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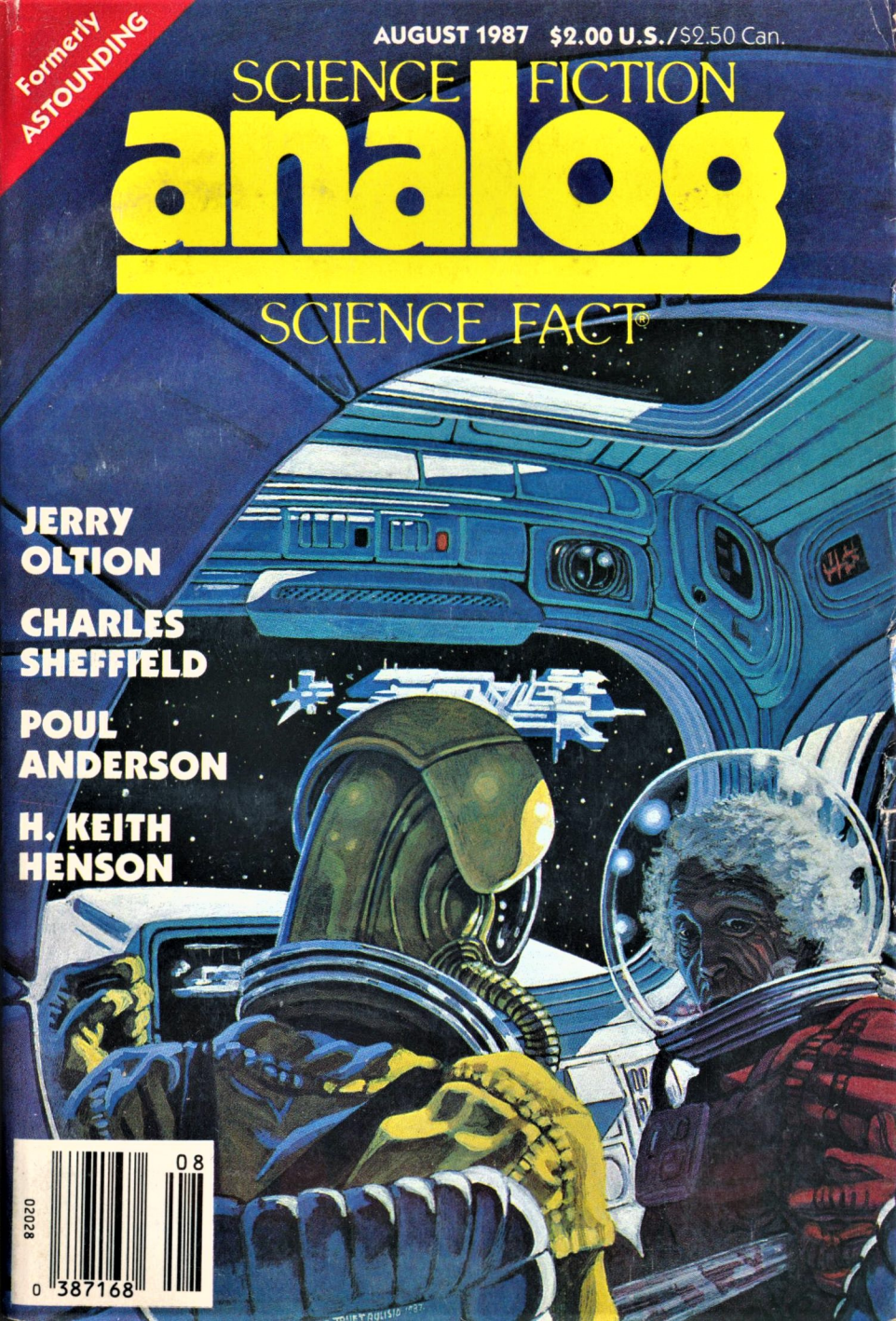

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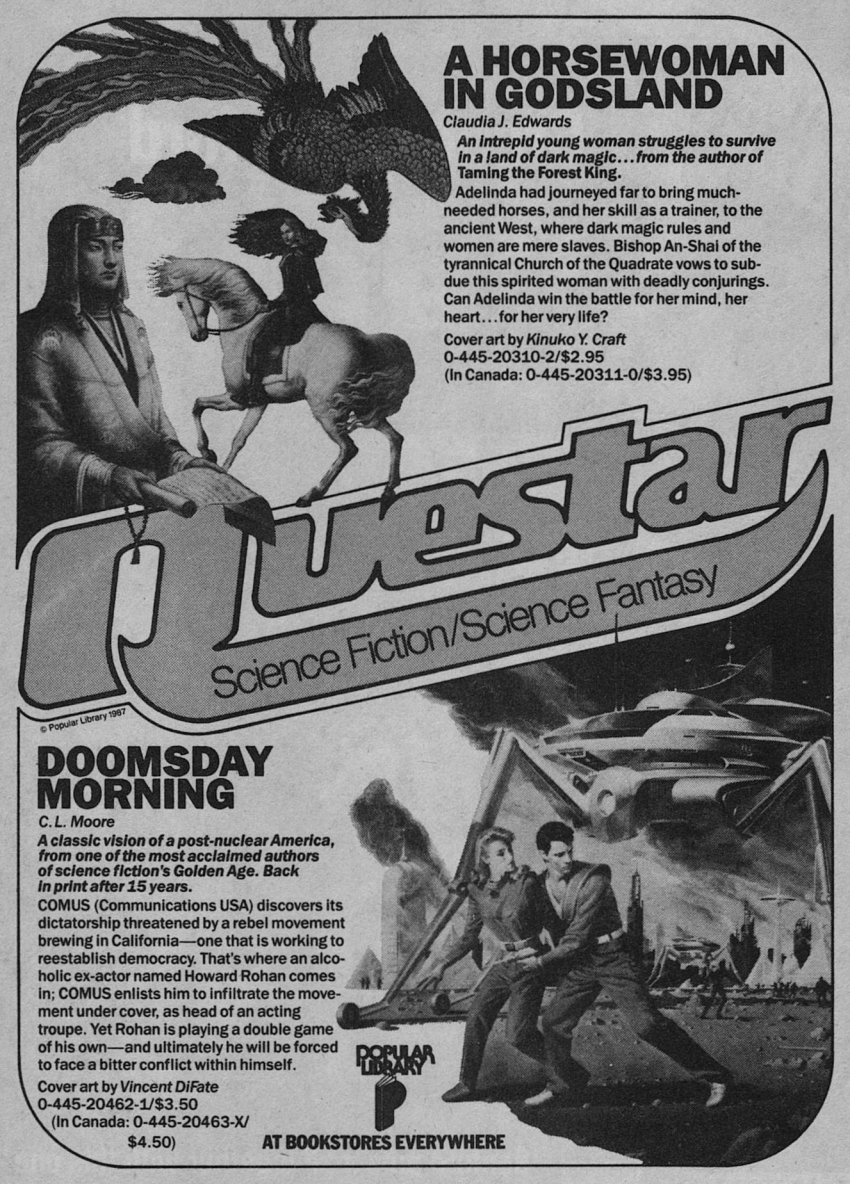
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Vol. CVII No. 8
August 1987

Next Issue on Sale
July 14, 1987

$19.50 per year in U.S.A.
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Indicia on Page 6

Editorial

THE MEMETIC MENACE

Stanley Schmidt

Readers sometimes tell me that when they get a new issue of *Analog* they read the editorial first. Normally that's fine with me, but just this month I would like to suggest that you read the fact article first (and then come back to the editorial!). I don't want to steal H. Keith Henson's thunder by anticipating everything he says, or bore you by repeating it. But I do want to comment on some possible implications I see in it.

Memetics, as Mr. Henson explains, currently appears to be one of the more promising lines of study directed toward developing a genuine predictive science of social interactions. The central idea is that social movements are largely determined by the dissemination and evolution of "infectious ideas," called memes, analogous to genes and describable in considerable detail by very similar mathematics. If efforts to formulate memetics rigorously continue to progress, the result could be a body of theory which for the first time allows accurate predictions of such things as how successfully a given idea will spread through a particular society and what effects it will have if it does.

I tend to think that any increase in understanding is at least potentially beneficial, but it's also true that most things that can be used can also be abused.

Would this be true of a well-developed science of memetics? In his article, Henson explicitly acknowledges that memetic models "are not without the potential to seriously affect our cherished institutions." In general, his view of this potential seems optimistic: "When viewed from the perspective of tolerance that has been developing in Western culture since the Renaissance, the changes in outlook seem to be positive. . . . " I haven't asked him, but I suspect that his thinking here is that if people *understand* how memes propagate, they will be less subject to passive manipulation and more able to guide the evolution of prevalent memes in beneficial directions, which would seem to require the availability of a well-stocked meme pool on which selection mechanisms can operate. My first inclination is to agree. You may remember last month's story "The Forest of Time," by Michael F. Flynn (another writer very interested in ways the social sciences might be made truly predictive). In his correspondence concerning that story, the author mentioned that it was, among other things, an example of "the effects of blocking the free circulation of memes"—and probably few readers would consider those effects entirely beneficial.

But might a flowering of memetics have other effects than the obvious benefits of increased understanding? In the same paragraph from which I quoted above, Keith Henson also says, " . . . but it would not surprise me to find memetics condemned from the pulpit even more than evolution has been." Might it be condemned from other quarters as well, for other reasons? And might it not also be vigorously *exploited* by the very pulpits that most loudly condemn it? Indeed, that possibility might be one of the most threatening seen by people outside pulpits—for a cult leader with a solid grasp of memetics might be in an unprecedentedly good position to infect lots of people with the memes he's pushing, and to interfere with the circulation of others which he doesn't like.

Suppose, for the sake of argument, that memetics is developed to the status of a true science, or at least a good, solid engineering technology. In particular, suppose it becomes possible to predict accurately which memes will be highly infectious. That capability opens a wide range of new opportunities for highly effective advertising, propaganda, and censorship. The manufacturer who wants to sell lots of widgets hires a good memeticist to develop a sales slogan that he *knows* will catch on. The government that wants its programs passed and its members reelected hires experts to see that they're described in infectious terms. And if it would like certain ideas suppressed, it has a stronger weapon than ever before for justifying its actions.

Consider: if you grant that some memes are more infectious than others, and you can identify them in advance; and if you also believe their effects can be either "benign" or "deadly," then there's going to be an awfully strong

temptation to identify those which are both infectious and deadly and take measures to prevent their spread. Those who would defend such a course need only point to the Nazi meme complex, which dramatically showed its infectiousness in the educational experiment described in Henson's article, long after its destructiveness was a matter of well-known historical record. If advocates of censorship can point to such well-documented examples of memes that are both easily spread and dangerous in their effects, and can also make a credible claim to being able to identify such memes *before* they are allowed to spread, they will be able to make a very persuasive case for being allowed to aggressively suppress such ideas.

Might they even be right in some

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Analog Science Fiction/Science Fact (Astounding) is published 13 times annually by Davis Publications, Inc. at $2.00 a copy in U.S.A., $2.50 in Canada. Annual subscription $19.50 in the U.S.A. and possessions, in all other countries, $24.20 payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Second-class postage paid at New York, NY, and at additional mailing office. Canadian 3rd class postage paid at Windsor, Ontario.

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IN CANADA RETURN TO 628 MONMOUTH ROAD, WINDSOR, ONTARIO N8Y 3L1
Editorial and Advertising: Analog Science Fiction/Science Fact, 380 Lexington Avenue, New York, NY 10017
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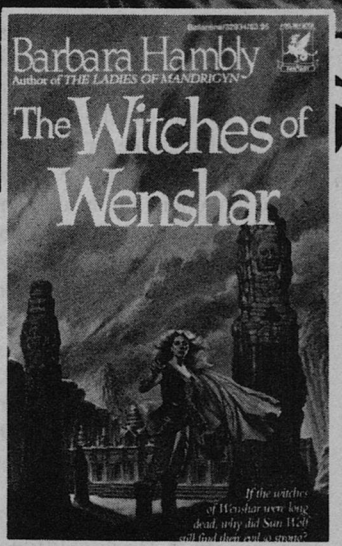

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cases? The possibility is intriguing, though disturbing. If it is tentatively accepted, it immediately raises other questions. Who is qualified to judge whether a meme is both dangerous and infectious, and how are such qualifications established? I suspect that, of the two meme traits in question, infectiousness will be the easier to determine. If memetics becomes a rigorous theory of cause and effect, it should be a relatively straightforward—and objective—matter to predict how far and fast it will spread. But the ultimate *effects* of its spreading involve forces beyond the scope of memetics itself—and value judgments. It may not be possible to say what the effects are, much less whether they were beneficial or harmful, until years after a meme's introduction.

So might it be that, even if infectious memes can be positively identified and if some appear clearly dangerous, no one should presume or be allowed to suppress them? Might it be that the best course in the long run is to let memetic evolution proceed as freely as possible, leading wherever it will? "The Forest of Time" showed how blocking the circulation of memes can slow historical change; and if historical change is seen as predominantly progressive, it would seem counterproductive to interfere with it. On the other hand, not all changes are improvements, and, for example, slowing a civilization's descent into a dark age might be worth considerable conscious effort. The trouble is that only posterity's historians know which changes were ultimately beneficial (and even they don't always agree!).

Remember, we are a product of evolution, and it would have been very difficult for an ecological engineer roaming the Earth *N* million years ago to anticipate us, or to know which earlier evolutionary changes worked toward or against our eventual development. (He might also have had trouble deciding which he preferred, but that's another matter.) Remember, too, that evolution also produced the smallpox and AIDS viruses. Evolution will always find its own solutions—but they may not look like solutions to any particular species involved in them! The participants in evolution want *themselves* to be among the "fittest" that survive. Humans, for example, have a vested interest in humanity. But the essential nature of evolutionary processes is that some survive at the expense of others—and genes or memes don't particularly care which. Their aim is their *own* survival, and host organisms or minds are only means to that end.

