, that first mission, didn't you?"

The admission was clear on Lyle's surprised face. "What are you talking about?"

"My first mission for you, the job in Jakarta. You allowed them to find me, didn't you? You tipped them off. Those interrogation sessions, that slimy little colonel of theirs with his razor—he was the final edge on my training, wasn't he?"

"That's crazy," Lyle snapped. "We shot our way in there and saved your butt, didn't we?"

Keating nodded. "At the proper moment."

"That was years ago."

But I still carry the scars, Keating replied silently. They still burn.

Lyle fluttered a hand in the air, as if waving away the past. Leaning forward across the table slightly, he said in a lowered voice, "I need to know, Jeremy. Just what happened to you in Athens? Why do you suddenly want to quit?"

Keating did not close his eyes again. He had seen enough of the past, and the shame of it seethed inside him. "Let's just say that I experienced a religious conversion."

"A *what?*"

"I've been reborn." Keating smiled, realizing the aptness of it. "I have renounced my old life."

For the first time in the years Keating had known the man, Lyle made no attempt to mask his feelings. "Born again? Fat chance! I've heard a lot of strange stories in my time, but this one . . ."

"Is the truth."

"Just tell me what happened to you in Athens," Lyle insisted. "I've got to know. It's important to both of us."

"So that you can decide whether to terminate me?"

"We don't do that," Lyle snapped.

"No, of course not. But I just might happen to have a car accident, or take an overdose of something."

Lyle glowered at him. "You hold a lot of very sensitive information inside your skull, Jeremy. We have to protect you."

"And yourself. It wouldn't look good on your record to have a trained assassin going over to the other side."

The section chief actually smiled with relief, and Keating could see that Lyle was grateful that the subject had finally been brought out into the open.

"Have you, Jeremy?" he asked, in a whisper.

"Gone over? Which side would I go to? The Soviets? But we're working under the table with them these days, aren't we? Neither the Russians nor the Americans want the World Government running things. We're both trying to bring the World Government down before it gets a firm control over us."

"The World Government," Lyle said slowly, testingly.

Keating shook his head. "If I admit to that I'm a dead man, and we both know it. I'm not that foolish, Jason."

Lyle said nothing, but looked unconvinced.

"There's the Third World," Keating went on. "They love the World Government, with its one-nation, one-vote

system. They're using the World Government to bleed the rich nations white; you told me that yourself. But then, the rich nations are almost all white to begin with, aren't they?''

''This is no time for jokes!''

''A sense of humor helps, Jason. Believe me. But you can't picture me working for a bunch of blacks and browns and yellows, can you? That's so completely against your inner convictions that you can't imagine a fellow WASP going over to the Third World.''

''Perhaps I can imagine it, at that,'' Lyle said, with dawning apprehension lighting his eyes. ''Your assignment was to terminate Rungawa . . .''

''Ah yes,'' Keating said. ''Kabete Rungawa. The Black Saint of the Third World. The spiritual leader of the poor nations.''

Lyle almost spat. ''That old bastard is as spiritual as . . .''

''As Gandhi,'' Keating said, sudden steel in his voice. ''And as powerful politically. That's why you want him terminated.''

Lyle stared at Keating for long, silent moments before saying, ''Rungawa. *He* turned you around! Jesus Christ, you fell for that black bastard's mealy-mouthed propaganda line.''

''Yes I did,'' said Keating. ''Not in the way you're thinking, though. Rungawa is quite a person. He made me see that murdering him would be a horrible mistake. He opened my eyes.''

''You admit it?''

''Why not? It's already in the debriefing reports, isn't it?''

The glitter in Lyle's cold blue eyes told Keating that it was.

''But here's something that isn't in the reports, Jason. Something so utterly fantastic that you won't believe it.''

The section chief leaned forward in anticipation. Hearing secrets was his trade.

''Kabete Rungawa is an extraterrestrial.''

''What?''

''He looks human, but he's actually from another world.''

Lyle's mouth hung open for a second, then clicked shut. ''Are you joking, Jeremy, or what?'' he asked angrily.

''That's what he told me,'' Keating said.

''And you believed him?''

Keating felt a smile cross his lips as he recalled that cold, rainy night in front of the Parthenon. His mission had been to terminate Rungawa, and he had finally tracked the Black Saint to the Acropolis.

''He was very convincing,'' Keating said softly. ''Very convincing.''

Lyle looked down at his untouched lunch, then back into Keating's eyes. ''Jeremy, either you're lying through your teeth or you've gone around the bend.''

''It's the truth, Jason.''

''You want me to believe that you *think* it's the truth.''

''Would I tell such a crazy story if it weren't the truth?''

The section chief suddenly seemed to realize that he held a knife and fork in his hands. He attacked the Virginia ham vigorously as he said, ''Yes, I think you might. A completely wild story might make us believe that you've flipped out, might convince us that you ought to be retired.''

''To a mental institution?''

"This isn't Russia," Lyle snapped. But then, looking up from his platter at Keating again, he added, "A good, long rest might be what you need, though. You wouldn't be the first field agent to suffer from burnout."

"A permanent rest?" Keating asked.

Lyle turned his attention back to his food. "Just relax and eat your lunch. We'll take care of you, Jeremy. The agency takes care of its own."

Keating took the afternoon off and drove far out into the wooded Virginia hills without any conscious destination, merely drove through the late March sunshine in his agency-furnished inconspicuous gray Ford. He did not have to be told that it was bugged; that anything said inside the car would be faithfully recorded back at headquarters. And there were tracking transmitters built into the car, naturally. Even if he drove it to Patagonia, satellite sensors would spot him as plainly as they count missile silos in Siberia.

And he knew, just as surely, that he expected a contact, a message, a set of instructions or some sort of help from the entity he had refrained from killing that rainy night atop the Acropolis.

How can I be so certain that he'll help me? Keating asked himself as he drove. There's no doubt in my mind that he is what he said he is: an extraterrestrial, a creature from another world, sent here to keep us from blowing ourselves to kingdom come with our nuclear toys. But will he help *me?* Am I important enough to his plans to be rescued? Does he know what Lyle is going to do to me? Does he give a damn?

No answers came out of the sky as Keating drove blindly toward Charlottesville. It was not until he turned onto Interstate 64 and saw the signs for Monticello that he realized where he was heading.

He joined a group of five Japanese tourists and followed the guides through Thomas Jefferson's home, half listening to the guides' patter, half looking at the furnishings and gadgets of the brightest man ever to live in the White House. In the back of his mind Keating realized that he had slept in hotel rooms far more luxurious than Jefferson's bedroom. Was *he* one of them? he wondered. Were they tinkering with our world's politics that far back?

Keating kept pace with the other tourists, but his attention was actually focused on a message that never came. He felt certain that they—whoever they were—would contact him. But by the time his group had been ushered back to the main entrance of the house at the end of the tour, there had been no contact. He was out in the cold, completely alone.

He drove back in darkness to the apartment in Arlington that the agency had provided for him. It was a pleasant enough set of rooms, with a view of the Washington Monument and the Capitol Dome. Keating could sense the bugs that infested the walls, the phone, most likely the entire building. A fancy jailhouse, he knew.

His apartment was on the top floor of the six-story building. Death row? Very likely. Lyle could not risk letting him go loose. And there were no close relatives or friends to raise a fuss about him.