There is, of course, another side to the whole question of what should be done with a science of memetics. I have raised the possibility of its being used to justify censorship as a means of eradicating dangerous and infectious memes. But "infectious" is not simply an intrinsic property of a virus or a meme. It describes a *relationship* between a virus or a meme and a potential host, and the parameter which I haven't yet mentioned is *immunity*. Organisms have developed elaborate mechanisms for defending themselves against biological

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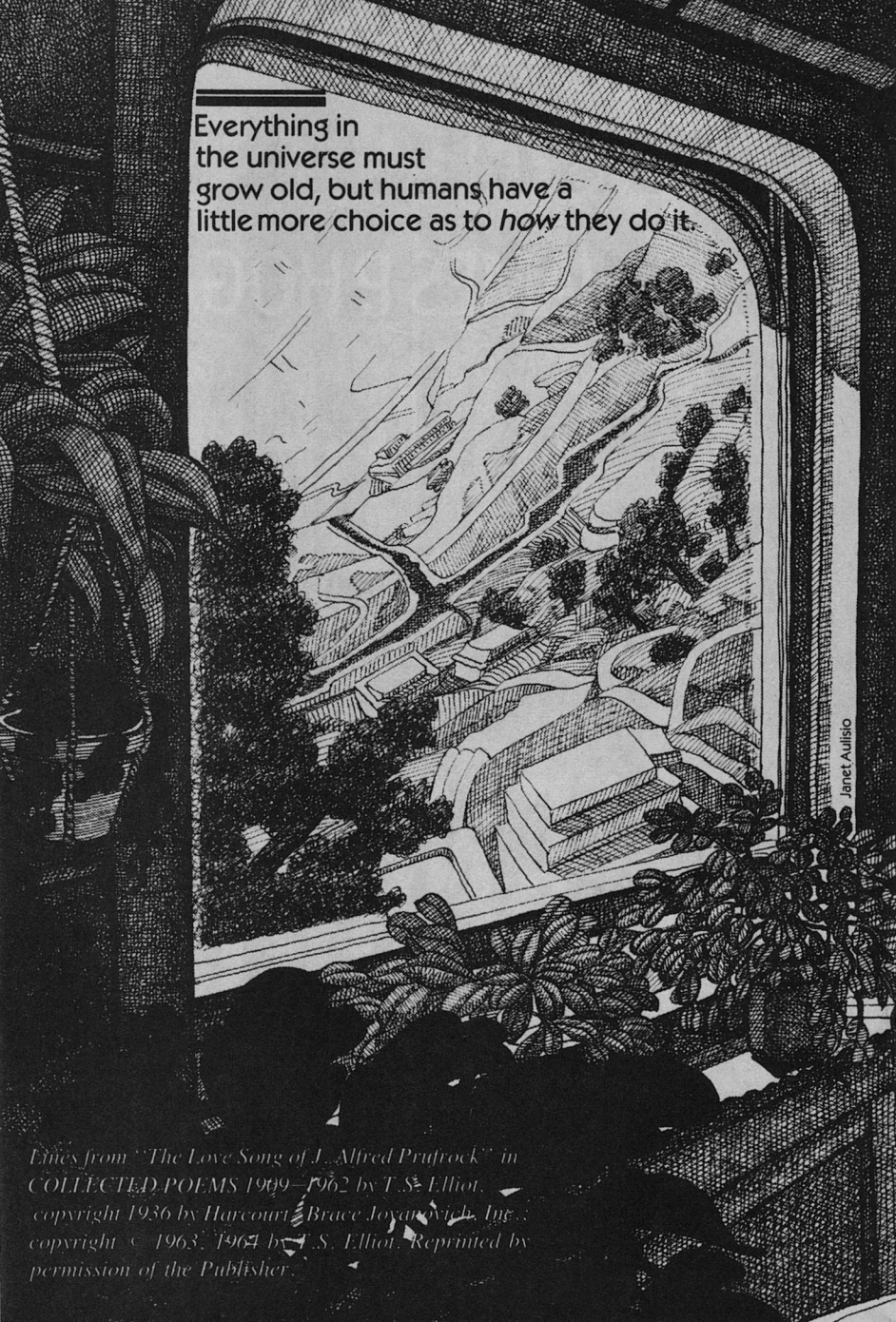
invaders. If the immune system has such a mechanism in place for, say, smallpox virus (as it now does for most humans), then smallpox virus, even if present, is no longer a threat to the organism so protected. The hopeful side of memetics is that a widespread understanding of it could lead to the development of effective "mental immune systems," teaching people's minds to distinguish between useful and destructive memes and to reject the latter. If most people have learned not to be taken in by catchy advertising slogans or political propaganda, then it will be far more difficult than it is now for dangerous ideas to be epidemically infectious. And the use of memetics to justify censorship will be harder to defend. (This would, of course, be bad news for certain politicians, admen, and cult leaders—but they could always retrain and find honest jobs in some other field, much as buggy whip makers once had to do!)

Memetics, then, has the potential for menace only in the same sense as most other sciences or technologies: it is dangerous to the extent that only a few understand it and others trust them, and that those who do understand think they understand more or better than they really do. It has not yet been proved (at least to my satisfaction) that memetics *can* be developed into a full-fledged predictive science—but neither has it been proved that it *can't*. If it is, it will be dangerous if it's left in the hands of an elite group who believe, and can convince others, that they can be trusted to identify and eradicate dangerously infectious ideas. But if its understanding can be made an integral part of general education, memetics may become its own best protection against that very sort of abuse. ■

● Science has given back to the universe that quality of inexhaustible richness and unexpectedness and wonder which at one time it seemed to have taken away.

Sir Edward Appleton



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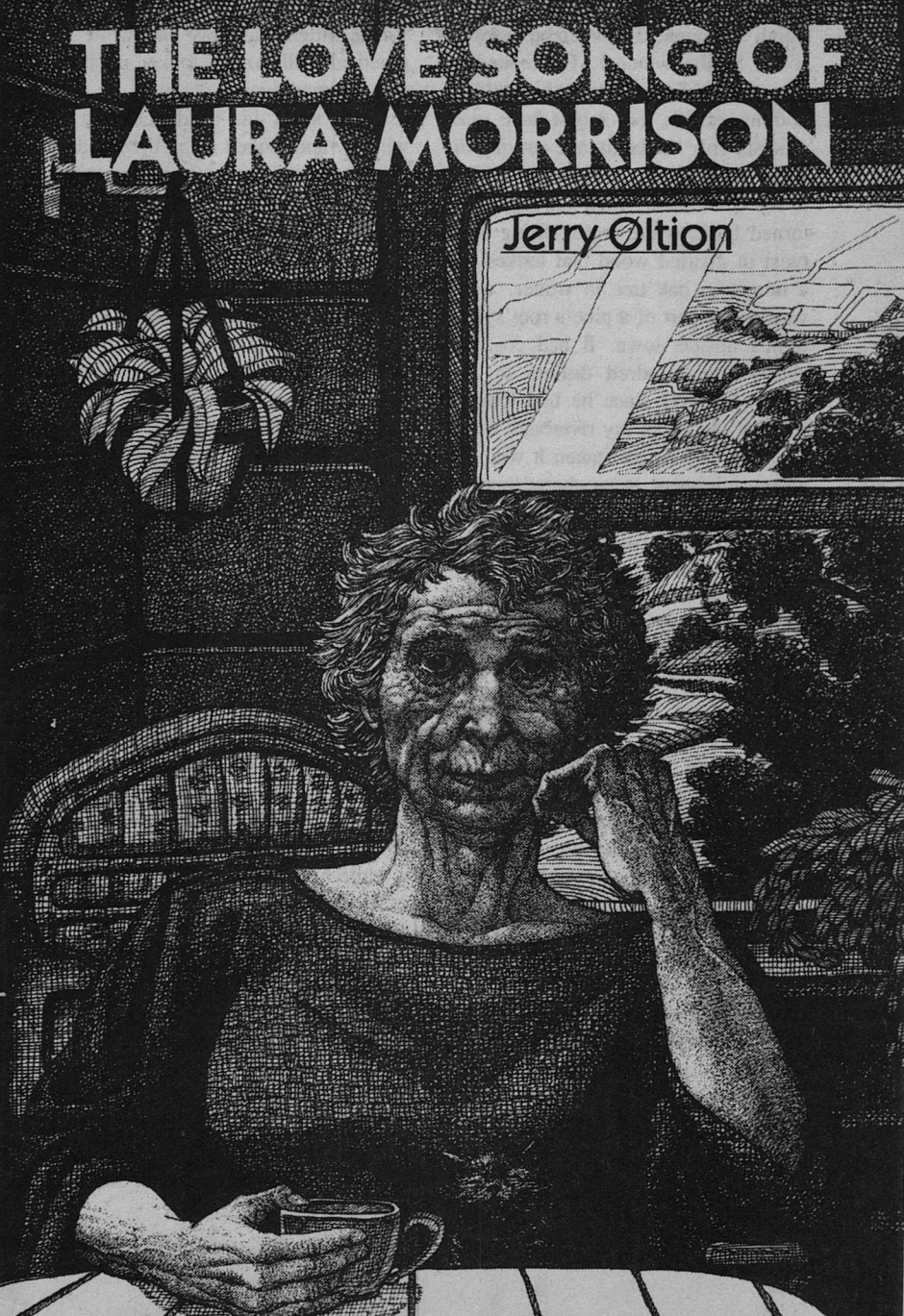
THE LOVE SONG OF LAURA MORRISON

Jerry Oltion



Teigh was unpacking when he heard the sound at the window. He looked up from the pressure crate, but he could see nothing outside that might have made a noise; only the landscape curving upward in the distance. He looked out at it for a moment, then shrugged and turned back to the crate, lifting out a twist of gnarled wood that looked like a miniature oak tree in winter, which was in fact part of a pine's root system turned upside down. It had cost him nearly five hundred dollars to ship along, but ever since he had found it sticking out of an icy riverbank nearly ten years ago he had taken it with him wherever he went. Its weathered branches held for him the essence of Earth, a moment of life frozen in its struggle with the elements.

He stood with it cradled in his hands while he turned once around in search of an appropriate spot for his treasure, and he heard it again. A kind of high-pitched squeak, like a bearing going out, or . . .

Or a kitten, hanging onto the ivy that grew along the divider between his apartment and the next, looking down over one shoulder the way kittens do when they're thinking about jumping.

Teigh set his tree down on the bed and stepped to the window. He still wasn't used to the light gravity in the colony and he didn't know what the varying rate would do to a falling object's velocity, but he was pretty sure that a three story fall wouldn't do a kitten any good even here. He opened the window gently so he wouldn't scare it into jumping, reached out from below, and pulled it in, saying, "Well, little thing. Where did you come from?"

The kitten was gray and white and practically all fuzz. It looked up at him and meowed again.

Teigh stuck his head back out the window and looked along the building. The ivy originated from the apartment below and to the right; a perfect trellis for climbing kittens.

"So," he said as he pulled his head back in. "You're checking out your new neighbor. Hello. Nice to meet you." He let the kitten pull its legs up until it was standing in the palm of his hand. It couldn't have been much over two months old. "You're cute," he told it, "but I'll bet your mother wonders where you are."

He looked out the window again, but he saw nobody below and he didn't feel like shouting. "Well," he said, "I guess it's time I did a little visiting myself."

The nameplate on the door said Laura Morrison. Teigh looked down at the kitten in his hand and cocked an eyebrow. Single? He pushed the doorbell.

A voice from within said, "Just a minute," and there were some bumping sounds, then the door opened to reveal a white-haired woman in her seventies or so. Teigh tried to hide his disappointment.

"Hi, I'm Teigh Kuhlow, from upstairs in 308," he said. "I, uh, I found your kitten climbing on the ivy."

The woman nodded wearily and reached for it. "Not surprising. Sorry. I'll close the window."

Teigh shook his head. "Oh, no. I didn't mean that. I didn't mind, really. I was just afraid he'd fall. I, uh, I like kittens."

She lowered her head and looked at him through squinted eyes. "You do."

"Sure. Who doesn't?"

The woman smiled for the first time. "The last guy who lived up there, for one. Hah. Well, come on in, then. I've got a lot of 'em."

Indeed she had, Teigh discovered when he was inside. He counted six cats without looking hard, three of them from the same litter as the one which still purred in his hand. There might have been more, but if there were they were hidden in the lush foliage that grew almost everywhere. Laura led him to the kitchen table and moved a potted geranium from one of the chairs so he could sit.

"So you got the Hulk's apartment, eh?"

"The Hulk?"

"That's what I called him. Barbells. Always lifting them, banging them back down on the floor. Said he needed to keep in shape in the light gravity. Hah. What did he know? I've been here thirty years without lifting a barbell once and I'm still kicking." She took two cups down from a shelf and filled them with water. "Tea?"

"Uh, yes, please."

"Good, 'cause I don't have coffee. Horrid stuff. Should've left it on Earth. That where you're from?"

"I was. I guess I'm from here, now."

She nodded. "One-way ticket, huh? Me too. What do you do?"

Teigh set the kitten on his lap, where it promptly curled up to sleep. "I'm an architect. I'm working on the life support system for *Daedalus*."

"*Daedalus?*"

"The starship."

She put the cups in the microwave, punched a few buttons, and reached into a cannister for a tea bag. "I use regular tea," she explained. "Don't like the aftertaste that heat-em-up stuff leaves. God knows what chemicals are in there anyway. Starship, you say. I didn't know they had one."

Teigh smiled involuntarily at her quick changes in subject. "Oh, come on now. You have to have heard. They're building it right outside. It's the biggest news in the solar system."

"Ah, well, I'm not much for news, you know. Full of wars and killing and such. I decided about twenty years ago that it wasn't worth listening to."

"Oh."

The microwave chimed softly and Laura took the steaming cups out. There was a silence while she dunked the teabag in one cup, swished it around, and dunked it in the other. Teigh used the opportunity to gaze out the glass door in wonder. He'd thought the view from his apartment was spectacular, but Laura's corner apartment had windows on two sides, and the side that faced along the colony's spin axis had an unobstructed view all the way down its length. Through the haze of distance Teigh could see the polar ice forming a bull's-eye in the middle of the endcap, melting the edges to form the streams that ran outward from the center to the rim of the cylinder that was Spacehome. The three windows running the colony's length were strips of blue radiating from the pole, the blue fading to white overhead where the sun's brilliance dominated the sky.

This would be a coveted apartment, he realized. He wondered who Laura

Morrison was to have it. The mayor's mother? But certainly the mayor's mother would know about *Daedalus*.

"You like the view?" she asked.

"Yes, very much."

"David did, too. He was my husband."

Suddenly it all clicked into place. "David Morrison? The architect?"

Laura turned, surprised. "You knew him?"

"No," Teigh said. "But I wish I had. Everyone on the *Daedalus* project wishes so too. We could have used his genius in designing the ship."

She pretended no false modesty. "Ah. Yes, maybe so. He'd have liked that." She brought the two cups to the table and sat down beside him. "He was always pushing for a starship. Even building Spacehome wasn't enough. He wanted the stars."

"Then I wish he'd lived to see *Daedalus*."

Laura looked out toward the pole. "So do I," she said.

There was an uncomfortable silence. Teigh took a hesitant sip of tea, wishing he could ask for sugar in it but knowing that he wouldn't, then feeling surprise to taste the honey she had stirred in while he was lost outside.

Laura took a sip of her own and winked at him over the cup. Teigh smiled, somehow embarrassed. This wasn't the sort of behavior he expected from a seventy-year-old woman.

"Yeah," she said, "I do miss the old coot. Hard as hell to live with, but I loved him anyway."

Teigh had read biographies of David Morrison, but none of them had portrayed him as being particularly hard to live with. But then none of his biographers had had to live with him, either.

"What was he like?" he asked.

With a fond shake of her head Laura said, "Oh, well, he was a real space nut. One-track mind. 'Get our race into space' and 'Stay alive in L-5' and all that. When we first met he wouldn't take me out on a date unless I joined the L-5 Society. I didn't even know what the L-5 Society *was*, but David was so magnetic I went ahead and joined just to be with him. We were still in college then."

She took another sip of tea and gazed out over the colony. "He was always pushing. Made me take astronomy classes. Said that a person who couldn't find Cassiopeia without a map was as bad as someone who couldn't read. What do you think? Can you find Cassiopeia?"

Teigh felt the color rising in his ears. "Uh . . ."

"Shame on you. And you on the crew of a starship. Where are you taking it? Not Cassiopeia, I hope."

Her grin was contagious. "Nothing so ambitious," he said. "We're going to Alpha Centauri first. It'll take us about twenty years just to get that far."

Laura sighed. "You're a lot like David. He wasn't afraid of big projects either."

Teigh blushed again. Being compared to his personal hero—by his hero's wife, no less—was embarrassing. He stuttered a moment in search of something to say, then managed, "You must not be either. To come up here to live while they were still building it."

"Hah. No. I was terrified. But David was coming whether I did or not, so I

didn't have much choice. I spent most of the first few months being sick, and then I got pregnant with Michael and spent *another* few months sick, but I guess you get used to anything after a while."

"I guess that's what it means to be a pioneer."

Laura said something that sounded like "Hrumph," and drained her teacup.

Teigh wasn't sure how to take that. He decided that a change of subject was probably safest, so he said, "What were you studying in college before you met David?"

"English literature," Laura said with a sudden smile. "Had my nose buried in a book almost all the time. I was going to be the greatest poet since Shakespeare, but I had to read everything that'd been written first, you know, and I never finished doing that. Do you like poetry?"

"What I've read of it," Teigh admitted. "I didn't have a whole lot of time for reading it in school, though. Just what we got in Freshman English."

"Ah, yes. 'In the room the women come and go/ Talking of Michelangelo.' T.S. Eliot. Remember him?"

Her words had loosed a tumble of images in his mind. "Yes! Yes, I do! *The Ballad of J. Edgar Prunecoat* or something like that, isn't it?"

"*The Love Song of J. Alfred Prufrock*," Laura said, laughing. " 'Let us go then, you and I/ When the evening is spread out against the sky—' I think everybody gets that one. You know, I was going to be a teacher once, too."

"You were? Why didn't you?"

She looked away at the colony. "Oh, well, you know. David had his project, and we were moving all over those first years. And then we moved up here and I had the family to look after and it just never seemed to come together." She shook her head. "I don't even read as much as I used to anymore."

"Why not?"

Laura looked at Teigh as if she were sizing him up before she imparted a secret, then finally said, " 'I grow old . . . I grow old . . .I shall wear the bottoms of my trousers rolled.' " She shrugged. "Same poem. It's hard for me to get to the library sometimes. Arthritis, tendonitis, you know. All the old-people stuff. You caught me on one of my good days."

"Can't you just download books onto your computer?"

Laura looked embarrassed. "I never could get the hang of working one of those things."

"I could show you. It's really easy."

She was definitely blushing now. "No," she said. "I don't get along too well with gadgets. Anything with buttons on it. Besides, there's nothing like having a real book in your hand when you're reading."

"I suppose not," said Teigh, who had never read a book on anything *but* a screen. He had a sudden thought. "How do you get your mail if you don't use a computer?"

"I go to the post office," Laura said in the voice a person uses to answer a dumb question, but her laugh was a quiet, little girl sort of a laugh that carried no contempt. "On my way to the library. My grandkids think I'm crazy too," she added, "but they humor me. They're scattered out all over the solar

system. I get letters from Ganymede and Vesta and Ceres all the time, but they come by regular mail, on paper."

More likely the post office printed them out for her from the digital transmission, Teigh thought, but he supposed they *could* still send letters by ship. People sent packages, after all. But it cost a fortune, even shuttling up from Earth. He shook his head. If Laura would learn to run a computer she could save herself a lot of trouble and a lot of money too. He didn't doubt that she could; she'd shown plenty of facility with buttons when she used the microwave.

But it didn't sound like she was interested. Teigh shrugged. "Everybody's got their own way of doing things," he said. "I'm certainly not the one to say what's crazy and what isn't." He finished his tea and set the cup on the table, scooped up the kitten in his hands, and said, "I should get back to unpacking. I've got to dig down as far as my socks before I go to work tomorrow. Thank you for the tea, and the lap-warmer."

"Anytime." Laura stood and took the kitten from him, and followed him to the door. "Come back and visit again," she said.

"I will." Teigh stopped at the door to look at something he had missed on the way in: a fish bowl shaped like a pressure suit helmet. He bent down for a closer look, then laughed in surprise. It *was* a helmet. He looked up at Laura and asked, "What do you do for a suit when you go outside?"

"I haven't gone outside since David died," she replied. "There hasn't seemed much point."

"Oh." He stepped into the hall. "Well, maybe I can take you to see the ship sometime. And you can show me Cassiopeia."

She grinned. "Maybe so. We'll see."

As he unpacked, he thought about Laura and her husband. David had died almost twenty years ago in a construction accident, before Spacehome had been completed, but he had been the driving force behind it even after he was gone. It had been his plans that got the public funding for the project in the first place—his incredibly detailed plans that showed not just a cylinder with houses and forests and farms in it, but just where the houses and forests and farms ought to go and how to get them there. He had designed the entire colony right down to the last rivet and rock; he had written the manual on living in space, and then he had sold it to the world.

It was hard to imagine his wife as the kind of person who couldn't—or wouldn't—work a computer, but Teigh supposed it was just another sign of David Morrison's genius that he could build a high-tech world with room enough in it for someone like her. Maybe she was part of the reason why Spacehome was so liveable. She was a reminder that people were individuals and wouldn't all fit the same mold. She provided the human touch to David's technical expertise. Teigh would have to remember her while he helped design *Daedalus*'s lifesystem.

The starship was going together in a completely different way than the colony had. With Spacehome they had had the complete plans from the start, but *Deadalus*'s designers were barely a

jump ahead of the builders. It was a reflection of the changing times; people were more impatient to get into space now that the first efforts had proved so successful, but the lack of an acknowledged genius for a designer was also part of the reason. Nobody had yet come up with a complete set of plans that somebody else couldn't tweak into a slightly better configuration. And now here was Teigh to add his own twist to the developing plans. Well, he thought, thanks to Laura he might at least have a direction to twist them.

The next few months were the most intense in his life. The problem of designing a closed environment that people could live in for twenty years was bigger than anything he had ever worked on before, and he found himself immersed in it from the start. He dreamed it at night and he lived it during the day, and slowly a picture began to emerge. It was a picture of mutability, gained from studying David's plans for the colony and noticing the changes that had been made in it since. In twenty years any lifesystem would become boring, so the answer to that was to make it changeable. Spacehome was by its very nature changeable and always changing; new housing replaced old, trees grew and forests expanded, and living styles from Earth and the outer colonies swept through in constant waves of variation. That wasn't as easy to do on a starship, but Teigh thought it might be possible. If the building materials were modular and if the modules were small enough to move around easily, then the crew could conceivably rebuild the entire lifesystem in transit, and they could do it as many times as they liked. The trick was not so much in designing the finished product, since there would be no true finished product, but in designing what the building blocks would look like and how they would go together.

Teigh took the idea to Laura after he had worked it out. He had visited with her a few times since their first meeting, and he had learned to value her quick insight into human nature. This time she listened to his explanation of building materials and mutable living quarters and looked at his drawings, and when he was done she said simply, "Not everyone will want to change things around."

"That's true," he said. "That's the beauty of it. If you like what you're living in then there's no reason why you have to change it, but the opportunity is always there. Just knowing that you *can* change it if you get bored will probably be enough to keep most people happy."

Laura nodded. "You know, this whole idea of yours sounds like something David showed me once. I'd forgotten all about it until now."

"He did a starship design?" Teigh had never heard of a David Morrison starship plan. Nor had anybody else, he was sure. But who was to say what David had worked on in his spare time? And if he had . . .

He felt like the carpenter who uncovers a fresco by one of the Old Masters behind a false ceiling. A David Morrison starship design!

"Do you think you could find it?"

"Me?" Laura said. "Hah. Not in a million years. It's on his computer. But

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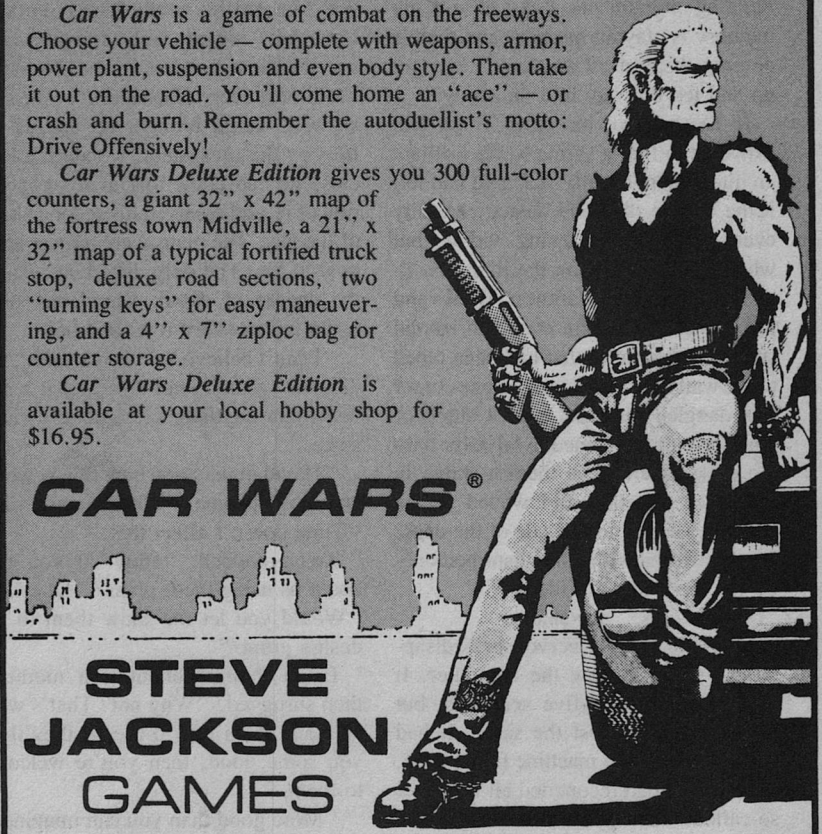

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you're welcome to give it a try if you want."

"I'd—" He swallowed. He couldn't speak.

"Come on, you said yourself that computers are easy."

"It's—" Teigh managed. "It's —that's—I mean, I'd be honored."

"Oh, cut that out. Next you'll be building monuments. Like as not my memory is playing me false and there's nothing there at all anyway." She got up and led the way into the study.

In the back of his mind Teigh still expected to find a shrine to the brilliant architect, kept exactly as David had left it the day he died and dusted carefully every day by his grieving widow, but when Laura flicked on the light that illusion fled with the darkness. Books and papers lay stacked on every horizontal surface, a blueprint that had been taped to the wall had come loose on one corner and dangled outward, and a stack of empty boxes threatened to fall over onto the desk. Laura gave them a shove in the other direction and waved at the computer sitting to the side of the desk. It was covered with dust, disturbed only by the footprints of kittens.

"Have at it," she said.

Some of Teigh's nervousness disappeared when he saw the computer. It was at least twenty-five years old, but he recognized it just the same. It had been an incredible machine for its time, the one that had reconciled all the other so-called "standards" into a single true standard that was still in use. He would be able to run it, provided it still worked.

He blew off the dust and sat down in front of it, fumbled for the power switch, and turned it on. The fountain of sparks he had half expected didn't happen; instead he got the normal sign-on message and a menu of choices. One of them was a directory, a listing of all the files in storage. Teigh chose that, and file names began to scroll onto the screen.

Ten minutes later he had it. There was an entire subdirectory entitled "starship" filled with drawings and specifications for not only the lifesystem but almost every other aspect of the ship as well. Teigh brought up one of the files on the lifesystem, wondering how close he had come to David's conception of it, and received his second shock of the day. The plans were almost identical to his. The only difference was in the degree of detail; David had once again put in every rivet and bolt.

"I can't believe it," Teigh said. "He did this twenty years ago and it's still better than anything we've come up with since."

"David understood how things work, and how people work," Laura said. "Time doesn't affect that."

Teigh nodded. "How do you feel about us using these plans?" he asked. "Would you let me show them to the design group?"

Laura thought about it a moment, then shrugged. "Why not? That's what he made them for, to use. If they'll do you some good, then you're welcome to them."

"More good than you can imagine," Teigh said. It was true. It would mean giving up the credit for the design, but having David Morrison's name on the plans would effectively cement them into place. They could get on with the

job of building the ship instead of constantly changing the details, and the crew who flew in it would start the trip knowing that the design was right. Their confidence in it would go a long way toward making it work.

He sat with his hands resting lightly on the keyboard, marveling at how much information had been locked up behind it all this time. He supposed this was how Laura felt when she blew the dust off a book and opened it for the first time in years. On impulse he said, "Why don't I show you how to get into the library with this?"

Laura's reaction was too immediate to be thought out. "No, I'm too old to be learning how to run one of these things."

"Nonsense," Teigh said, "If you can run a telephone you can run a computer. Watch." Explaining what he did at every point along the way, he returned to the opening screen, loaded the communications program, and accessed the colony library, all by picking options off menus. The library computer gave him another menu of choices, from which he picked the poetry index, and the author index under that.

"Okay," he said. "We're there. What do you want to read?"

Laura looked flustered. "I don't know. I usually just browse until I find something interesting."

"Easily done," Teigh said. He picked the first name off the index—Alan Aaron—and got another menu of titles. He picked the first title, and the first page of *After Gazing at Ganymede* scrolled onto the screen.

Laura leaned forward to read it, but after a few lines she straightened and said, "Hrumph. Doggerel."

Teigh laughed. "I'm afraid I wouldn't know the difference."

"No? Here, I'll show you." She turned away as if to go after a book, then stopped and turned back. "What am I doing? You've got the whole library right there. Okay, see if you can find Pope in there. Alexander Pope, his *Essay on Criticism*."

Teigh did, and within seconds was presented with the lines:

'Tis hard to say if greater want of skill
Appear in writing or in judging ill . . .

"There," Laura said. "Read that. He talks mostly about critics, but he's got a lot to say about good poetry, and the *Essay* is good poetry in itself. See here, this is called a couplet, and it's in iambic pentameter . . ."

Hours later, printouts of Laura's favorite poems in hand, Teigh made his way back to his apartment. He sat up well into the night reading them, laughing in delight at the crisp imagery and humor in her choices. He'd used to think that poetry was all stiff and formal and hard to follow, but not after reading Shakespeare's sonnets. Some of it was —he was going to have to read five or six more times through the *Essay on Criticism* before he could truly say he understood it, but he had to admit there was a certain attraction even to the difficult stuff.

He grinned when he realized what had happened. He had tried to get Laura excited about computers, and instead she had gotten him excited about poetry.

* * *

He stopped by the next afternoon to copy the starship files off of David's computer. Afterward, as he and Laura sat at the kitchen table over tea, he said, "You ought to go ahead and go into teaching. You're good at it."

Laura looked up at him in surprise. "Me? Hah. I've seen lots of seventy-year-old English instructors, but they were all on the way out, not in."

Teigh shook his head. "The best teacher I ever had was in her eighties. Late eighties. She was there because she liked what she was doing, and she made everybody in her classes like it too. You've got that same knack; you shouldn't waste it."

"No," Laura said, "I'd have to go back to school myself, get a teaching certificate, learn what's being *taught* these days—no, it's too late for all that, even if I wanted to."

"It's not too late. People live longer now than they used to, you included. You've got plenty of time to do anything you want." He paused, thinking, then said, "Remember J. Alfred Prufrock? I read about him again last night. He didn't act when he had the chance and he regretted it the rest of his life. That's kind of silly, don't you think? If you've got time to regret not doing something, then you've got time to go back and do it."

Laura looked out toward the axis, where a group of pedal planes were spiraling around one another in a near-weightless aerial dogfight. After a time Teigh realized she wasn't going to answer.

"Sorry," he said. "I guess it's none of my business."