He knew that he had to make a break

for it, and it had to be tonight. If Rungawa and his people would not help him, then he would have to do it alone. Have dinner, then take the car and drive out to the nearest shopping mall. Use the crowds to lose whatever tails they've put on me. Then get to Rungawa, one way or another. He owes me a favor.

Keating took a frozen dinner from the refrigerator, microwaved it into a semblance of food, and sat in front of the living room TV set to eat what might be his last meal. But after a few bites of the lukewarm Salisbury steak he felt himself nodding off. For a moment he felt panic surge through him like an electric current, but long years of practice damped it down. A short nap won't hurt, he told himself. Forty winks. He drowsed off in the comfortable reclining chair, while the TV screen played out a drama about corporate power and sexual passion in the cosmetics business.

"Mr. Keating."

He awoke with a start, looked around the living room. No one.

"Here, Mr. Keating. Here."

The TV screen showed the kindly-looking face of an elderly black man: Kabete Rungawa.

"You!"

Rungawa smiled and lowered his eyes briefly, almost as if embarrassed.

"Forgive this unorthodox way of communicating with you. Your erstwhile colleagues have listening devices on the telephone . . ."

"And in the walls," Keating said.

Rungawa replied, "They will not hear this conversation. As far as their devices are concerned, you are still asleep and the eleven o'clock news is on the air."

Hunching forward in his chair, Keating asked, "How do I know that I'm *not* asleep, and that this isn't just a dream?"

"That is a question of faith, Mr. Keating," said the black man gravely. "Can you trust your own senses? Only your own inner faith can give you the answer."

"They're going to kill me," Keating said.

"You told them about us." Rungawa's face became somber.

"I told them about *you*."

"That was not wise."

"Don't worry about it," Keating said. "Lyle thinks either that I'm a colossal liar or a crackpot."

The black man almost smiled. "Still, we would prefer that no one knew of our presence. I only told you because my life was at stake."

"Well, it's my life that's at stake now. Lyle's going to terminate me."

"Yes, we know. It will happen tonight."

"How can I . . ."

"You can't. You mustn't. The game must be played to its conclusion."

"Game? It's my *life* we're talking about!"

"It is your faith we are talking about," the black man said solemnly in his rumbling bass voice. "You believed what I told you that night in front of the Parthenon. You spared my life."

"But you're not going to spare mine," Keating said.

"Have faith, Mr. Keating. Haven't your own prophets told you that faith can carry you beyond death? Christ, Muhammed, Buddha—haven't they all tried to tell you the same thing?"

"Don't talk philosophy to me! I need help!"

"I know you do, Mr. Keating. It will come. Have faith."

Keating started to reply, but found that he could not open his mouth, could not even move his tongue. He no longer had control of his limbs. He sat frozen in the recliner chair, unable to move his legs, his arms. He could not even lift a finger from the padded armrest.

His throat was dry with sudden fear, his innards trembled with a fright that was fast approaching panic. I don't want to die! his mind screamed silently, over and again. I don't want to die!

"I know the terror you feel, Mr. Keating," Rungawa's deep voice said gravely. "It pains me to put you through this. But it must be done. They will never rest until you are dead and can no longer harm or embarrass them. I am truly sorry, but you will not be the first casualty we suffer."

Don't let them kill me! Keating shrieked inside his head.

But Rungawa said only, "Goodnight, Mr. Keating."

Jeremy's eyes slowly closed, like the curtain going down on the last act of a tragic play. Locked inside his paralyzed body, imprisoned within his own unresponding flesh, Keating saw nothing but darkness as he awaited inevitable death.

Slowly, slowly, the thundering of his heart eased. In the background he could hear the television set's sound again. The eleven o'clock news chattered away, to be followed by a talk show. Still Keating sat, unable to move a voluntary muscle, unable even to open his eyes. He tried to picture Joanna and little Jerry Jr., tried to tell himself that he would be with them at last, but a cold voice in his mind laughed mockingly and told him that he had never believed in life after death. Get accustomed to the darkness, Jeremy, he told himself. This is all there will ever be.

He wanted to cry, but even that was denied him. You're already as good as dead, the ice-hard voice said. What did you have to live for, anyway?

Time became meaningless. The voices from the television set changed, but Keating paid scant attention to them. They were nothing more than background sound effects; like the muted organ music played in a cathedral before the funeral service begins.

The click of the lock sounded like a pistol shot to him. He heard the front door open and then softly close. They had the key to the apartment, of course. The jailers always have the keys. The floor was carpeted, but Keating clearly heard the soft footfalls approaching him. Like a man who had been blind from birth, Keating's sense of hearing seemed magnified, hypersensitive. He could hear the man's breathing from halfway across the living room.

He knew it was not Lyle himself. The section chief would never dirty his own hands. With something of a shock Keating realized that he knew hardly anyone else at the agency. Four years of service and he had barely made an acquaintance. The voice inside his head laughed scornfully again. You've been dead for years, old boy. You just didn't realize it.

"Wake up, man. Come on, wake up!"

Jeremy's eyes snapped open.

A swarthy, pinch-faced, dapper little man with a neatly trimmed black mustache was leaning over him.

"Wha . . . who . . . ?" Jeremy's tongue felt thick, his eyes gummy. But he could speak. He could move again.

"Never mind who," the man said. "We gotta get you outta here! Fast!"

Feeling almost dizzy with surprise, Jeremy sat up straight in the recliner and planted his feet on the floor. "What's going on?"

"I don't got time to explain, man. We only got a couple minutes before they get here! Come on!"

He looked Hispanic, or maybe Italian. He wore a white suit with a double-breasted jacket; strange outfit for an undercover agent. Or an extraterrestrial. Confused, Jeremy struggled to his feet. Out of the corner of his eye, he saw that the television set was playing an old black-and-white movie now.

"Splash some water on your face, wake yourself up. We gotta move fast."

Jeremy tried to shake the cobwebs out of his head. He lumbered to the bathroom and ran the cold water. The little man watched from the doorway. His suit was rumpled, baggy; it looked as if he had been wearing it for a long time. He pulled a small silver flask from his inside pocket, opened it, and took a long pull from it.

"Take a swig of this; it'll open your eyes for you."

Jeremy took the pint-sized flask and sniffed at its open mouth. Spanish brandy. He took a small, testing sip.

"Where are we . . ."

He never finished the sentence. A searing explosion of pain blasted through him. The flask fell from his spasming fingers, and the last thing he saw was the little man deftly catching it before it hit the floor.

Jeremy lurched to the sink, then collapsed across it and slid to the tile flooring. The pain faded away into darkness. He could feel nothing. He could not hear his heart beating, could not draw a breath.

Vaguely, far off in the darkly vast distance, he heard the electronic bleep of a pocket radio and the little man's voice saying, "Okay, he's had his heart attack. Looks very natural."

He opened his eyes and saw a featureless expanse of white. For what seemed like a measureless eternity he stared blankly at it. Then, at last, realizing that he was breathing slowly, rhythmically, he deliberately blinked his eyes and tried to turn his head.

The expanse of white was nothing more than the ceiling of the room he was in. He was lying in a bed, covered with a sheet and a thin white blanket. It looked like a hospital room, or perhaps a private room in an expensive rest home. Modern furniture, all in white: dresser, desk and chair, night table beside the bed, comfortable-looking upholstered chair beside the window. Sunshine streaming in, but the window blinds were angled so that he could not see outside. And he noticed that there were no mirrors in the room; not one, even over the dresser. Three doors. One of them was slightly ajar and showed the corner of a bathroom sink. The second must be a closet, Keating reasoned.