She turned back to face him and said, "Yes it is. You're a friend, and friends are entitled to worry about each other. But remember, not everybody wants to change. Some of us are comfortable just the way we are."

Teigh nodded. "Point taken," he said. But at the same time he was thinking *but there's a difference between comfort and complacence.*

The lifesystem project was taking up even more of Teigh's time now that they had started construction on it, but he still made a point of coming to visit Laura at least twice a week. He showed her a couple more times how to turn on the computer and call up books from the library and how to print them out on paper if she still wanted to read them that way, but even though she learned how he never saw any evidence that she had done it on her own.

It bothered him. He supposed everyone had the right to live their life the way they wanted to, but at the same time it seemed such a waste for her to sit around in her apartment with her cats and her plants and do nothing. She still had a good thirty years left—more if she would stay active—but it was obvious she'd already given up and was just watching herself grow old.

He tried to get her out more, going with her to the library since she wouldn't use the computer and taking her shopping when she felt like going and even taking her on the gondola around the curve of the colony on one particularly adventurous day. She seemed genuinely happy to get out, and that reinforced Teigh's conviction that even though she

said she didn't want it, what she really needed was a change in scenery.

"You know," he said one day while he fended off a triple assault from the now-adolescent kittens, "you ought to come with us to Alpha Centauri."

Laura looked at him as if he'd suggested something obscene. "Me, on a starship? Forget it."

"No, I'm serious. The crew selection committee would jump at the chance to bring you along."

"What would they want with an old lady? Starships are for young people."

"Starships are for everybody. The human race isn't all under thirty, and it'd be a mistake to make a starship crew that way. They'd drive each other nuts."

"So you need a few coots and geezers to keep you all sane. Makes tons of sense to me."

Teigh thought of his pine root that he carried with him from apartment to apartment, how simply looking at its gnarled, aged branches could calm him down after a particularly hectic day, but he could think of no way to tell Laura about it without embarrassing them both. So he simply said, "It's true. We need interesting people no matter how old they are. You should apply for the crew."

Laura shook her head. "There's something my grandmother used to say; she was talking about airplanes, but it still applies. She said 'I want to keep my feet right on the old terra firma, and the more firma the less terra.' That's me too."

"You came here, to Spacehome," Teigh pointed out. "This isn't really what I'd call terra firma."

"David built it," she said, as if that ended the discussion.

"We're using his design on the ship too."

"Hrumph."

"At least come have a look at it. Remember, you've still got to show me Cassiopeia, too."

She smiled. "Maybe," she said. "Maybe I will."

"Today?"

"No."

"Oh come on. It's a good day for a trip outside."

"No, really, I—"

Teigh remembered what she was using for a fish bowl and said, "Don't worry about the goldfish. We can rent you a suit."

Laura laughed and shook her head. Without a word she got up and went into the living room for the helmet, brought it back, and pulled out the plastic bag that held the fish. "I'm an eccentric old coot," she said, "but I'm not about to ruin my spacesuit. All right. Show me your starship."

"That's the spirit," Teigh said, standing.

Laura dug the rest of her suit out of a closet and blew the dust off of it, checked to make sure she could still fit into it, and pronounced herself ready. They had to stop on the way to the airlock to fill her air tanks and put a new battery in the backpack, and as a precaution Teigh had the attendant pressure test the suit to two atmospheres while he was at it. It passed the test, and fifteen minutes later they were at the airlock, Teigh climbing into his own suit that he kept there.

"How do you feel?" he asked for about the tenth time. The colony's two main airlocks were at either end, at the center of the spin axis where someone going outside wouldn't be flung out into space, and he was concerned about her reaction to zero-*g*.

She held out her hands thumbs up, and over the suit radio said, "Fine, for a terrified old lady. Let's hit vacuum before I decide to go back home and knit something instead."

"All right, here we go." Teigh checked the seals on both suits one last time, led the way into the airlock, and pressed the cycle button. Their suits stiffened with the drop in pressure, and the outer door opened to space.

"Take my hand," he said.

Laura did, and he led her out onto the surface of the colony. He could hear her breathing hard, but after a minute or so she said, "Hah. Hasn't changed much. Where's this ship of yours?"

Teigh smiled. She'd be all right. "Straight out," he said, pointing overhead.

She leaned back, tilting her head back still more, and said, "Oh. Doesn't look like much from here."

"It's twenty kilometers out. We'll take a car over."

"Okay. Lead on."

The cars were kept in a garage beside the airlock; Teigh checked one out and helped Laura inside, then set its autopilot for the starship and settled back for the five-minute trip. "So," he said, "where's Cassiopeia?"

Laura leaned forward and looked out the front windows for a minute, then turned to the side. "Got to be able to find the dipper first," she said. "What have they done with it? Not there; that's

Sagittarius. Hah, that's a clue. Sagittarius there puts the dipper . . . there. Got it." She pointed out Teigh's window. "See it?"

"The *big* dipper?"

"Right. Now you've follow the pointer stars north, past Polaris, right on over to—" There was a pop like a bursting balloon, and Laura's surprised exclamation was drowned out in the hiss of escaping air.

Teigh could see the blowout in her suit where the underarm seam had ripped when she stretched it to point. Pressure testing hadn't caught the weakness there. He felt panic closing in at the sight, but it receded when he remembered where they were. The car had its own air.

"Hold your arm tight to your side!" he said as he searched for the car's presure control. Laura couldn't have heard him over the howl of air rushing through her suit, but she didn't need to be told to plug the leak. She pinned the arm down and doubled over to the side.

The car's controls seemed a sudden blur of switches and dials to Teigh. He had gotten a full briefing on them all when he had first come up to the colony, and he had passed his flying test with ease, but for the quick trips back and forth to the ship he had never pressurized the cabin and now, months later, he had forgotten how to do it. He heard the hiss of Laura's air dwindling as her suit tanks bled dry, and still he hadn't found the right control. Fighting panic, he began to read the labels one by one and finally found the right switch, then almost broke it off in his haste to flip it on.

Air rushed into the car. Teigh reached out and pulled off Laura's helmet, but she wasn't breathing and there was blood on her lips.

He felt the gentle tug as the forward rockets fired to slow the car for docking with the starship. Looking up he saw its familiar shape growing nearer, and he switched his suit radio to the emergency channel and shouted, "Blowout! I've got someone with a suit blowout. Help me!"

"Where are you?" a calm voice asked.

"Coming in in a car. I've got the cabin pressurized now, but she was in vacuum for a while, and she's not breathing."

"I'm opening the emergency lock. Is your car on autopilot?"

"Yes."

"Switch to remote. The red switch on the upper right corner of the—"

"Got it."

"Hang on," the voice said, and at the same time the car's thrust doubled and it swung around past the aft of the ship and curved in toward a still-widening rectangle of light. The car shot in through the lock, still decelerating, the door slammed shut behind it, and within seconds people were pulling Laura out and ripping off the rest of her suit.

Teigh watched helplessly while the medics forced air into her lungs and tried to stimulate her heart into beating again, getting nothing, nothing, nothing . . . and then a faint beat that faltered and stopped again. More breathing and pushing on the chest and another heartbeat, this one holding for a while

longer before it stopped. Again, this time with pure oxygen.

At last Laura was breathing on her own; a horrible, bubbling breathing that made Teigh sick to listen to it, but she was alive again.

As the medics carried her into the ship, one of them turned to Teigh. "Are you all right?"

He managed to nod.

"She's going to make it. You did good. She's lucky you were there."

Teigh shook his head. He found his voice and said, "Not so. If she was lucky she wouldn't have met me. Wouldn't have had some stupid kid dragging her around doing things she didn't want to do in the first place. I damn near got her killed."

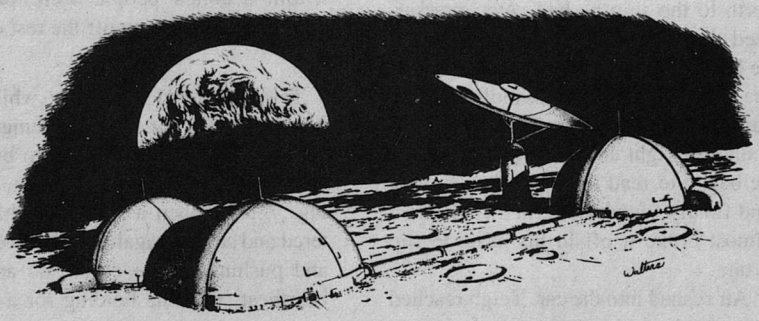
He told her the same thing when they let him in to see her a few hours later. She was inside an oxygen bubble and her voice was barely a whisper, but her response was clear all the same. "Wrong. My suit blew because . . . it was too damned old . . . but that doesn't mean *I* am. I used to think I was, but I . . . had a lot of time to think about it . . . while my life flashed in front of me. You were right, it'd be silly . . . to die in a rocking chair. I'd rather go out in the middle . . . of something, like David did."

"You—" *almost did.* No. Wrong thing to say. Instead he said, "You're still invited on the trip to Alpha Centauri."

Laura was silent for a long time, so long that Teigh thought she had fallen asleep with her eyes open, but just as he was about to get up she nodded once and said, "So when do we leave?" ■

● What is a rebel? A man who says no, but whose refusal does not imply a renunciation. He is also a man who says yes, from the moment he makes his first gesture of rebellion.

Albert Camus, *The Rebel*



H. Keith Henson

MEMETICS AND THE MODULAR MIND— *Modeling the Development of Social Movements*

Science fiction writers do not always manage to stay ahead of science. One significant concept showed up in the scientific literature 13 years before Charles Sheffield and Arthur Clarke simultaneously wrote stories that incorporated the "Skyhook" or "Beanstalk." But in projecting a science of social prediction SF writers have been far ahead of the scientists. Isaac Asimov based the entire Foundation series on "Psychohistory." Robert Heinlein developed the theme of predicting social movement in his Future History stories, especially in *Revolt in 2100, Methuselah's Children,* and in the unwritten saga of Reverend Nehemiah Scudder.*

Science fiction aside, we don't have a science of social prediction. Until recently we haven't even had much in the way of theories. Our continual surprise at the development of cults, religions, wars, fads, and other social movements is a notable exception to the steady progress humans have made in building better models of our environment. When you consider the suffering associated with some social movements our lack of good models must be considered a major deficiency.

A successful theory of the development of social movements will have to provide a unifying theory for events that make up much of the evening news. It will have to discover common features that lie behind the diverse trends causing problems in Nicaragua, South Africa, Northern Ireland and the Middle East. A good theory should be able to evaluate the danger or lack of danger from the LaRouche organization, whose accidental win in the Democratic primary forced Adlai Stevenson III to run as an independent in the Illinois governor's race. (This cult more recently made the news when the FBI raided its offices in the wake of alleged massive credit card frauds.) It should be able to produce a plausible model for the breakup of the Rajneesh cult (whose Bhagwan Shree Rajneesh accumulated 93 Rolls Royces

* "First Prophet," President of the United States, destroyer of its Constitution, and founder of the Theocracy. If this makes you vaguely uncomfortable, it is probably because you have been reading about fundamentalist preacher/presidential candidate Pat Robertson. As the Ayatollah Khomeini recently demonstrated, fundamentalist religion and politics can make a nasty mix.

before abandoning his Oregon community). The theory should be able to predict the conditions under which Turkey will be subverted by a fundamentalist version of Islam similar to that which led to so much grief in Iran.

A tall order! But an emerging field of study, *memetics,* holds just such promise. Sometimes thought of as "germ theory applied to ideas," it provides models where social movements are seen as side effects of infectious ideas that spread among people in a way mathematically identical to the way epidemic disease spreads. It has been noticed, for example, that use rates for various drugs, most recently "crack," have closely followed epidemic-like curves that seem to be as oblivious to the efforts of authorities as the Black Death was in 1348. At a deeper level, research in neuroscience and artificial intelligence is starting to develop an understanding of why we are susceptible to "infectious information," both the benign and the deadly.

As useful as these models may be, they are not without the potential to seriously affect our cherished institutions. A good understanding of the mechanisms of our minds and the dynamics that underlie the spread and persistence of *any* social or political movement has the potential to forever alter the way we think about all other social movements, including those of our own culture, religions, and nation. When viewed from the perspective of tolerance that has been developing in Western culture since the Renaissance, the changes in outlook seem to be positive, but it would not surprise me to find memetics condemned from the pulpit even more than evolution has been.

Memetics comes from "meme," (which rhymes with "cream") a word coined in purposeful analogy to gene by Richard Dawkins in his 1976 book, *The Selfish Gene*. To understand memes, you must have a good understanding of the modern concepts of evolution, and this is a good source. In its last chapter, memes were defined as replicating information patterns that use minds to get themselves copied much as a virus uses cells to get itself copied. (Dawkins credits several others for developing the concepts, especially the anthropologist F. T. Cloak.) Like genes, memes are pure information.* They must be perceived indirectly, most often by their effect on behavior, or by material objects that result from behavior. Humans are not the only creatures that pass memes about. Bird songs that are learned (and subject to variation) and the songs of whales are also replicating information patterns that fit the model of a meme. So is the "termite-ing" behavior that chimps pass from generation to generation.

Meme is similar to "idea," but not all ideas are memes. A passing idea which you do not communicate to others, or one which fails to take root in others falls short of being a meme. The important part of the "meme about memes" is that memes are subject to

*The essence of a gene is in its information. It is still a gene "for hemoglobin" or "for waltzing behavior in mice" whether the sequence is coded in DNA, printed on paper, or written on magnetic tape.

adaptive evolutionary forces very similar to those that select for genes. That is, their variation is subject to selection in the environment provided by human minds, communication channels, and the vast collection of cooperating and competing memes that make up human culture. The analogy is remarkably close. For example, genes in cold viruses that cause sneezes by irritating noses spread themselves by this route to new hosts and become more common in the gene pool of a cold virus. Memes cause those they have successfully infected to spread the meme by both direct methods (proselytizing) and indirect methods (such as writing). Such memes become more common in the culture pool.

The entire topic would be academic except that there are two levels of evolution (genes and memes) involved and the memetic level is only loosely coupled to the genetic. Memes which override genetic survival, such as those which induce young Lebanese Shiites to blow themselves "into the next world" from the front seat of a truck loaded with high explosives, or induce untrained Iranians to volunteer to charge Iraqi machine guns, or the WW II Kamikaze "social movement" in Japan are all too well known. I have proposed the term "memeoid" for people whose behavior is so strongly influenced by a replicating information pattern (meme) that their survival becomes inconsequential in their own minds.

For a vivid example we can hark back a few years ago to Rev. Jim Jones and the People's Temple incident, where 912 people, including Jones, died of complications—poison and gunshot wounds—induced by an information disease. The Children's Crusades of the middle ages were larger and more lethal; only 2 of 20,000 returned from one. The mass suicide in the first century by the Jews at Masada is a clear example of information patterns in people's minds having more influence over their behavior than the fear of death.

A more seductive example of a social movement set off by a lethal meme comes from South Africa. In the 1850s, a meme (originally derived from a dream) led to a great sacrifice by the Xhoas people during which they killed their cattle, burned their grain, and refrained from planting in the belief that doing so would cause their ancestors to come back from the dead and expel the whites. At least 20,000 and perhaps as many as 60,000 starved when the predicted millennia of plenty failed to arrive. Known as the Cattle Killing, it was not a unique response for a primitive society being displaced by a more technically advanced one. The "Ghost Dancers" phenomenon among American Indians was a similar response.