The third door opened just then and Kabete Rungawa stepped in.

"You have awakened," he said,

smiling. Somehow, even when he smiled, his face had the sadness of the ages etched into it.

Keating said nothing.

"You have returned from the dead, Mr. Keating. Welcome back to life."

"I was really dead?"

"Oh, yes. Quite. Your agency is very thorough."

"Then how . . ."

Rungawa asked permission to sit on the edge of the bed by making a slight gesture and raising his snowy eyebrows. Keating nodded and the old man sat beside him. The bed sagged disturbingly under him, even though he looked small and almost frail.

"Your own medical science can bring a man back from clinical death, in certain cases," the Black Saint said gently. "Our science is somewhat more advanced than that."

"And the agency . . . Lyle . . ."

"Mr. Lyle was present at your cremation. He was given your ashes, since you had no next-of-kin listed in your personnel file."

Keating thought swiftly. "You switched bodies at the crematorium."

"Something like that," said Rungawa.

"Then you really are . . . what you said you were."

Rungawa's smile broadened. "Did you doubt it? Even when you risked your life on it?"

"There's a difference between knowing here," Jeremy tapped his temple, "and believing, here in the guts, where . . ."

He stopped in mid-sentence and stared at the hand that had moved from his head to his midriff. *It was not his hand.*

"What have you done to me?" Jeremy's voice sounded high, shrill, frightened as a little child's.

"It was necessary," Rungawa's deep voice purred softly, "to give you a new body, Mr. Keating."

"A new . . ."

"Your former body was destroyed. We salvaged your mind—your soul, if you want to use that term."

"Where . . . whose body . . . is this?"

Rungawa blinked slowly once, then replied. "Why, it is your own body, Mr. Keating."

"But before . . . ?"

"Ahh, I understand. We did not steal it from anyone." The black man smiled slightly. "We created it for you especially, just as this body of mine was created for me. You would not expect a being from another world, thousands of light-years from your Earth, to look like a human being, would you?"

Jeremy swallowed once, twice, then managed to say, "No, I guess not."

"It is a very good body, Mr. Keating. A bit younger than your former shell, quite a bit stronger, and with a few special sensitivities added to it."

Jeremy threw back the bedclothes and saw that he was naked. Good strong legs, flat ridged midsection. His hands looked heavier, fingers shorter and somewhat blunter. His skin was pink, like a baby's, new and scrubbed-looking.

Wordlessly, he swung his legs to the floor and stood up. No dizziness, no feeling of weakness at all. He padded to the bathroom, Rungawa a few steps behind him, and confronted himself in the mirror.

The face he saw was squarish, with curly red-blond hair and a light sprinkling of faint freckles across its snub nose and broad cheeks. The eyes were pale blue.

"Christ, I look like a teenager!"

"It is a fully adult body," Rungawa said gravely.

Jeremy turned to the black man, a nervous giggle bubbling from his throat. "When you say born again, you really mean it!"

"You spared my life, Mr. Keating," said Rungawa. "Now we have spared yours."

"So we're even."

Rungawa nodded solemnly.

"What happens now?" Jeremy asked.

The black man turned away and strode slowly back toward the hospital bed. "What do you mean, Mr. Keating?"

Following him, Jeremy said, "As far as the rest of the world is concerned, Jeremy Keating is dead. But here I am! Where do I go from here?"

Rungawa turned to face him. "Where do you wish to go, Mr. Keating?"

Jeremy felt uncertain, but only for a moment. He was slightly shorter than he had been before, and the Black Saint looked disconcertingly taller.

"I think you know what I want," he said. "I think you've known it all along."

"Really?"

"Yes. This has all been an elaborate form of recruitment, hasn't it?"

Rungawa really smiled now, a dazzling show of pleasure. "You are just as perceptive as we thought, Mr. Keating."

"So it has been a game, all along."

"A game that you played with great skill," Rungawa said. "You began by sparing the life of a man whom you had been instructed to assassinate. Then you quite conspicuously tried to get your employers to murder you."

"I wouldn't put it that way . . ."

"But that is what you did, Mr. Keating. You were *testing* us! You set up a situation in which we would have to save your life."

"Or let me die."

Rungawa shook his head. "You accepted what I had told you in Athens. You believed that we would be morally bound to save your life. Your faith saved you, Mr. Keating."

"And you, on your part, have been testing me to see if I could accept the fact that there's a group of extraterrestrial creatures here on Earth, masquerading as human beings, trying to guide us away from a nuclear holocaust."

Nodding agreement, Rungawa said, "We have been testing each other."

"And we both passed."

"Indeed."

"But why me? Out of five billion human beings, why recruit me?"

Rungawa leaned back and half sat on the edge of the empty hospital bed. "As I told you in Athens, Mr. Keating, you are a test case. If *you* could accept the fact that extraterrestrials were trying to help your race to avoid its own destruction, then we felt sure that our work would meet with eventual success."

Keating stood naked in the middle of the antisceptic white room, feeling strong, vibrant, very much alive.

"So I've been born again," he said. "A new life."

The Black Saint beamed at him.

"And a new family, of sorts. Welcome to the ranks of the world saviors, Mr. Keating. There are very few of us, and so many of your fellow humans who seem to be intent on destroying themselves."

"But we'll save the world despite them."

"That is our task," Rungawa said.

Keating grinned at him. "Then give me some clothes and let's get to work." ■

ON GAMING

(continued from page 65)

the opposite side of the board, which is Mordor. To accomplish this, he must avoid, deceive, and misdirect the EP forces.

The EP starts with his minions scattered around the board searching for the Ring: agents in most of the population centers; monsters (guardians) in the wilderness; and the Nazgul searching for the Shire and Baggins.

First, you draw an event card and update the health and combat status of your characters. Then you generate rumors (to throw off the other player's forces) and move your forces. Next, all searches are attempted. Finally, any combat resulting from movement or searches are fought in a series of combat rounds.

Play ends when the FP player declares that the Fellowship is dissolved, or the EP player captures the Ring and takes it to a Mordor garrisoned area. If neither of these situations occurs by the end of 20 turns, the game is determined to be a draw or a victory (marginal, tactical, or major) for one side based on how close the Ringbearer came to Mordor and which character has the Ring.

While secrecy is helpful to the EP forces, it's critical to the Fellowship Player. He's involved in a deadly game of hide-and-seek with the forces of Sauron. The EP's evil minions not only outnumber the members of the Fellowship, they are more powerful. Getting close to Mordor isn't easy.

Here are some strategy hints for both players:

If you're the Fellowship Player, try to keep at least two different groups that might have the Ring. Secrecy is your main advantage, and forfeiting it means that Sauron's superior forces will eventually wear you down. Also, looking for a fight is counter-productive. Not only are some of the enemy monsters indestructible (if killed, Nazgul just returns with more strength later), but there are too many of them. Losing even one character while slaughtering dozens of monsters hurts you far worse.