Memes that bring about suicidal behavior are at least self-limiting. Those which induce one group of people to kill another are much worse, and the social movements they induce are often much larger. The scope of the social movement known as the Inquisition is seldom mentioned in history textbooks, but:

"The number of victims claimed by the witch-hunts, which lasted for three hundred years, is reckoned by historians

to be between five and six million people; it therefore caused more deaths than all the wars waged over the period. . . .

"It is only when one takes into account the brutal, pitiless, expression of mass-mania, and that a belief in the devil, his traffic with witches and warlocks, was constantly being fanned anew by the Church . . . that it is possible to gain any measure of understanding. . . ."*

The depredations and brutality of the Inquisition were about typical of deadly memes stemming from religions or closely related social movements such as Marxist-Leninist communism.

In the last decade, the people of Kampuchea were infected with an anti-intellectual, agrarian utopian meme clearly mutated (in the minds of Pol Pot and his close associates) from the Vietnamese variation of the communist meme. They were Eric Hoffer's "True Believers" of the most extreme stripe. The resulting social movement was a massive self-genocide. Over one third of the population of Kampuchea, including almost all of the city dwellers and the educated, died before the Vietnamese (embarrassed by news stories of rivers clogged with bodies) invaded and put a stop to the killing. Many more would have died had the social movement run its course without interference. Kampuchea will take decades to recover, but " 'tis an ill wind . . ." The people of Thailand, with a front seat on the slaughter, seem to have lost all sympathy for their own related social movements.

History classes have made us more aware of the genocidal depredations resulting from the "master race" meme that was part of the Nazi meme complex. Considered from the viewpoint of memes, Hitler was less a prime mover than a willing victim of this particularly nasty and pervasive variety of information disease. Had plague struck Germany in the '30s instead of Nazism, we would have understood it in terms of susceptibility, vectors, and disease organisms. What did happen may soon be modeled and understood in terms of the social and economic disruptions of the time increasing the number of people susceptible to fanatical beliefs, just as poor diet is known to increase the number of those susceptible to tuberculosis. For vectors, we have personal contact, the written word, radio, and amplified voices substituting for rats, lice, mosquitoes, and coughed out droplets. A pool of "sub-memes," many of them ancient myth, contributed to the syncretic Nazi meme in much the same way mobile genes contribute to the virulence of the influenza viruses.

Nazism was not the only fanatical movement growing and evolving in the fertile social media of Germany between the wars. The Marxist-Leninist meme was a visible competitor in the early period. Even though most of those infected with it were conquered or killed, and Nazism became a suppressed meme, it cannot be said to have died. As a replicating information pattern that has gone through a great deal of evolution-

* *Five Thousand Years of Medicine* by Gerhard Venzmer, Tr. Marion Koenig, Taplinger Publishing Co., NY 1968 pg. 163.

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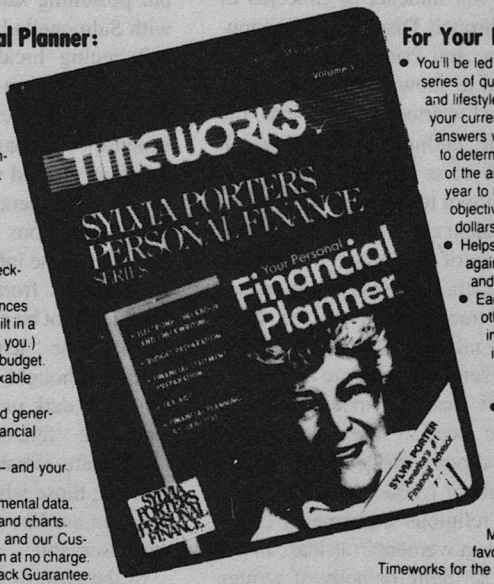

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ary honing, it is still successful in infecting a few susceptible people today.

A fascinating footnote to the German experience with Nazism and its horrors happened in 1969 when Ron Jones, a teacher in Palo Alto, exposed a high school history class to an intensive, five-day experience with the ideas that made up the Nazi meme. The experience of that week was originally published as "Take as Directed" in *The CoEvolution Quarterly*, Spring '76 and a few years ago was made into a TV movie, *The Wave*. Over four days, Jones introduced and drilled his students in concepts of Strength Through Discipline, Community, Action, and Pride. (The fifth day was devoted to showing them how easily they had started to slip into the abyss.) The enthusiasm with which most of the class adopted the memes and spread them to their friends, swelling a 40 student class to 200 in 5 days, made it one of the most frightening events the teacher had ever experienced. Given the track record of the Nazi meme, the mini-social movement his experiment set off is no more surprising in retrospect than the medical effects would have been if the teacher had sprayed smallpox virus on the class.

An empirical characteristic of large, long-lived religious movements or related social movements (at least in the West) is a scripture or body of written material. This may function to standardize the meme involved or at least slow its evolution as the number of people infected with it grows. From Scientology right back to the Hindu Vedas, I can think of no counter examples. Social movements involving more than a few thousand people or lasting more than a few years may have been rare before writing came along.

It is possible that the breakup of the Rajneesh cult was related to its lack of an organized written scripture at a critical juncture. The memes that were the origin of that particular social movement were characterized by considerable instability; that is, parasitic memes arose out of the local culture soup at short intervals. Some of them (tapping phones) made a kind of paranoid sense, but poisoning salad bars at restaurants with Salmonella bacteria in the hope of influencing local elections made no sense. The group seems to have amplified individual crazy impulses at the expense of propagating the meme.

I have noticed several features of the social movements that derived from really dangerous memes. One is self-isolation of the infected group or at least new recruits from the rest of society. This need not be an "intelligent" action taken by the "leaders." There may be no more thought involved than the selection of dark moths in industrial England. The "fanatic cult" memes which incorporate isolation are the ones we observe; those which do not incorporate isolation are like light moths, gone and not observable.

In the case of the Soviet Union, the cult-like communist meme survives in a society largely isolated from the rest of the world. In recent years the isolation may have resulted from reasoned considerations about the fragility of the communist meme in open competition

with other memes. A more parsimonious view would note that without originally having a strong isolation component, the communist meme would have had no more social influence in the USSR than it has had in, say, France.

Isolation makes possible exposure to a single meme (or meme set) many times a day for months or years without much contact with other memes. Exclusive exposure to one meme (also known as brainwashing) induces a "dependent mental state" in some people. *Snapping* (1979) is a pre-memetics account of this phenomenon in a variety of contemporary cults. After exposure to the meme-about-memes, it's a hard read. What theory it advances reminds me of a pre-germ-theory account of epidemic disease.

Thankfully most of us have not experienced the dependent mental state firsthand, but we have all seen such people on the news programs boarding buses for the front in Iran, or been harassed by them in airports, or had them knock on our doors and try to infect us. It is clear that the people who suffer from extreme cases of "information disease" have lost much of their ability to take care of themselves or their children. Truly dedicated people often fail to replace themselves, since too much of their life energies are channeled into propagating the infecting meme. One example comes from the largest subdivision of Christianity, where celibacy for its most dedicated has long been institutionalized.

Given that memes have been interfering with our reproduction for a long time, one must wonder why humans are still so susceptible to information diseases. The answers to such questions are starting to come from research in artificial intelligence (AI), neuroscience, and archeology. It is becoming apparent that our vulnerabilities are a direct consequence of the way our minds are organized, and that organization is a direct consequence of our evolutionary history.

Marvin Minsky (a principal founder of AI) and Michael Gazzaniga (one of the major workers in split brain research) have independently come to a virtually identical model of the mind. Both view minds as vast collections of interacting, largely parallel (co-conscious) modules or "agents." The lowest level of such a society of agents consists of a small number of nerve cells that innervate a section of muscle. A few of the higher level modules have been isolated in clever experiments by Gazzaniga, some of them on split-brain patients.

One surprise from this work is that we seem to have our mental modules arranged in a way that guarantees we will form beliefs. *What* we believe in depends, at least in part, on what we are exposed to and the order in which we are exposed. Gazzaniga argues that we slowly evolved the ability to form beliefs because the ability provides a major advantage in surviving. Being able to infer, that is to form new beliefs, and to learn, in the sense of acquiring such beliefs from others, was a major advance over learning by trial and error. Being able to pass the rare new ways

our ancestors found for chipping rock or making pots from person to person and generation to generation was vital in allowing humans to spread over the earth.

But as this ability became the norm, communicating human minds formed a new "primal soup" in which a new kind of non-biological evolution, that of replicating information patterns or memes, could get started. A wide variety of competing memes has evolved in the intervening seventy thousand years or so. It should not be surprising that the survivors of this process, like astrology or religions, are so effective at inducing their hosts to spread and defend them. It is also plausible that in the tens of millennia since memetic evolution became a major factor there has been a biological counterrevolution. The parts of our brains that hold our belief systems have probably undergone biological adaptation to be better at detecting dangerous memes and more skeptical about memes that result in death or seriously interfere with reproductive success.

This type of evolution/counterrevolution is known as an "arms race" to biologists. One such biological arms race has resulted in almost perfect egg mimicry by the cuckoo and in correspondingly sharp visual discrimination in the birds it parasitizes. By analogy, while we get better at spotting dangerous memes, the memes may be evolving to be more effective at infecting us. Advancing technology (which itself is an improving collection of memes) changes the environmental conditions where memes survive or fail as well. The modern telephone system and the tape cassette player were major factors in the takeover of Iran. It has been argued that the rise of the Nazis depended strongly on radio reaching a previously unexposed and unsophisticated population. Exposure to modern advertising may be one factor which makes a television broadcast by Lyndon LaRouche attacking (among others) the L5 Society so absurd that tapes of it are used as entertainment at L5 parties. He might have been taken seriously in the '30s.

I have picked dangerous examples for vivid illustrations and to point out that memes have a life of their own. The ones that kill their hosts make this hard to ignore. However, most memes, like most microorganisms, are either helpful or at least harmless. Some may even provide a certain amount of defense from the very harmful ones. It is the natural progression of parasites to become symbiotes, and the first symbiotic behavior that emerges in a proto-symbiote is for it to start protecting its host from other parasites. I have come to appreciate the common religions in this light. Regardless of how harmful they may be when they start, the ones that survive do not cause too much damage to their hosts. Contrariwise, the Shaker me is now confined to books, and the Shakers are gone. It is obviously safer to believe in a well aged religion than to be susceptible to a potentially fatal cult.

History doesn't change, but our interpretation of it can. For example, the contemporary "causes" of historical


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epidemics (such as the miasma theory) have been totally supplanted by germ theory explanations. Before germ theory came along, memes of causality for epidemics were remarkably stable. The "explanation" for the Black Death of 1348 was still in use for the Philadelphia Yellow Fever epidemic of 1796. Similarly, various "explanations" for wars have been with us for hundreds of years.

Memetics provides an interesting alternate way to analyze recent wars and the roots of current disputes. In this view, the ultimate (though unaware) protagonists of World War II were memes such as the Nazi "master race," and the Marxist-Leninist meme (MLM). The current clash between the Soviets and the western world can be viewed as a meme conflict (for space in minds) between the religion-like, competition-intolerant mono-meme of communism and the western meta-meme of tolerance. While it is not a religion by any reasonable definition, the Marxist-Leninist meme is clearly in competition for the "belief space" in minds usually occupied by religious memes. It, and its more cultish offshoots, have the typical virtues and excesses of cult-stage religious memes. In an amusing twist, the "godless" communist meme is the more religion-like of the two in its battle for mind space with secular western culture!

Reviewers of an earlier draft of this article objected to my description of Soviet memes. Words like "tolerant" or "intolerant" have acquired a great deal of positive/negative connotation in the western world, but in describing memes, I am using them in the same way we would say that a mold colony is intolerant of a bacterial invasion. With respect to the belief system that dominates the meme pool of the other superpower, I am trying to be descriptive, not partisan.

If anything, I would think that understanding the memetic nature of religions and related movements like communism would defuse the emotional connections and substitute something closer to dispassionate understanding of the parasitic-to-symbiotic memes behind such social movements. It has had that effect on me. Many, even the most gruesome, features of communism are what they are simply because those features were (and are) necessary for the meme to exist in a world of competing memes. Isolation, for example, is a common feature of virtually all successful religious-type memes while they are in the cult stage. Anyone who has studied history knows that suppression of competitive memes by the power of the state is a common experience once a meme of this class has infected the leaders or they have been replaced by those infected.

From a meme's viewpoint, tolerance of other memes is *not* a virtue; it is, in fact, a fatal characteristic for a particular meme, as memes inducing *in*tolerance to other memes would soon displace it. On the other hand, a meta-meme of limited toleration, even cooperation among memes is possible. The western meta-meme of tolerance seems to have emerged from an ecosystem of memes in much the same way that cooperative

behavior has been modeled as emerging from an ecosystem of individuals.* In the area of meme tolerance the western world may be unique. We think of censorship as evil; where but in an advanced ecosystem of memes could such a strange idea have emerged?

I have recently had a lot of fun reading history to trace the development of the meta-meme of tolerance. This particular character of our ecosystem of memes has been developing at least since the writings of the Greeks and Romans were rediscovered during the Renaissance. Studying inactive pagan religions may have been the first step in developing tolerance for a variety of religious memes. The fragmentation of the dominant religion during the Reformation led to a series of largely indecisive religious wars in most of the major countries of Europe. Sheer exhaustion may have been one of the most significant factors in developing a grudging tolerance, which in these later times has taken a patina of virtue in the division of our culture known as "liberal."

In this view, western culture is a vast ecosystem where memes of many classes engage in "fair" competition with each other. Attempts to subvert fair competition by changing laws or education (such as introducing "creation science" into schools) draw opposition from defenders of a wide variety of memes which have evolved within this environment. This model may provide testable explanations for both western culture's tolerance of intolerant memes (such as creation science and the MLM) and the hostility these memes evoke from various segments of the culture. David Brin's "Dogma of Otherness" in the April 1986 *Analog* prompted considering a memetic explanation for such peculiar ambiguities in our culture.

Several current social movements are obvious candidates for examination with memetic theory. Given the available data, we may be able to predict the remaining course of the "non-literate graffiti epidemic," which has spread in the past 15 years from New York City to remote corners of the country. There are substantial financial reasons (such as the cost of mark-resistant walls) to want to know if scribbler behavior will be a limited epidemic, or will this behavior become an endemic part of our culture?

Drug use, clearly a replicating pattern of behavior passed from person to person, is another "social movement" where the similarity to epidemic waxing and waning has been widely used by reporters, and noted without much explanation in a number of learned journals. If it were formally considered as an epidemic with memes as the infecting agents, the ways by which the behavior spreads might get more attention. Counter drug programs might be evaluated in terms of how well they induce reasonable behavior. Some efforts in the past, especially those which wildly exaggerated the dangers of a drug such as marijuana, may have *increased* the behavior of taking other drugs. These efforts may have immunized those exposed against

* See *The Evolution of Cooperation* by Robert Axelrod, 1984 Basic Books, NY

believing any official pronouncements about drugs.

Formal consideration of drug use as an epidemic of meme-induced behavior might also lead to the realization that the percentage of people susceptible to abusing most drugs is not all that large. (Cigarette smoking is an exception.) For example, most of the people I know who have tried cocaine don't care for it. Not liking the effect, they wouldn't use it if it were free. People who really like opiates aren't that common either.