If you're the Enemy Player, you're only disadvantage is that it takes a long time to mobilize some of your forces, and most of the time you'll only be able to move part of your forces. Therefore, try to block possible routes and eliminate rumors immediately. You don't have to capture the Ring to win, just slow the Ringbearer down. ■

the reference library

By Tom Easton

1984 Fantasy Calendar, Boris Vallejo, Workman, $5.95, 28 pp.
Realms of Fantasy, Malcolm Edwards and Robert Holdstock, Doubleday, $17.95, 120 pp.
The Illustrated Book of Science Fiction Lists, Mike Ashley, Cornerstone Library (Simon & Schuster), $7.95, 190 pp.
Dramocles: An Intergalactic Soap Opera, Robert Sheckley, Holt, Rinehart and Winston, $15.95, 204 pp.
Space Age Terrors! Hilary Milton, Wanderer (Simon & Schuster), $2.95, 118 pp.
Eros Ascending, Mike Resnick, Phantasia, $17.35, ?pp., Signet, $?, ?pp.
An XT Called Stanley, Robert Trebor, DAW, $2.50, 221 pp.
The Helix and the Sword, John C. McLoughlin, Doubleday, $13.95, 234 pp.
The Man in the Tree, Damon Knight, Berkley, $2.75, 240 pp.
The Steps of the Sun, Walter Tevis, Doubleday, $14.95, 264 pp.
Welcome, Chaos, Kate Wilhelm, Houghton Mifflin, $13.95, 285 pp.
Star Rebel, F. M. Busby, Bantam, $2.50, 208 pp.
Fire From the Wine Dark Sea, Somtow Sucharitkul, Starblaze (Donning), $6.50, 301 pp.

I usually start this column with novels and wind up with popular science, anthologies, collections, criticism, and what-nots. This time, I want to turn that order around, largely because I've got one what-not I can hardly wait to talk about. It's Boris Vallejo's **1984 Fantasy Calendar**, with 13 delightfully sensuous nudes, variously clawed, winged, scaled; riding dragons, embraced by demons, rising from the minotaur's jaws. The pictures come from his latest book, *Mirage* (which I haven't seen), and they are glossy, provocative, provoking Vallejo girls, every one. There's even a centerfold. I love September's "Quest," a flight of dragon-riding coeds off to school. August's "Flight" is ecstatically explicit. July's

"Bride" (the minotaur one) is totally salacious. February's "Prisoner" is extravagantly phallic—a prone maiden, back arched, chained to a horizontal tree trunk, is menaced by a colorfully winged snake, fangs agape—or is that a tree trunk? It springs from a tendriled hillside whose surface suggests pebbled skin, and in the background rise organically rounded towers.

It would be easy to say that Vallejo overplays his hand in these paintings. His women are too lush, too smooth, too blatantly sexy, and his symbolism is too bold. My wife *hates* this calendar. But I suspect Vallejo had as great a time preparing his paintings as I did looking at them. So will you, if you have any prurience in your soul at all.

Now, what am I going to do with this thing? I can't hang it on the wall at home, not with a six-year-old daughter in the house. And I don't think I dare hang it on the wall at Thomas College (where I'm teaching biology part-time this fall). Do I have a bachelor friend who would like to get if for Christmas? Mmmmm. Maybe.

From England, and nicely printed in Spain, comes **Realms of Fantasy** by Malcolm Edwards and Robert Holdstock. It's an unusual survey of fantasy literature, offering essays on Middle Earth, Lost Worlds, Gormenghast, Mars, Conan's Hyborea, Atlantis, Moorcock's Melnibone, LeGuin's Earthsea, the Land of Thomas Covenant, and Gene Wolfe's Urth. Each essay describes the concept and its books and is competent enough. I found very little to take exception to, and the book could serve as an adequate introduction to fantasy for students and for readers new to fantasy.

What makes the book stand out is its illustrations. Each essay is accompanied by several paintings and drawings by various artists. The artwork is colorful and apt and, in some cases, quite expressive. Paul Monteagle's work for the Middle Earth essay is especially nice. So is Mark Harrison's for Melnibone, Earthsea, and Covenant; Stephen Bradbury's for Earthsea; and Ian Miller's for Gormenghast. Only that for Urth notably fails to live up to or rejuvenate my own images of the author's world; there Michael Johnson has either missed or ignored Wolfe's distinctive sense of scale and texture, and Edwards and Holdstock made a serious error, to my mind, in closing the book with his weak efforts. They might easily have switched the places of Urth and Covenant to great effect.

For trivia fans—Mike Ashley is the Britisher who compiled the *Astounding/Analog Index*, as well as quite a respectable list of other reference works, anthologies, and collections in SF and fantasy. Now he brings us **The Illustrated Book of Science Fiction Lists: An Unusual Collection of Facts and Trivia from the Realms of Science Fiction**. Its 166 lists cover definitions, all-time bests, award winners, firsts, authors' favorite stories and characters, George Scithers' ten least favorite last lines, youngest starting, oldest award winning, most prolific writers, oldest editors, longest series; 24 authors and their birth signs, pen names, dedications, titles, longests, and shortests.

Get the idea?

The only thing Ashley left out was a list of the ten awfullest SF novels of all time. So let me put forward two candidates for that list. The first is Robert Sheckley's latest, **Dramocles: An Intergalactic Soap Opera**, to which the man actually signed his name. Dramocles is a king who knows he has a des-

tiny—a message from himself, twenty years in the past, says so—but he doesn't know what it is. He obeys blindly as his computer delivers orders from his past self, and he betrays all his friends, seizing their worlds behind their backs. In the end, Dramocles and his friends are all buddies again, his betrayals forgiven.

The tale is a farrago of non sequitors. Sheckley pulls rabbit after rabbit from his hat, like Ron Goulart at his worst, trying vainly to make the hat look like a Russian doll. In the end, he tries to make sense of it all by ringing in a pathetic master-mind, but the book remains the rankest bilgewater. Furthermore, it's told in an annoyingly condescending and cute style—one of my correspondents calls it so "cutesy-poo that . . . at least one critic" will think "it's brilliantly satirical." Maybe so. At least, the jacket copy calls the book "a magical tour de force with a comic mastery that is completely, and delightfully, [Sheckley's] own." Maybe. But I don't believe it. The famous Sheckley wit has finally gone sour, poisoned by too many years of urban living.

Even worse, if possible, is Hilary Milton's **Space Age Terrors!** It's the third of Wanderer's (Simon and Schuster's juvenile paperback line) "Plot-Your-Own Horror Stories." That means there is a five-page introduction which tells you that you have spent the day visiting Vanguard Air, Rocket, and Space Museum at Vandenburg Air Force Base in California. That night, in your motel bed, you realize that you left your camera at the museum. So you get up, get dressed, and go back there in the dead of night. You find the door unlocked, enter, and hear footsteps. Is it a guard? Has your Daddy followed you? Or is it . . . something else? Turn to page 24, 18, or 12, according to your answer. And so on.

Each track through the story is no longer than a brief short story. Most of the tracks end in death or dismemberment: "GOTCHA!" Very few get you out, and even fewer get you out with your camera.

The book is so appalling that it mocks itself. In both plot and writing, it insults the intelligence of a six-year-old, and it is supposedly for kids five to ten years older than that! *Don't* throw your money away on this thing, and pray that your kids, if they find it anyway, recognize it for the garbage it is.

I have no more dogs for you, and it's a pleasure to leave them behind. The goodies list starts with Mike Resnick's **Eros Ascending**. (Maybe I should send him the calendar? Nope. He's not a bachelor.) It's the first of a series set on the *Velvet Comet*, a dumbbell-shaped brothel and luxury resort orbiting the world of Charlemagne. The *Comet* is run by the Vainmill Syndicate, which is a legitimate business operation in Mike's universe even though the name connotes something else again. Much of the book is a guided tour of the *Comet*, and it suffers for the lack of action. I didn't like it as much as the first in the Galactic Midway series (*Sideshow*), but it does offer a good sense of an exotic setting. Future volumes, I expect, will exploit the setting more actively.

What plot is there? The protagonist, Harry Redwine, is an accountant whose main skill is monkeying with the books to bring companies down. He is employed by Vainmill, and he has been sent by his boss to do the *Comet* in. If he succeeds, one of the heirs apparent to the soon-to-retire syndicate chief will

be out of the running. However, he quickly falls in love with the Leather Madonna, the woman who runs the *Comet*, and begins to look for ways to save her and her job.

Harry soon runs afoul of the Madonna's rival, an exhausting nymphet named Suma, who plies her trade with the enthusiasm of a hot rodder. She is lust personified, at home in a brothel. The Madonna is love, and Mike exploits this intriguing juxtaposition nicely as he explores the difference between love and lust. He's obviously a romantic at heart—but an awfully cynical one. He persuades the reader that Harry and the Madonna are good and true and will conquer all evil. And then he tells us that romanticism just doesn't wash. The fittest survive in both biology and business, and here the fittest are the cold, calculating, lustful chiefs of the syndicate.

I think Mike makes a mistake here. Love—mutual aid and comfort—can be just as much an aid to survival as calculation and scheming, for it enlists better allies. Perhaps he shouldn't have had his heroes try the whistle-blowing solution, for whistle-blowing is always an excellent way to put your neck on the block. But if he had let them simply cut and run, he would have lost his story. And his universe lacks any civil authority to which his heroes might have appealed.

Signet will bring out *Eros Ascending* in the fall. Phantasia brought out its edition in January, with 1200 trade copies at $17.00 and 300 collector's copies, boxed, numbered, and autographed, at $35.00. Take your pick, but buy one version or another, and join me in wondering what Mike will do with the next two volumes in the series (*Eros at Zenith* and *Eros Descending*). Will he, for instance, find a way to give romanticism its due?

The cover artist (Kevin Johnson) doesn't seem to know how to draw a double helix, and that immediately puts off any reviewer who is also a biologist. But any book titled **An XT Called Stanley** just *has* to get reviewed in this magazine! The author (and narrator) is Robert Trebor, the palindromic pseudonym of "a professor of mathematics and physics at a large Eastern university." The book is his first novel, and it's not bad.

On the Lagrangian habitat New Hope, which is run with a picky tyranny reminiscent of the classic boarding school, scientists have picked up and translated an extraterrestrial signal. It contains the instructions for building a super-computer. Built and educated, the computer presents itself on screen as a human figure. Asked its name, it replies, "Call me Stanley." Asked for the secrets of alien technology, it demurs. It is there not to help, but to learn. Would the humans please arrange library access and phone lines so it can talk to anyone it pleases?

Trebor obliges while his colleagues debate the alien's intent. A fearful few want to destroy Stanley. Others are disgruntled because of Stanley's reticence. And tragedy develops.

What is especially interesting about the book is what the mathematician/physicist author has to say about the nature of alien technological help. His humans want physics and weaponry. Stanley, however, seems to be a skilled social engineer. Even as he denies help, he helps. Using the phone, he liberates New Hope's prostitutes from their pimps and prompts an epidemic of good works. He is a Christ figure, and like Christ, he is misinterpreted. The human big-

wigs see the good he does as subversive, mentally damaging, evil. Trebor and his friends, on the other hand, are true disciples. The work will go on.

Joe Caroff, cover artist for John C. McLoughlin's **The Helix and the Sword**, can't draw a double helix either. McLoughlin is a popular science writer with five successful books to his credit. This is his first novel, and I found it a lovely one indeed. On its strength, I recommend the science books heartily, and I hope he will send me a review copy of his next.

Nearly six thousand years in the future, Earth is both abandoned and taboo. Humanity lives in the Deep, orbiting the sun with the asteroids and planets, dwelling in living Islands and traveling in living ships, all grown from seeds planted on chunks of rock. Some of the Islands are big enough to replicate pieces of Earth's biosphere, and there live also whales and other beasts.

There are, of course, factions of humanity. Pirates and liberals live off the plane of the ecliptic. A Church preaches the damnation of Earth and enforces the taboo. A Sisterhood creates the genetically engineered tools and shelters of life. And rebels seek salvation on Earth.

Helix is the story of the rebels, their trek and encounters and victory, which is never in doubt. Their first landing on Earth is a striking prose poem, almost beautiful enough to justify the price of the book. The author is pessimistic about the immediate future of life on Earth, but he loves the planet and the species and he is ultimately an optimist. He has a very good sense of the biology, too, and the whole package works beautifully.

Buy it!

Damon Knight's **The Man in the Tree** is also quite good. It begins with Gene Anderson, young, growing fast, and with the singular talent of reaching into parallel worlds for duplicates of marbles, coins, and the like. He stands out among his peers, of course, and when he accidentally defenestrates a bully, he runs. The dead boy's father is the town cop, and he vows to hunt Gene down and kill him. He does, it seems, kill Gene's parents.

Resourceful Gene builds a tree house in the forest and manages quite nicely until the sheriff finds him. He barely escapes alive. Running again, he finds California's Lost Forest and hears a strange voice. He studies art in San Francisco, but the sheriff finds him again, and he flees to New York. When his artist patron dies, he joins the circus as a giant until the sheriff shows up once more. He flees to Europe, gains wealth, and spends twenty years on a yacht.

Knight skips blithely over those twenty years to show us Gene setting up a mansion in the Florida keys. He has with him a few people from his past, and he is preparing to set up a new religion based on the injunction, "be kind," and fortified by Gene's capacity for miracles. Yet a religion needs a martyr. Gene is prepared to play that role, if not at the hands of his old nemesis. He returns to certain trees of his childhood to play Mohammed. One of his disciples takes the part of Christ.

It's an ambitious story with an obvious Biblical parallel, even to twenty "lost years." The characters are well developed and warmly treated. The incidents are richly developed and convincing. Yet the story itself is not convincing. Gene Anderson is too much a symbol and not enough a man. He is also too naive, and his religion, while appealing, is too simplistic. Depending on little more than an exchange of to-

kens (play money inscribed with "you were kind to me") reminiscent of some of the more simple-minded behavior modification therapies, it demands too little of its adherents. And the end resolves nothing. It is too arbitrary by far.

Should you buy it? You may or may not agree with me once you reach the end, but you will surely enjoy getting there. Knight is a masterful writer, and he offers much to reward the reader. It's only his last two chapters that sour my perception of the whole.

In **The Steps of the Sun**, Walter Tevis gives us Ben Belson, a savior whose name carries an echo of death camps. Ben is one of the richest men on the twenty-first-century Earth. His world is poor in energy, and faster-than-light space travel, though available, is banned. The Chinese are a dominant force in the world economy. The Mafia controls the coal supply. Firewood goes for a sawbuck a sawlog. And poor Ben is bored and impotent.

So he buys a Chinese starship to go hunt a planet with "safe" uranium (it becomes radioactive only in a magnetic field). If he can find it, he can save the world and increase his fortune in a more constructive way than he has built it. But boredom is his prime motivation. We see this in his desultory hedonism, his dope addiction, his self-exile on a barren planet of singing grasses, anodynous herbs, and obsidian plains while his crew returns a cargo of the uranium to Earth.