Part of my interest in memes stems from a ten year (and continuing) experience of being infected with the space colony meme which developed in the minds of Gerard O'Neill and his students in the late '60s. (See "Memes, L5 and the Religion of the Space Colonies," September, 1985 and "More on Memes," June 1986, both in *L5 News*)) Memetics provides candidate explanations for why the space colony meme spread in the first place, why it is not making much progress now, and some insight into what might be done to revitalize the meme and actually accomplish the implicit goals.

From a recent survey of L5 members, there seems to be two main factors and a minor one that contributed to the attractiveness of the space colony meme. First was the "new lands" factor. We are the genetic and memetic heirs of people who moved into vacant areas of the planet. It should be no surprise that the prospect of new lands is an irresistible attraction to many people. This may also explain the higher than proportional membership in L5 from California, where the last of the restless pioneers piled up. The minor factor (suggested by Dale Skran of Bell Labs) is fear of random events such as nuclear war, asteroid impact, worldwide epidemics or crazy social movements that could badly damage civilization or even extinguish human life. As Heinlein put it, one planet is too fragile a basket to put all the human eggs in. The other main factor was possibility of personal involvement, of going into space. Surprisingly this is still a very important factor. Some 60 percent of respondents to a survey at the 1986 L5 annual conference said they expected to live in space.

If the attractiveness of the space colony meme is in the prospect of large numbers of people being able to live in space within a short time, these factors are quite at variance with today's reality; since the Solar Power Satellite project bit the dust, there haven't even been any widely accepted proposals that would get us out there in the next 50-100 years. Since the space colony meme never had a fixed deadline, the lack of correspondence between the meme and reality hasn't hit as hard as "the day after" hits a millennial religion, but informal surveys of former L5 members indicate that lack of a timetable was an important factor in their becoming inactive. If we want to get out there, we need to tap a very large source of social energy. The biggest single source of social energy on the planet is the meme conflict between the MLM and the western metameme. There are ways this might be tapped to get us into space, but that would take another article.

The memes which embody the germ theory of disease emerged when they did partly because "the time was right." The work of von Leeuwenhoek, Semmelweis, Spallanzani, and their less remembered colleagues established in scientific culture the background memes about microorganisms. Without these cooperating memes the ideas of Pasteur and Koch could not have replicated. The tragic history of Semmelweis and his statistical work on childbed fever stands as an example of the failure of a meme to take root in a culture before the conditions are right for its spread, no matter how true or useful to humans it may be.

If most conflict in the world is an indirect effect of memes, memetics holds as much potential for reducing human misery as the germ theory of disease. Just being able to model the interaction between the Soviets and the West in terms of memes might go a long way toward making the world a safer place. It took at least 60 years for the germ theory of disease to be widely accepted, though, as anyone who has traveled much knows, it still has a ways to go in many parts of the world. What are the prospects in the near future for a similar acceptance of the meme-about-memes? If it were widely accepted, what changes could we expect to see analogous to public health? Would widespread awareness of infectious information make us less susceptible to dangerous memes? Can we separate ourselves from the memes that possess us?

Further exploration of the analogy between replicating information patterns and the ecosystems-epidemic models biologists have painstakingly developed for other purposes may provide badly needed insight into the origin and courses of social movements and the nature of meme competition/ cooperation. If memetics develops soon enough, it may provide help in evaluating proposed solutions to current international problems, predict the course of troublesome social movements and suggest solutions for conflicts between social movements. If this article succeeds in infecting you with the meme-about-memes, perhaps it will help you be more responsible about the memes you spread and less likely to be infected by a meme that can harm you or those around you. ■

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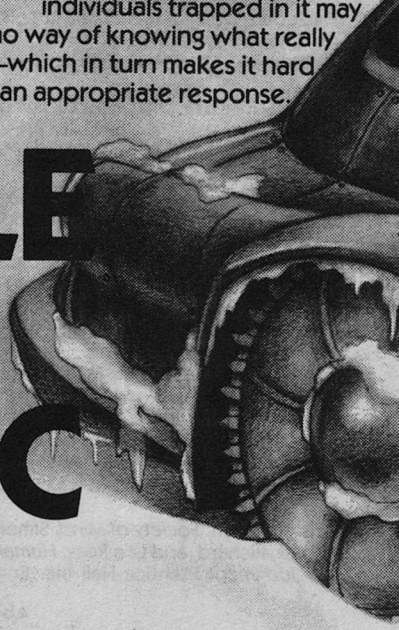
About the Author

H. Keith Henson was one of the founders and first president of the L5 Society. In addition to space colonies, memes, computers and watching cults, his interests include nanotechnology and cryonics. He is also the founder of the informal "Last Proton Club," whose adherents are dedicated to watching the last proton decay.

He thanks Arel Lucas, who first proposed the term "memetics," did much of the research that went into this article, and reviewed numerous drafts.

One of the greatest tragedies o
a great tragedy is that the
individuals trapped in it may
have no way of knowing what really
happened—which in turn makes it hard
to know what is an appropriate response.

CANDLE IN A COSMIC WIND



Joseph Manzione


Judy Mitchell

I.

Go down now, through the tumultuous layers of atmosphere, through storms of ice-crystals streaming along violently shifting patterns of wind, into the becalmed, translucent regions of ash and dust, floating in stagnant eddies above the blighted surface. Down there, the forests are barely visible, hardened stumps rising above the deep snow. The cities sprawl like desiccated corpses, mouths open to the sky, veins clogged with debris. The mountains writhe like wounded beasts and bleed living ice.

Strange things happen in that inhuman cold. Sounds. Visions. Dogs raise their heads above the snow, baring broken glass teeth as gauzy vapors sluice from their maws and spill across the land. The wind on their liquid backs, they hunt with the guttering sun, seeking warmth in the waste. Cold. Shadows lingering lovingly over the dead snow, the stillness under dark bellies flowing inexorably from horizon to horizon.

The dogs lope across the white plain, espying what they hunger for; a large vehicle lies mired by the remains of a highway. The stillness is shattered by the sounds of ice striking hot metal, as several of the creatures leap onto the hood and runners. One draws back a hard, blue paw and smashes the rimed windshield. The woman inside awakens and screams as the maelstrom of glass and teeth explodes over her, engulfing her—

Avdotya Nazarovna choked and sat up in her tiny bunk, wringing with sweat. She gasped and struggled to breathe, flailing at her throat and face with her muscular arms. The quiet inside the cab silenced her. The ticking of the diesel calmed her. Finally she glanced at the dashboard in front of the driver's seat. 0513 on the morning of June 17th, the display read; the wind was from the northwest at fourteen kilometers per hour, and the ambient air temperature was–101° Celsius. The dogs had fled back into her subconscious, but the filthy, frigid twilight outside remained.

She arose shakily and moved through the cramped cab, making coffee and reconstituting eggs and cereal. It was the city she had just passed through, she decided, as she took a shower in the small water closet. After twelve days on the ruined interstate, she had crossed over a high range of mountains and descended into the valley of the Great Salt Lake. She had expected the city to be a tertiary detonation site; certainly the Americans had a military airbase here, as well as corporate research and manufacturing centers for strategic weapons systems. Getting through would be dangerous, since the blast would have buckled bridges and filled the streets with rubble.

But when she emerged onto the uplands above Salt Lake City, it spread out as far as she could see, unblemished, almost geometrically pristine. Her fury welled up and she hammered on the dash for many minutes, screaming curses at Ben Kimball and all of the American killers who had escaped Russian vengeance, as well as the stupidity and incompetence of her own people, especially in the *Racketnyye Voyska Strategischeskovo Naznacheniya*.

They had lost the war when it finally came, all of the new Soviet peoples, and particularly those like herself. She hated

the treachery she had seen; her motherland could only be pocked and pitted like the skin of an old orange, and Gregori and the boy Nikolai would be gone.

But the city had shown her the other side of the same story, for if the Americans had created so much slaughter, they had paid the greater price after the short war ended. Avdotya could not forget what she saw, scenes so similar to those in her dreams.

A young woman wrapped in a grimy yellow blanket knelt rigidly in the deep snow, one arm locked across her forehead, as though she grieved. The other arm stood stiff against the sky, the delicate, blackened fist appearing to beat the air. A small sheet of ice flared from the naked arm and hand, the moisture and warmth of the tissue forceably extinguished by the searingly cold wind.

An armed group of citizens had tried to hold a large grocery market against a mob. Somebody had made a careless effort to stack and burn the bodies, for sanitary reasons or perhaps just for the heat. In the yard of an elaborate church across the street, three children hung by their necks from a painter's scaffold. The crows had frozen dead at their feet.

Near the zoo, a partially dismembered giraffe was roped up to a traffic light. An axe was still buried in its carved flank.

A police officer had been crucified on a cinema marquee. IT'S A WONDERFUL LIFE, Avdotya read, as she drove slowly by.

The neighborhoods beyond were shrouded in ice, the homes shut up behind blank windows and barricaded doors. She could imagine families asleep in the upstairs bedrooms.

Avdotya had stopped in the downtown district in front of Temple Square and the shopping malls across the street. Dressed in a black thermal suit, she had climbed down from the truck to look around. She abruptly decided to visit an American department store and find a pair of cowboy boots and some makeup, if there were any left.

But something had howled in the distance, as she trudged through the snow.

She had jumped, and twisted around, listening.

The howl came again, faintly, almost floating on the air. It drew out into a wailing screech, and faded.

"Ai . . .," she whispered, letting out her breath. What was it? Somebody else? A . . . dog?

Something else?

She had backed across the street, breathing heavily. Shadows of the empty office buildings and arcades crept across the snow. Behind the idling truck, the Mormon temple rose into a salmon-colored sky. Its grey-granite walls and fluted arches were hung with thick blue sheets of ice that sparkled perversely in the dying light. Atop the highest tower, a ghostly figure draped in burnished gold blew salvation on a horn to the empty gardens and avenues below.

Avdotya had shivered. When the howl came a third time, she scrambled into the trunk and drove quickly away through the drifts, out of the city, past the dead lake, and into the desert wastes beyond. Hours later, she had stopped and slept.

Of course it was the wind, she told herself, as she swung down into the driver's seat, toweling her short, wet, red hair. The wind, sluicing through a

shattered window, growling up out of an elevator shaft, or lapping around a pile of rubble. And then, in her dreams, the dogs had come.

"Eventually it's going to get to me," she said aloud. "I'll begin a conversation with myself that I'll never finish. I'll have a dream and I won't wake up."

She hit the charging switch on the main diesel.

"But not here . . . not in this place. At home."

The diesel caught, and roared.

II.

There were worse dreams.

She stood in the bottom of a cavernous pit, staring up at a small, circular patch of blue sky, far above. She was desperately trying to find a way to climb out, when with a sudden flash, the sky kindled and burned. Through the heat and bitter odors, she noticed figures appearing around the edges of the pit, silhouetted against the roiling glare. They jumped, one, and then another, and then many, flailing their arms and screaming thinly as they hurtled down. But they burst into flames before they hit the bottom, and soon the air above was saturated with fire, and a rain of cinders streaked Avdotya's face with soot and covered the concrete beneath her feet with a dark carpet that crunched underfoot.

Thick clusters of writhing torches fell about her, and the vast, steel walls of the pit were lit with a lurid, unsteady glow. The rain of cinders congealed and heaped around her knees, rising up over her thighs and waist as she struggled to remain on top of the tide. The air grew heavy with dust and smoke and she gagged and retched and the light softened into a diffused crimson radiance and still the cinders fell, burying her, and sifting into her open, working mouth.

"Nikolai!" she spit up. ". . . Gregori. . . ."

But the last thing she felt was the earth below wrenching and splitting wide with a roar and a wave of great heat, as a huge steel spike thrust up through the cinders and impaled her, lifting her broken body toward the dying sky. And as the light faded and her eyes stilled and went cold, she caught sight of the mummified remains of Ben Kimball beckoning to her from the lip of the pit, the skull grinning with obscene familiarity.

When the war began, she had been in an American wing command bunker in the missile fields northwest of Omaha. She was a major in the R.V.S.N., the Soviet Strategic Rocket Forces, and her own rocket regimental complex, a group of RS-21 launchers outside of Novosibirsk, already had been dismantled under the detailed provisions of U.N. Resolution 242. The Ministry of Defense could think of no better qualifications nor more sensitive postings for professional orphans like Avdotya, so she and thousands of others—R.V.S.N. technicians, P.V.O.—Strany officers, political commissars, boom-boom submariners and more—were sent to the United States to observe comparable American disarmament under the 242 plan. The American officers at Omaha had tolerated her, just as she had politely ignored Stockwell and Belinda Nhu the year before. The Americans deactivated systems according to a meticulously

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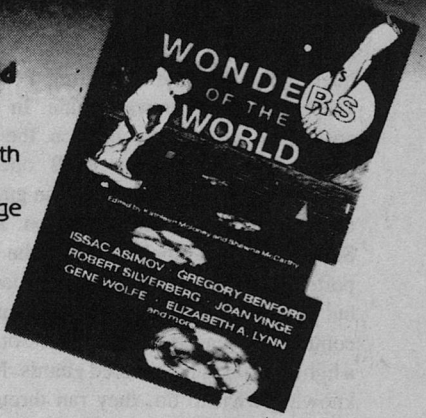

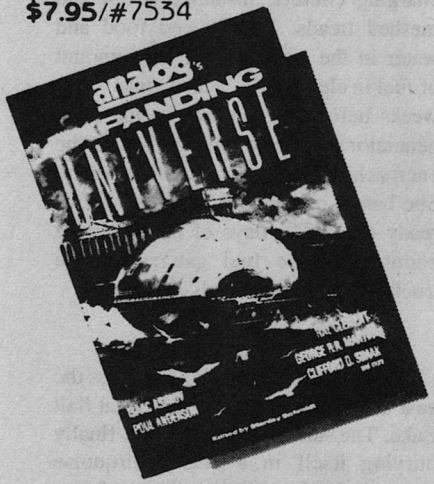

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negotiated schedule, while Avodtya and four comrades, and a very serious team of U.N. observers from Senegal, simply watched, day after day.

Until Ben Kimball had slammed down the blue phone on his desk in the operations center, pointed a pistol in Avdotya's face, and given a launch-sequence order to the remaining Peacekeeper II missile crews on line. In the ensuing shouting and confusion, the reporter from *Izvestia*—a KGB operative—garroted a young American guard and grabbed her automatic weapon. The Senegalese died quickly, as did the reporter and three American technicians, but Avdotya and her two remaining comrades managed to break out through a light cordon of bewildered guards. Not knowing what to do, they ran through endless corridors pursued by the Americans, and Avdotya lost the P.V.O. Strany pilot first, and later the boy from the embassy. She had taken to the air-ducts then, and eventually found herself outside the main generator bunker and the underground fuels and stockpiles depot. She killed three guards and managed to barricade herself in that section before they found her, but by then the short war was almost over, and circumstances had changed. The generation of power in a protected environment was paramount, and she controlled supplies, machines, and computers. Despite the desperate efforts of the surviving Americans in the weeks that followed, they were not able to flush her out.

Above ground, the world appeared to die very quickly. Avdotya resigned herself to a life spent in a safe cage; there was enough of everything to sustain her body, but her emotional suffering was unavoidable. By the third year, however, the permafrost reached far below the bunker and the huge fuel tanks embedded in the earth around it. Inside the tanks the heating elements could no longer cope with the extreme temperatures, and the fuel slowly congealed into a molasses-like gel that could not be pumped. She foresaw these consequences, and though she could do nothing about them, she took steps to make a temporary escape. She selected a huge all-terrain diesel tractor, building in heating systems, generators and charging circuits, insulated armor and meshed treads. She stowed food and water in the trunk, and a vast amount of fuel in electrically-heated tanks. Two weeks before she was ready, the main generator shut down, and she fought the encroaching frost with portable burners. She barely managed it, but she was already dead. The days of her life were counted by the fuel gauges on the truck's instrument panels.

III.

She drove slowly for hours across the vast desert playa west of the Great Salt Lake. The sun sank ahead of her, finally burying itself in a pearly turquoise smear beneath a moving front of ice-crystals. The storm came and went, and she continued well into the night.

She thought of home.

She feared the frozen sea most. She would have to cross onto it somewhere along the coasts or Oregon or Washington, and make the best of whatever she found. Possibly . . . probably?. . . .she would be hindered or stopped by deep crevices, or ranges of jumbled pressure ice thrust up from the interior, frozen

geology to match the oceans of Callisto, or Europa. If she was stopped, she would get out and walk, she told herself; the sight of the mountains of the Kamchatka Penninsula on the distant horizon would be enough. She did not want to die here.

Strange, she thought, as she stared out at the fierce stars riding the darkened sky. Everything is so different from my expectations . . . I anticipated little more than a burnt crypt up here on the surface, the climate barely beginning to find an equilibrium, a few resilient species of plants coming back, a lot of detonation sites and dirty zones, background contamination localized at specific points . . . instead, there is the terrible cold, the clear nights and days without much evidence of dust and ash, the quickly changing weather, the absence of detonation damage, the unfocused nature of periodic radiation . . .

. . . and the sun: pale and fitful, with a murky, copper color she did not recognize. Even on the clearest summer days, shadows and dark places seemed to dominate the endless snowfields. Nothing she could think of would account for it, though admittedly she knew less than a Soviet officer should about such things as windborne dust particles and the surface effects of eradicating the ozone layer. The *Voskoya* manual only spoke of "temporary climatological aberrations," and Avdotya could see now that something was amiss, or that it was a case of the usual official "optimism-laden-with-a-secret-prayer:" the Communist faith.

"I'll never know," she said aloud. Through the thick windshield, the stars glittered impassively.

She was suddenly aware of a faint glimmer of light directly ahead on the flat horizon, diffuse and alone. A star? she thought. Perhaps the moonlight reflecting on a patch of ice somewhere in the middle distance.

But there is no moon tonight, she realized.

As she drew nearer, the image sharpened into several distinct points against the grey, sloping uplands beyond the desert. With a start, she recognized them as artificial lights.

The highway map she carried showed a small town on the edge of the playa named Wendover. It sounded vaguely familiar, then she remembered that American B-29 crews had trained there to drop atomic bombs on Japan at the end of the Great Patriotic War. Now it was probably one of those desolate little settlements ringing the Nevada border, where oppressed and stupified working people could come and lose hard-won sustenance on gambling, gasoline, awful food, immoral stage acts, and other forms of swindle.

Even so, someone was still there. It must be so, for the cold and seasonally violent weather had lasted too long for any power source to function without maintenance, whatever the wizardry of American technology. Someone had survived. How, here on the edge of the wasteland, Avdotya did not even consider. Instead, she unhitched a .357 magnum taken from a Cheyenne sporting goods store, and checked its load. But the feeling she had as she watched the bullets in the cylinder spin was not one of hate or fear. Instead, she felt a soft warmth in her stomach, and anticipation.

The buried highway curved around the shoulder of a low, rocky range rising abruptly from the desert floor, and the town spread out along the edge of a stone-strewn alluvial fan. It was not much to look at: a few motels and gas stations, a surprising number of hotels and casinos, and rows of trailer homes in the snow. On the opposite side of the town, set upon a low knoll, lights illuminated a large casino-hotel complex, and something else.

Avdotya could not understand what she saw, because the shapes scattered around the knoll were enormous and unfamiliar. She was a kilometer from the casino-hotel, off the interstate and rolling up the main road through town, when she noticed that one object, a long cylinder with stubby projections spaced along serrated spines, had fallen on a wing of the hotel, reducing most of the structure to rubble. A similar cylinder lay on its side in the parking lot, surrounded by the charred hulks of several automobiles. Ice lay congealed and black with dirt around the wreckage, as though it had melted in the heat of some great conflagration, and slowly refroze amidst the debris.

A third cylinder rested upright on a squat tripod in the midst of the broad street in front of the casino. Though dented and burned, it seemed relatively intact.

Just then, she thought she understood: RVSN missiles, perhaps XRS-4s from Mirnyj, malfunctioned while inbound and fell here. Or perhaps they did not malfunction; she knew little of the XRS generation's performance profiles. Perhaps the spent boosters released their warheads, reentered the atmosphere, and by some fantastic coincidence, three of them came down on a casino on the Nevada-Utah border.

Ridiculous.

They were far too large, and no staged booster she knew of looked remotely similar. The chances of three spent boosters impacting on the same place were not high, and had they done so, providing they survived the heat of reentry, their explosive energy would have leveled the town. These objects were brought down under control, but something obviously had gone wrong.

But what were they? And who had turned on the lights, outside on the garish signs and the driveways, and inside, in the undamaged portions of the casino and hotel?

"I am in no shape for this," she muttered.

There is more to it than a few survivors holed up in a desert town, she thought as she glanced around. Above the truck, a large marquee flickered; a giant neon-lit cowboy hooked a hand in its denims and signaled her with its thumb. A cigarette drooped from the plastic face, and the red lips leered. She detested it.

Cylinders with odd-looking fins and superstructures, she thought. Large. Torus-shaped bulges at one end . . .

And then she had the answer: cylinders, large enough to be spacecrafts, perhaps—

Something leaped onto the side of the cab and hammered on the window by her head.

She had momentary impressions of a face, fangs, sharp features and staring eyes, and then she slammed on the brakes and pulled the pistol out of her

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jacket, and drew down on the creature through the glass.

There was nothing there.

She looked around, following her eyes with the oversized .357. Nothing.

She waited.

Finally she zipped herself into the thermal suit and unracked the M-16 from the ceiling compartment. She cracked open the cab door and stepped out onto the runner.

The lights burned steadily on the snow-covered lawns and in the broken windows of the casino and hotel. The stars flickered overhead, random points of scintilla struggling against a few tatters of cirrus. The wind gusted, and fell silent.

She climbed down off the truck, holding the rifle at ready. Barely had her boots sunk into the snow when she noticed footprints, shallow and rounded, angling away from a large depression where something obviously had struck and rolled.

So she had seen the creature after all, she thought, and took a deep breath.

Behind her, she heard a quiet footfall in the snow.

She whirled around just as two of the creatures stepped from behind the back end of the truck, the red taillights glinting in their many-faceted eyes. She did not really think about what happened next; her reflexes and the panic she had held for so long under the surface flew together and achieved a critical state. She fired, squeezed the trigger and sprayed the things as they saw her and stopped in their tracks.

She worked the trigger, and nothing happened. She looked stupidly at the rifle in her hands. It did not even click.

Ayich! she thought. My gun is frozen.

She shrugged suddenly, and dropped it. The creatures stared at her, not moving.

They were ugly, she decided. They resembled three-meter-tall, rust-colored ducks, with curved fangs set in long, leathery snouts. Their arms were short and thick, and folded over large round bellies hidden in heavy cloaks. Skinny, chitinous legs held them up, and their naked knees were knobby and bent backwards. They were manifestly adapted to colder weather, and wore brightly-colored turbans around their heads. Avdotya did not know whether to laugh or be terrified, or simply amused at the irony, for their circumstances were clear now.

They're as lost as I am in this place, she realized. And I was going to shoot them.

Ayich . . .

She tried to smile at them, no small feat at the time, but it had no effect.

She waved, and both creatures dropped clumsily into the snow and crouched, as if ready to run. After a minute they slowly got to their feet and looked at each other. They gesticulated and pointed, waving their arms and kicking their feet, murmuring in low tones. One finally turned and waved back.

She waved again, and the second one waved. She smiled and waved both hands. They glanced at each other again, and then waved, one with its left arm, the other with its right.

Interesting symmetry, she thought. I wonder what we're saying . . . hello, probably; don't hurt me.

Abruptly she knew she was being

watched from behind, and when she turned, she saw at least fifteen or sixteen silhouettes standing in the snow, backlit in a ghostly, bluish aura by the floodlights on the hotel roof.

I hope they're not hungry, she thought inanely, suppressing an urge to giggle.

They only wanted her to come indoors. Pointing and waving they escorted her past the smashed doors and the ice-encrusted lobby, through the casino and its legion of blinking, beeping slot machines and dusty crap tables, to the inner amphitheater and stage. There, they had insulated the walls, built low partitions for privacy, and set up unfamiliar generating and heating systems. There were shops and a rudimentary laboratory, and remembering the great cylindrical spacecraft propped upright in the street, she could guess what they were trying to do. Pieces of salvaged equipment, some of it of human origin, lay all about the stage.

One of the creatures picked up an object and showed it to her, murmuring and turning it over and over in large, horny hands. It was a partially disassembled color television receiver with a Japanese brand name. She smiled and nodded, reminded that she had almost bought one, once. This time, everyone seemed to appreciate the smile; they waved at her as she stood there next to a gaming table strewn with odd beakers filled with colored liquids, shivering and wondering what she would do now. On the wall above, a grimy banner undulated in the air currents. *Welcome to the Stateline,* it read, *Coming October 24th . . .* the rest, ripped and frayed, was gone forever.

* * *

IV.

She lived with the ducks—for that was how her mind insisted on visualizing them—in the casino in Wendover for seven months, as summer gave way to winter, and a thin carbon dioxide sleet fell frequently. She was constantly cold, and at first, very frustrated. No one could talk to her, although by the middle of the third month the anthropologist, whom she had taken to calling Daffy Duck, learned to read and write in English fairly well. It would not take the time to learn Russian, and although she bitterly resented the slight, she recognized the logic. Every day Daffy and the biologist, Lysenko Duck, would come to her room in a converted storage area off the stage, and sit at a wooden table under a strong light, murmuring to one another as Daffy painstakingly wrote out questions in longhand with a ballpoint pen. She would answer with short essays in dubious English typed on a battered word processor, or simply shrug her shoulders and wait for the next question.

The ducks were very good to her. They brought her canned food and hotel furniture for her room, and little gifts: an electric razor, a child's kite, a baby bassinet and a large portrait photograph of the former kitchen staff of the complex. Daffy brought her a set of plastic figures that could be manipulated to change from vaguely human form into aircraft or imaginary spaceships, and asked whether the religious significance of these icons were similar all over the planet. The ducks had found the toys in a box in the nursery of the church down the street. They were excited about the discovery, and nothing she

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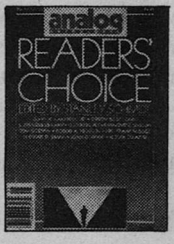

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could say could quite convince them of their mistake.

They let her wander around the hotel and the grounds as much as she wanted. If she tried to approach the cylindrical spacecraft in the street, however, a phalanx of ducks always came running, and shooed her away with low, sing-song noises and gentle sweeping motions. They made no attempt to interfere with her in any other way, and she was sure they would let her go when she wanted, but it was plain they desired her to stay. She liked that.

They asked her how she had survived, and she told them part of the story, but they never asked how everyone else had died. She appreciated the courtesy, thinking that the ducks must be endowed with a sense of tact, and repaid the favor by never mentioning the wrecked ships outside, or the sloppily-healed wounds some of them bore. Nor did she say anything about the morning on which she witnessed a suicide attempt by one of the ducks in the casino lobby, although she was deeply troubled by what it might mean, and why the others had reacted so quickly and seemingly without surprise.

One evening she met Daffy Duck and the engineer she called Korolyov Duck on the lawn in front of the casino. She asked them where they were going, writing with a pencil on Daffy's pad of paper. After murmuring to each other, they motioned for her to follow. She did her best to keep up as they crossed the town and climbed the barren slopes above. On a broad, gravel-strewn shelf below a sheer rock wall they came across many stone mounds set in parallel rows, perhaps a hundred or more. Here the survivors of the disaster, twenty-two in all, had buried their comrades. The first few weeks must have been very difficult, she reflected, as she sat on a boulder and watched while Daffy and Korolyov D. walked from grave to grave, sprinkling a reddish, crystalline substance on each mound.

Custom, Daffy wrote when she asked. They had been here for several years, and two or three evenings a week a few of the survivors came up to lay grains of sand from home on the graves. The anthropologist's attempt to explain why faltered badly, or else she could not grasp the translation from "duck" to English to Russian. Perhaps it had something to do with various ritualistic responsibilities of the living to dead, but she was disturbed by the reference to "those who had sacrificed themselves willingly for the mistakes of others," and when she tried to question the anthropologist, it had turned away.

She slept better at night. Occasionally she suffered dreams, and woke up with sweat rasping down her face and back. But there were mornings when she was almost glad to roll out of bed, if only to help the ducks carry equipment or clean the amphitheater, or chip away ice from the entrances. The ducks encouraged her, and Daffy always had a list of things to do.

Later, she had an idea. There was a flatbed trailer in a gas station lot down the street. She proposed that they hook the trailer to her truck and make a run to Salt Lake City to look for useful items. The ducks considered it for a few days, but by that time they appeared to trust her too, and so they agreed. Once they found out what diesel fuel was,

they happily set about distilling and reprocessing the muck in every gas tank and station in town. She and Daffy and Korolyov D., and sometimes Lysenko D. or Huey and Dewey and Lewey, drove to Salt Lake several times, and even to Reno on one occasion, and to the American air base at Mountain Home, Idaho. They brought back miscellaneous things: computer components, laser arrays, plastics, many types of valves and fittings, books, tapes, art objects, anything that looked interesting.

She returned with videotapes and showed American movies on a salvaged VCR. The ducks were enchanted by *Shane*, and asked her to show it two or three times a week. She was baffled by their behavior toward this typical cowboy opera. As they watched Alan Ladd gun down the henchmen of the proto-bourgeoise rancher, they did incomprehensible things. Some rocked back and forth on the benches in unison, some made clicking noises with their beaks and raised and lowered their arms, while others sat still with their eyes shut. But when the little boy ran shouting after the hero Ladd at the end of the film, everyone stood up and screeched. A few of the ducks did a passable phonetic imitation.

"Zannee! Quimbak . . . Zannee! Mumndad nid oo!" they cried.

She showed *Apocalypse Now*, and their reaction bordered upon the bizarre. She found it an impressive documentation of a criminal holocaust, but the ducks appeared to argue about it for three days, during which time several became violently, but temporarily ill. Often they resorted to role-playing to make some important point. Once she walked into the casino to find Lysenko D. the biologist wading carefully through a pile of "corpses," gesticulatingg to a group of unclothed ducks, brandishing pool cues on the balcony above. That evening they insisted upon seeing the movie twice. No one made a sound.

The following day she had a long and frustrating argument with Daffy and Lysenko D. by note paper. For some obscure reason they wanted to bury the tape in the ground and post a guard over it. Their explanations made little sense to her. Their reaction to the movie appeared to be predicated upon the way in which the ducks distinguished imagination from reality, but she could not begin to understand their point of view. For their part, Daffy and Lysenko D. grew upset over her inability to comprehend them. Finally, they allowed her to simply throw the tape away.