He is galvanized only when Earth preposterously bans his uranium and the U.S. confiscates his citizenship and his fortune. He returns, fights, and wins. Even his potency returns.

The story begins with the journey to the stars. The background is all flashbacks. Characterization is strong, but only for Ben Belson, and he is a pitiable, boring character, and therefore so is the book. The book also suffers from the very basic unlikeliness of Tevis' "safe" uranium.

An unenchanting hero and an impossible premise, despite the author's immense skill, force me to warn you off. If you've found yourself agreeing with me in the past, you will not enjoy this book. Put your bucks on McLoughlin, or . . .

Try Kate Wilhelm, who blesses us with **Welcome, Chaos**. It is the novel that grew from "The Winter Beach," the novelette I praised in *Listen, Listen* back in March 1982. A woman professor loses her job when she asks a leave of absence to research a book on eagles. A secret agent pressures her to get the fingerprints of her neighbor on the Northwest coast. She allies with the neighbor, who possesses a remarkable scientific secret, tells him of the agent, and watches him escape. The novel carries the tale on. Heroine Lyle Taney is now an immortal, part of a select group dedicated to keeping their elixir secret until the world has found it despite their efforts. Russia gets it. So does the U.S. Secret agent Hugh Lasater is on Lyle's trail. The immortals decide to go public, to disseminate both samples of their elixir and instructions on how to make and use it to the populace, even though it has a fifty percent mortality rate. They do so to save the world, for they are sure that the U.S. and Russia will use it to protect their soldiers and elites only, and then push the doomsday button.

The novelette was vivid, potent, deft, satisfying. So is the novel, although my 1982 guess that a novel version would have a more dilute impact is unfortunately realized. Nevertheless, *Welcome,*

Chaos is excellent. It is the best treatment of the immortality theme I have seen in ages, and I recommend it strongly.

F. M. Busby's **Star Rebel** tells the story of Bran Tregare, a character in Busby's earlier *Rissa Kerguelen*. Shorn of his powerful family by politics, Bran is trained in the brutal space academy, the Slaughterhouse. There he learns the skills of space, murder, and depersonalization. Once graduated into space, he seizes his first chance to mutiny and takes over an armed ship. He is now one of the strongest assets of the free worlds, and he will play a great part in the war against Earth, which is ruled by heartless corporations.

It's thud and blunder space opera, folks, and strongly reminiscent of Busby's other tales. Can he write nothing else?

How often is it that a writer turns a strong novelette into a weaker novel? Wilhelm did it (though the novel remains very good). So have dozens of others. And now, I see, so has Somtow Sucharitkul. I liked the novel *Starship and Haiku*. Now I have his collection, **Fire from the Wine Dark Sea**, and in it I find "The Last Line of the Haiku," the precursor novelette. And it is stronger, more compressed and poetic.

The book has some other nice ones, too. The title story brings Odysseus across the ages. "Angels' Wings" shuts down all Earth's communications so a hyperspatial mother can give birth. There are two early Inquestor tales plus ten more, for a total of fourteen stories.

In addition, there are a few youthful and embarassing (*he* said so!) poems and two interviews that reveal Somtow as a child prodigy born of a Thai diplomat and educated at Eton and Cambridge. He is too old to be a prodigy now, but the interviews record a speech pattern with a strongly precocious flavor—deliberately and ebulliently cryptic.

Oh, yes! Lest I forget—the book also contains Somtow Sucharitkul's greatest orchestral composition: "The Isaac Asimov's Science Fiction Magazine March," with footnotes. It's arranged for the piano, and he *wants* you to play it. ■

IN TIMES TO COME

Our June cover story, with at least nominal appropriateness, is "Summer Solstice," an especially colorful display of Charles L. Harness's always unusual imagination. This one involves an astronaut in distress, forced to ask for help with a technical problem. The culture to which he must turn is not one that you'd expect to have much to offer, but that's just because you've probably never had much occasion to think about how his needs and theirs might connect. . . .

Some while back I did an editorial called "Ideas Before Their Time," about scientific and technological discoveries which were made prematurely—that is, before necessary adjuncts were available to develop them—and therefore went back into dormancy. I mentioned a few examples that I knew about and speculated on how many others might be lurking in the woodwork. Margaret L. Silbar has unearthed a few which she will talk about in next month's fact article, "Born-Again Ideas."

brass tacks

Dear Mr. Schmidt,

I read your editorial in the October 1983 *Analog*, and I both enjoyed and hated it. I agree that certain skills should be taught, and not replaced by specialized tools. I was the last of a generation brought up to use pencil and paper, slide rule, as well as a calculator and a computer to do number crunching. However, since I don't carry a calculator everywhere, it is my ability to do math in my head that keeps me from spending more money than necessary. On the teaching of basic skills, we both agree.

As a lifelong resident of New York City, I found your attitude toward my home both insulting and degrading. On top of that, it was inaccurate in several respects. First off, every New Yorker is not concerned with only the stock market and cultural concerts. Secondly, New Yorkers learn a very basic survival skill very early in life. It's called *walking*, something a large part of the United States has forgotten to do. I have been out of town in many places where being a pedestrian (*one who walks*, according to my dictionary), if not almost illegal, is downright difficult. It is these cities that have trouble during the all too common fuel shortrges, where no one knows how to live without being symbiotically attached to their cars. When the blizzard knocked out our transit system a few years back, many New Yorkers walked to work. Those living in New Jersey or Connecticut could not. When the blackout marooned me in Brooklyn, I and several others had to walk back to our homes in Manhattan. Some of us got rides, and some of us did not.

Third, all of our food does not come completely processed, as you indicated. Fresh produce stands are doing quite well in New York City, and more and more people are doing some farming of their own. Your foraging friends might

have more difficulty in learning how to deal in commodity figures, or surviving in an urban environment, than we would in learning how to get by without certain services that we now expect. You mention well water, and the pumping thereof. I seem to recall several recent incidents of contaminated water occuring in rural areas, as well as runoff of toxic wastes affecting local water sources, outside of New York. What happens when your rural friends get contaminated, and have to drive miles to the nearest facility? Also, how do rural areas get such medical care? Basically by having a nearby city maintain it both physically and financially. In what store do your rural friends buy their axe and supplies? Are they not also dependent (in a smaller part) on such fragile systems as we city folk?

Finally, you have ignored two basic facts about New York and New Yorkers. In case of a war, we are target #1. We'll be gone in a flash. Also, you overlook the temerity and the tenaciousness of New Yorkers. You admit that we can adapt to different system outages, but you refuse to admit that we might be able to extend this skill to all environments. We are not fawned over and protected by the system. We work for our system, and our schools do teach basic skills, and some of us even learn simple survival in summer camps, or on our own.

I think you should answer this letter in the reader's page, as well as in your column, as I feel that you owe us a big apology for your condescending attitude toward a city that has a hell of a lot to offer to everyone.

MARK MARMOR

New York, NY

Your basic fallacy is that over and over, where I said "many" or "some," you chose to read it as "all." Of course there are individual exceptions—one of the real strengths of a place like New York is the great diversity of its population—but my remarks remain true for many residents here or in any other big city.

Similarly, I never claimed my rural friends were absolutely independent—but even you admit that they are more so than many city dwellers. (And, just for the record, they've shown themselves quite capable of coping with urban environments, too.)

Finally, while many city folk may be quite adaptable, running a whole life from the ground up requires a good deal more special knowledge and skills than coping with a garbage strike. A real emergency might not allow time to learn those things, starting from scratch with the need already at hand.

Dear Mr. Schmidt,

Just received the October issue and read your editorial. You raise the right questions, but I think you came up with the wrong answers in regard to education for survival.

Do you recall *The Man Who Counts* by Poul Anderson? (Feb.–Apr. 1958 *Astounding*) In this novel Anderson shows that the entrepreneur Van Rijn is the man with the vital survival skills, not the Boy Scout-engineer type who is the foil to Van Rijn.

Incidentally, my stock broker is overweight, very wealthy (also very smart and honest), probably is unable to change the tire on any of his family's several Cadillacs, and in any kind of crunch I'll bet on him to survive long after the guys back in the woods who are playing with homemade bows and arrows and fish traps have succumbed to some stupid disease like tetanus, rabies, anthrax or plague.

Also, how come you own only one

HP-25? The answer to dependency on tools is redundancy. How many pens and pencils do you own? Calculators are information processing tools just as basic as pens. Yes, I can make a quill pen and ink out of oak galls and do long division in Roman numerals—but why bother?

Keep up the good work with your stimulating editorials. Right questions are far more important than right answers.

DON MILLMAN

If I were as wealthy as your stockbroker I might own lots of everything I use, but most ordinary mortals can't afford to. (The current version of the HP-25, the HP-33, costs about $50 if you shop very carefully.) Besides, redundancy is only a partial *solution to the problem of dependency. To pursue your calculator example, it becomes worthless in the event of any power outage that lasts longer than the available batteries—and that* can *happen. Redundancy in the sense of duplication is not nearly as safe as having backups which don't require the same things to function—so I'm keeping my slide rule and my memory of basic skills. (Incidentally, I'd have to see you do long division with Roman numerals before I believe it, but even if you can, why bother? That uses the same hardware as long division with* Arabic *numerals, and far less efficiently.)*

Dear Stan:

Far be it from me to step between my good friends Arthur Clarke and Jerry Pournelle, in their debate over space-based defenses in the July and December 1983 issues. However, I think this "missile gap" business needs some clarification.

On 15 March 1947 the Soviet government authorized formation of a State Commission to determine the feasibility of developing long-range ballistic missiles. The Commission reported directly to Joseph Stalin, who remarked that such missiles "could be an effective straitjacket for that noisy shopkeeper Truman." *That same month* an American Department of Defense study concluded that long-range ballistic missiles were not feasible. The U.S. Air Force concentrated on building big bomber aircraft, and the U.S. rocket industry nearly died.

By 1960, when Sputnik had proved to the world that the Russians actually had the rocket boosters and the guidance system to drop hydrogen bombs on any city in America, it was hard for many military officers and politicians to believe that the Soviets could be so *slow* in mass-producing the missiles. Certainly Khrushchev aggressively fostered the impression that Soviet factories were turning out missiles "like sausages," and warned the West that a rain of rockets would descend upon anyone who tried to interfere with Moscow's expansive plans.

So, despite the more cautious appraisals of the professional intelligence community, Washington believed the "missile gap" existed. And once the U.S. began to build a strong missile force, the Soviets redoubled their efforts to catch up. They did catch up, by about 1970, mainly because the U.S. stopped racing. The Russians have not stopped yet. As Bernard O'Keefe says in his excellent book, *Nuclear Hostages*, "When we arm, they arm. When we stop, they keep arming."

Much has been said and written about the so-called "Star Wars" idea of placing ABM weapons in orbit. Perhaps the earliest examination of the idea was in my 1976 novel, *Millennium*. So far, the real world is following my "script" pretty closely. I only hope the characters

in Washington and Moscow work things out as well as the characters in the novel did.

BEN BOVA

Dear Mr. Schmidt:

I read your editorial, "Placing the Blame," in the November issue with considerable interest. I am a retired high school teacher, and find myself in basic agreement with the points you make. However, there are two significant factors your editorial did not address:

1. High schools, even as recently as twenty years ago, were educating an elite. Now, *everybody* goes on to secondary school. *Today*, mass education is being attempted in American schools. No other country on earth makes any practice of doing this. The constitution of the student body makes academic achievement in the traditional sense a highly difficult, if not impossible, task.

2. The caliber of the teaching force has deteriorated steadily in the same period. Lack of respect for teachers, not only by students, but also by the community at large, and salaries that are not competitive with those in business are the principal reasons teaching no longer attracts first-rate minds.

The best remedy I can propose for these problems would be to create a three-tiered school system, with students segregated on separate campuses, if economically feasible. The groups should be the top 25%, the middle 50%, and the bottom 25%. Thus the teacher would have something approximating a homogeneous group, and superior achievement within each group would be attained because the teachers could gear teaching speed and technique to produce optimum results.

When I started teaching in 1927, less than half of elementary students entered high school; the drop-out rate was high, since there was no pressure for social promotion.

Homogeneous classes would also lighten the teacher's load, reduce disciplinary problems, and turn out more literate students, thereby restoring to the teaching profession at least some of the prestige it has lost in recent years.

HELEN EVANS

Miami, FL

There's a good deal to be said for ability grouping, but are separate campuses *the best level at which to do the dividing? I could have attended a "homogeneous" college-preparatory high school, but chose intead to go to a regular school with ability-grouped classes. The advanced placement classes there were academically on a par with the special school, but I suspect that in some ways it was good for me to associate with the more diverse group of students where I was (even though that included some unpleasant elements which were probably less prevalent at the special school).*

Dear Stan:

In the October "Times To Come" you wrote "everybody knows the Berserkers—those spacefaring machines programmed to destroy life wherever they find it—are Fred Saberhagen's invention and literary property." In one way you're quite right: "everybody knows it." But as usual, "everybody" is quite wrong.

I think this erroneous belief became propagated back when Norman Spinrad wrote one of the better *Star Trek* episodes in which a "berserker-type" machine was the central plot element. Self-appointed critics whose zeal exceeded their knowledge loudly proclaimed Norm's "plagiarism" of the idea from Fred. Norman—fine gentleman that his is—kept his own counsel. And Fred—

another fine gentleman—never to my knowledge raised any claim of priority.

The third gentleman involved here is Theodore Sturgeon, who also has kept silent. But it was he who wrote what pretty obviously is the very first story about what we have come to call "berserkers" and, as anyone might expect about a first major concept in science fiction, it was published in this magazine as the lead story in the February, 1948 issue: "There is No Defense." That's more than 12 years before Fred's earliest published story. For current readers, the novelette referred to may be more accessible in *The Worlds of Theodore Sturgeon*, Ace Books, 1977.

There's a moral here, I think, and one that I am sure is pretty well understood by many science fiction writers: ideas belong to everyone, and a good one will be used again and again in differing times and settings. We could scarcely do without the FTL ship, the warp drive, or even the ubiquitous blaster—no matter which writer first came up with the concept.

JAY KAY KLEIN

Dear Mr. Schmidt,

The article "Mining the Moon" by Stephen Gillett (November, 1983) was to me the best fact article you have run in "many moons." BUT, it contained an error. "Chalcophile" does not mean "sulfur loving." If "chalco-" referred to sulfur then the common mineral, charcopyrite, would be redundantly named since a pyrite is a sulfide. "Chalco-" is a root for copper. I'm sure that when Dr. Gillett thinks about it, he will realize that he already knew this.

Aside from that it was a marvel of concise exposition and clarity of concept. It gets my vote for best of the year!

LARRY LARASON

Monroe, LA

And the question you've raised gets my vote for the oddest etymological quirk I've seen in a long time. You're right that "chalco-" is a root meaning copper, but Dr. Gillett is also right that "chalcophile" means "having an affinity for sulfur." Both major dictionaries I checked agree on both these points—and both completely evade the question of how these roots got together to form a word with such an unexpected and seemingly inappropriate meaning! ■

siseneG

And God said: DELETE lines One to Aleph. LOAD. RUN.
And the Universe ceased to exist.
Then He pondered for a few aeons, signed, and added: ERASE.
It never *had* existed.

Arthur C. Clarke

(continued from page 8)

Loyal Opposition

that war had become pretty thoroughly unpopular; vocal criticism of it by both press and private citizens was common and widespread. But that was only after a great many troops had already been committed and lost and the public had gradually come to realize that it had nothing to show for the loss. At the beginning—when the U.S. commitment was small enough that it would have been relatively easy to disengage—the prevailing popular attitude was very much like that which Mr. O'Neill seems to be advocating after Grenada: do not criticize while troops were committed. There were people who *did* criticize then, but overwhelming popular opinion seemed to regard them as verging on treason in all but the letter of legal definition. That attitude did a lot—perhaps more than anything else—to encourage the insidious buildup of more and more troop commitments. If public and government had been more willing to listen to the few questioning voices *early* in the conflict, the subsequent course of history might have been considerably different. It's a bit late for Viet Nam or Grenada, but the lesson is worth remembering when similar situations arise in the future.

I realize, of course, that it is difficult for the public to have complete and accurate information about international situations, and even that some aspects of international dealings must be handled quietly to have any chance of success. But I also realize that the argument that some things must be done covertly can pose serious temptations to those in power—to do secretly more things than need to be done that way. If press and public are too willing to accept that excuse without prompt and persistent questioning, the government—or even some segment of it—can get away with a great deal that would not be tolerated if it were known.

The conflicting needs for an informed public and a government which can handle sensitive issues without damaging publicity pose one of the basic dilemmas of trying to run a government "of the people, by the people, for the people." But such a government still seems one of the more worthwhile social experiments in human history, and well worth continued support. But that implies that the government must expect the people—including the press—to take an active interest, in "real time," in what it does. A vital part of making such a system work is that the government view secrecy as a last resort and strive always to let the public know, as promptly, thoroughly, and accurately as possible, what it is doing and why. A no less vital part, which must not be suppressed either by legislation or by government-encouraged social pressures, is that the people oppose the government when it cannot adequately justify its actions. To treat *government* as infallible or unaccountable can be the worst kind of disloyalty to the *country*.

And the time to begin questioning is when questionable courses of action *begin*—not when we are so deeply mired in them that we can't get back out. ■

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a calendar of analog upcoming events

20 - 23 April
SEACON (Combined British Eastercon and Eurocan SF conferences) at the Metropole Hotel, Brighton, England. 5 Guests of Honour. Attending membership $16. Info: Mary Burns, 23 Kensington Court, Hempstead NY 11550.

20 - 23 April
EUREKACON (Australian National SF Convention) at Melbourne Town House, Carlton, Victoria. Guest of Honour—George Turner. Registration—$A10 supporting, $A20 attending. Info: Eurekacon, P.O. Box 175, South Melbourne, Victoria 3205, Australia. Use airmail.

23 - 26 April
General meeting of the American Physical Society at Washington, D.C. Info: A.P.S., 335 East 45th Street, New York, NY 10017.

27 - 29 April
CON*TRETEMPS 3 (Nebraska SF conference) at Omaha, Nebr. Guest of Honor—Patricia A. McKillip, Artist Guest of Honor—Real Musgrave, TM—Stephen R. Donaldson, SMOF—Rusty Hevelin, Fan Guest of Honor—Ken Keller. Registration—$14 until April, $16 at the door. Info: Con*tretemps 3, Box 12422, Omaha NE 63112. Include S.A.S.E.

30 April - 2 May
Workshop on Computer Vision (IEEE) at Annapolis, Md. Info: Workshop on Computer Vision, P.O. Box 639, Silver Spring MD 20901. 301-589-8142. TWX 7108250437 IEEECOMPSO.

4 - 6 May
COLORADO MOUNTAIN CON (SF conference) at Cascade Village, Vail, Colo. Registration—$12. Info: Colorado Mountain Con, c/o Stan Gardner, P.O. Box 541, Leadville CO 80461. 303-486-2016.

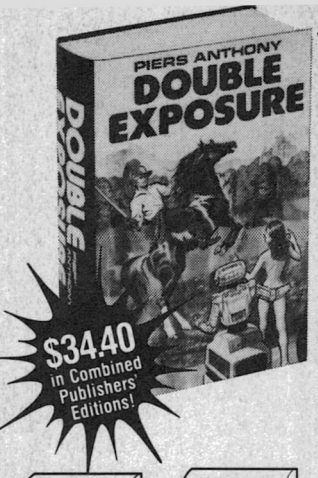
4 - 6 May
ONOCON '84 (Central NY SF conference) at Sheraton Inn, Syracuse, N.Y. Guests of Honor—Frederik Pohl, L. Sprague de Camp, Carl Lundgren, Randy Elliot, and Jay Kay Klein. Registration—$15. Info: Onocon '84 P.O. Box 305, Syracuse NY 13208. Include S.A.S.E.

18 - 20 May
MARCON 19 (Central Ohio SF conference) at Quality Inn, Columbus, Ohio. Guest of Honor—C.J. Cherryh. Registration—$12.50 until 15 April, $15 thereafter. Info: Van Siegling, 222 Andalus Dr., Gahanna OH 43230.

25 - 27 May
V-CON 12 (B.C. SF conference) at University of British Columbia Conference Centre, Vancouver, B.C. Guest of Honour—Samuel R. Delany, Special Guest—Elizabeth A. Lynn, Fan Guest of Honour—Debbie Notkin. Registration—C$25. Info: V-Con 12, Box 48478, Bentall Centre, Vancouver, B.C. V7X 1A2 Canada.

30 August - 3 September 1984
LA CON II (42nd World Science Fiction Convention) at Anaheim Convention Center, Los Angeles, CA. Guest of Honor—Gordon R. Dickson, Fan Guest of Honor—Dick Eney, TMs—Robert Bloch & Jerry Pournelle. Registrstion—$40 until 31 December 1983, more later and at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: LA Con II, Box 8442, Van Nuys CA 91490.

—Anthony Lewis



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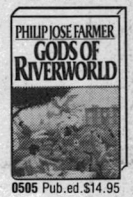

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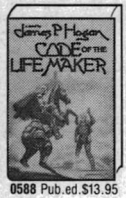

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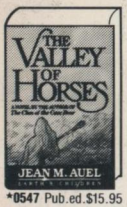

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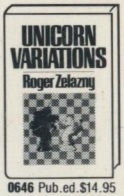

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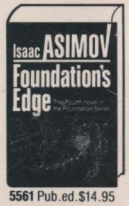

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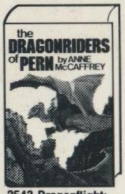

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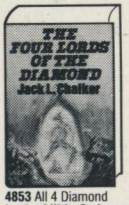

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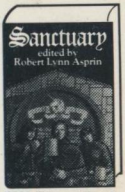

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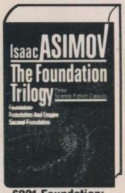

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