She realized now how great the gulf was between herself and the ducks. There were superficial similarities, enough to communicate on a fairly complex level. It was quite possible that there were parallel personality and intellectual traits that ran deep. But the biological "wiring" was different, and the cultural matrix very strange to her. She might never understand their motivations, and they might always mistake hers. She was not unappreciative of their benevolent qualities, but she began to suspect that coexistence would become difficult as time went by. Paradoxically, as she grew familiar with the ways of the ducks, Avdotya isolated herself from them.

* * *

V.

One morning Daffy Duck banged into Avdotya's room lugging an assortment of equipment, including an ordinary stereo speaker and what looked like an amplifier and several cannibalized and resurrected computer components. The duck waved and set about plugging everything together, and she watched with interest, wondering what it was all about.

After a few minutes Daffy threw two switches, typed in a sequence of commands, and then glanced up. It shoved a microphone over to the center of the table and murmured in low, modulated tones.

"Hello. This project is successful. I feel happy," the speaker said in English.

She sat stunned. She exclaimed something in her native language, but the speaker burped and let out a high-pitched buzz.

"In English, please," said Daffy. "I am sorry."

"It is you speaking," she said, and smiled.

"Yes," replied Daffy. "I have been successful with this project."

It paused.

"But you do not speak to me naturally. This project needs refinement. It needs more memory. It especially needs more processing power and elective definition to decide proper nuance and syntax."

The duck rocked its head back and forth. "Again, I am sorry. I am not a linguist . . . that one is dead." It motioned at the equipment on the table. "And I work with unfamiliar designs."

"But it does work," she said. "You're magnificent."

"Thank you. You have been very patient and useful. Will you read your books for us?"

"What? I don't understand."

"We can build a library," Daffy replied. "You can read fiction books into a storage tape for us, please. I have Hemingway, Borges and Kawabata, and others. I believe that the . . . art . . . can be enhanced by a human voice, and the materials that you produce can be stored easily for a long voyage."

"Of course. It will be an honor, even."

The duck watched her carefully. "I also have Chekhov and Solzhenitsyn. I have Pasternak."

She laughed. "All are very proper, now."

What would a duck associate with "A Dull Story," or "An Incident at Krechetovka Station"? For that matter, how would it react to "A Way You'll Never Be"? She wondered if all the tapes and photographs, the image and voice of herself as well, would be lost in a museum somewhere far away . . . to be inflicted occasionally upon visiting schoolchildren from nearby academies.

"Oooooh! She is so ugly!" Avdotya imagined the strange voices clicking and murmuring. "What is she saying now? When can we go home?"

Daffy was in a talkative mood, and had more to say.

"We will be leaving soon," it remarked. "In a week we will hold a complete systems test and if it is successful, we will probably schedule a departure date within the month."

"Yes, you ran a check on the fusion

torus yesterday, didn't you? It certainly seemed to work."

By aiming the vehicle's main thruster nozzle away from the casino, the ducks had inadvertently destroyed the small shopping center across the street. For some reason, they appeared very upset by this.

"Do you think you'll be able to go back?" Avdotya asked.

"I think so," Daffy replied. "You have saved us years of preparation and we are grateful."

They sat silently for a few minutes. She stared at the walls, and the duck watched her.

"I've been thinking about what I'm doing here," she finally said.

"You are improving your English," said the duck, and rocked its head.

She looked at it with surprise and irritation, and then suddenly realized that Daffy was attempting a joke.

Avdotya smiled. "Yes, that, too."

"We assumed that you did not want to be alone," observed the duck.

"It is pleasant to be among people again," she said, continuing to smile.

"We make poor company, I think."

"But you've been very good to me, and I like you. I regret that there is only me now . . . there were beautiful places I could have shown you once. There were good people, too. Most of us were good, despite what we did to ourselves. Do you understand?"

But the duck had straightened and sat back. "No," it replied, clearly upset.

Avdotya shrugged. She wondered what she had said. "I'm not explaining myself well. I wanted to say thank you. For everything you've done . . . is there something wrong?"

The duck tucked its snout under one arm in agitation. Its body trembled slightly.

"Have I offended you?" Avdotya insisted in a bewildered tone.

"No," said Daffy at last, and raised its head. "Yes . . . I understand. I will try to say the right words. It is good to be here with you. I wish for better circumstances, too. But to meet you gives me a better perspective and appreciation of human character than if I only had artifacts to examine. I like you for this. It is a difficult situation for you to be in, and I respect you for your behavior in this place. It is very sad that you are alone."

"Sad," she agreed, still puzzled. They both looked at the walls.

Then Daffy said, "You cannot survive here. The planet's climate has been radically altered, and will probably remain so until the ablation effects on the sun have subsided years from now."

Ablation effects? She shook her head. "What?"

"We will take you with us, if you want to come. You can go home with us."

She was stunned. She saw herself in the museum, along with the photographs, the carefully restored furniture and dead voices. Schoolchildren brushed her clothes and hands, the facets of their eyes catching her reflection as they stared at her.

"Have we offended you?" they chorused.

"No!" she screamed.

"Consider our offer carefully," Daffy was saying. "Your going will present no technological difficulties, but there will be psychological problems. You

will be alone among us, isolated by insurmountable biological and cultural obstacles. We will keep you in a special place, for our home will be both terrible and wonderful to you. You could not cope by yourself. We will try to make you happy, but you will not be happy."

The duck suddenly stretched across the table, bringing its large, slightly bitter-smelling head close to her own.

"We want you to come with us," it said. "But I like you. I want you to be happy."

She said: "I won't go."

Daffy quietly tucked its snout under an arm.

After a few minutes, Avdotya said, "Will you answer a question?"

The duck raised its head and stared at her, the face chillingly unfathomable.

"Yes."

"Why are you here? What happened to you?"

The duck was silent for a long time. Finally it answered.

"Home received some of your television broadcasts, twenty-two-year-old signals, but we knew you were here. It was exciting. You were the first ones we knew of for certain, and we decided to come and have a look. Four ships were constructed. They were very good ones, better than those we sent to build colonies in our nearest neighboring stellar system."

The duck paused, and turned its head away.

"They did not incorporate the necessary safeguards," it said, and the voice from the speaker had an odd cadence. "We were just under half a light year out from this system, shifting from cruise mode into deceleration, when an accident occurred."

"Half a light year out?" Avdotya interrupted. "Are you saying that you lost ships out in space?"

"One ship," Daffy replied hesitantly. "You know very little about our ships. The vehicles outside are . . . were . . . only small planetary landers. There are three interstellar cruisers in a parking orbit around the poles, and two of them are badly damaged. But the third . . . if we can get the remaining lander operational and rendezvous with the third ship, we can go home."

"What happened during the accident?"

Inexplicably, Daffy bared its fangs and screeched. Avdotya scrambled to her feet.

"What is it?" she demanded. "What did I say?"

"I am sorry . . . I cannot tell you what happened."

"Why?"

"I cannot."

"Okay," she said. "All right, I don't need to know this. We can talk about something else."

"You do not understand. You do not know what happened. I do not know what you think happened. I do not want to tell you."

Avdotya wondered if the duck was hysterical.

"Why? Is it something I'm not permitted to know? Is it . . . religious? A taboo? No?"

"Guilt," Daffy replied, and once again gave her an unfathomable stare. "Shame is what we feel."

"You told me that it was an accident."

"It was an accident."

"They happen. One accepts them, comes to terms with them, learns—"

"No. No one learns from this accident. No one can come to terms with it. Listen to me, Avdotya Nazarovna!"

The sound of her name momentarily took her breath away. No duck had ever used it before.

"Listen, and then you will learn," said Daffy, leaning across the table. "You do not know about our ships. Our landers are fusion-powered and use hydrogen as a propellant. Our cruisers propel themselves by forcing an interaction between hydrogen and antihydrogen, and ejecting the resulting muons and pions along a diverging magnetic field to produce thrust. We carry several tanks of hydrogen, and several more of electrostatically-suspended, supercooled antihydrogen. We tether two opposing engines on a twenty-kilometer cable, and hang the command module, tanks, lander, and shields in between. In the acceleration and cruise mode, the leading engine fires, and the shields provide protection against gamma radiation. We protect ourselves from interstellar dust and micrometeors by diverting their kinetic energy into a ferrous fluid compound and spraying a screen of droplets out ahead of the ship. In the deceleration mode, we shift the shields and command module around and fire the opposing engine against trajectory. We deploy a great number of lightweight layers of thin plastic film to protect the ship against particles, and we grind up the empty fuel tanks into fine dust and shoot it out ahead at ninety percent light speed to clear the way of larger particles."

"It sounds remarkable. What happened?"

The duck flailed an arm. "Going into deceleration one of our ships misfired its load of dust from the ground-up tanks. Our ships normally operate in a formation hundreds of thousands of kilometers apart, but even so, one ship was destroyed and another severely damaged through impacting a scattering of dust molecules moving in an angular trajectory at relativistic speeds. The malfunctioning ship was forced to decelerate without a dust shield, and literally eroded in the process."

Daffy paused. "It took us a year to decelerate and attain a parking orbit around this planet. All of our landers were damaged from shuttling back and forth between the cruisers at near relativistic speeds, coping with emergencies and repairs. Only one landed successfully, though not without further damage."

The duck gestured outward and around. "When we arrived here, we found all of this."

Avdotya shook her head and looked at the floor. "It must have been so difficult to come this far," she whispered, "through so much hardship, just to find that we'd killed ourselves in a war. You're right. The word is guilt. Shame."

She sincerely felt both emotions, along with a ghost resurrection of hatred for the stupid Americans. The face and rotten hands of Ben Kimball beckoned to others besides herself, she realized.

But Daffy Duck blinked slowly and cocked its head.

"War?" it asked. "What war?"

"What war? . . . the war. The war that caused all of this . . . killed my

people. The war the Americans—the ones who lived right here—started."

She felt hot, all of the sudden. "What do you mean, 'what war?' "

"Forgive me," the duck implored. "I am trying to understand you. Perhaps there is a concept here that I am not familiar with. Are you speaking of a conflict between nation-states?"

"Yes," she replied, calming down. Why had the duck upset her?

"But the Americans did not begin a war here. I have seen no evidence of any war. We scanned the planet—"

"I was there!" she snapped, her face reddening. "I . . . fought in it!"

"I believe you," Daffy insisted, "but nothing less than a nuclear conflict—"

And then the duck sat back. "You do not know what has happened here," it said, the cadence of its voice distorting horribly. ". . . no war!"

"No war!" it croaked again, and fled from the room.

VI.

Later that day Avdotya wandered far out onto the vast playa, clad in her thermal suit.

She thought about the ducks' reactions to the movies she had shown. After a time, Daffy Duck had managed to convey to her some sense of what was going on. The ducks distinguished imagination from reality in wholly different ways. They understood that what happened on a television screen, or on canvas or the printed pages of a book, was fictional, in that events never occurred in quite that way. But they personalized their imagination, art, even discursive learning as opposed to experience, in exactly the same manner as they internalized and reacted to their own existence. Everything was real to them; they could not divorce themselves from anything around them, not through passive observation, or rationalization, or withdrawal. They were not "scientists" in the Soviet sense, they were quantum physicists, artists, and philosophers.

A long time ago we declared war on another tribe, Daffy wrote, by sending them a book scrawled by a blind neurotic, describing how they ought to conduct their fertility rites. We won the war by dispatching the images of the empty southern deserts under terrible seige by sandstorms, set to music written by a composer for a lover who lay dying. The other tribe sued for peace immediately.

Do you often fight wars among yourselves? Avdotya had written.

Not for an age, the duck replied. There came a day when a young philosopher wrote an epistle to all of the tribes, describing how he had ground pieces of glass into lenses and set them in a long, moveable tube, and thus had turned the machine onto the silky lights in the night sky. The philosopher described what was to be seen there and what was to be deduced from it, and millions of the machines were built, and millions of us concurred. It was decided that we really were a small people after all, and yet, it was *we* who were looking at the infinite stars, and not they at us. We were alive, and we came to understand the significance of that fact. We took hope, and determined to make ourselves as big a people as we could. In such a universe, war ceases to be the most direct and efficient method.

In human terms the ducks are schizophrenics, Avdotya told herself as she trudged through the snow. They are unable to behaviorally distinguish fantasy from reality. The trait made them both more and less adaptable than humans. More, because they were capable of assimilating novel new situations and incorporating radical solutions into society without upheaval; witness the fact that the invention of the telescope eradicated war. Less, because their reaction to imagination could push them into extremes of behavior that were detrimental to their well-being. More and less. The concept seemed uncomfortably paradoxical from a human point of view.

How to solve the riddle of the ducks? I haven't an idea, she thought. Kindness and suicide, brilliance and irrationality, the sense of something hidden . . . they sympathize, and yet they fear me. Why? How does someone like me, who carefully creates artificial reference points and a system of perceptual boundaries between the real and the unreal, communicate with creatures who have no similar concepts? How can I be sure of what I say? How can they?

Why did the duck run out of the room?

I assume myself when I speak, Avdotya thought. And perhaps the duck assumes itself. When the worlds we so carefully construct in our imagination totter on reality, we run, screech, or stand up and strike out!

Her thoughts strayed to the image of Ben Kimball, fury contorting his gentle face, the jaw muscles rippling under the expanse of snow-white beard, as he cocked his gun and held it to her nose.

Bastard, she had shouted, nonetheless. Betraying dog . . .

She suddenly stopped. Directly ahead sprawled a large lump of dark material, half-buried in the snow. Off to one side was an unraveled green turban.

Lysenko Duck lay motionless in the middle of the empty playa. Blood seeped from an opened artery in its neck, and one hand clutched a sharpened screwdriver.

"Nyet!" Avdotya cried, as she frantically dug the body out. The duck was barely alive. It made a feeble motion with the other hand, patting her on the back and stroking her heaving shoulder.

It shook its head.

She could not carry it. It was too large and bulky. She stuffed torn fabric from the turban into the wound and succeeded in hoisting the duck's arms up over her shoulders. Dragging its legs in the snow, she staggered away, toward the distant lights below the darkening evening sky.

But the casino was still only a faint glimmer on the horizon when she realized that her thermal suit was icing up. The batteries were nearly flat. It made little difference when she tried to pull harder. The duck's wet, rasping breath could no longer be heard in the silence.

An hour passed, and she was stumbling and falling over herself. Still she dragged and pushed the body. The joints of her suit had frozen, and she was forced into a stiff-legged limp that only emphasized the numbness in her feet and calves. Finally she slipped and collapsed onto a hard pan of ice. As the duck sagged across her, her leg twisted with an odd crunching sound.

"Nikolai! Oh . . ." she croaked, as the boy danced across the ice at the edge of her vision.

"Ben Kimbaaaaaalll!" she bawled. But the mummified skeleton with the great white beard took aim and fired the gun anyway. The boy dropped.

VII.

Avdotya Nazarovna stood in the wing operations bunker at the edge of the missile field, and jotted notes on a pad. The command link to "D" complex had been severed six minutes earlier, rendering the missiles' lock-in and guidance systems inoperative. The caretaker crews were just beginning to climb out of the underground silos, and except for the maintenance displays, the boards were dark.

"Another twenty-two megatons," she told herself. "Ust-Kamenogorsk is saved."

It was a Soviet intelligence estimate; the Americans were not verifying anything. They would not have to for five weeks, when the warheads themselves were scheduled to be dismantled.

Behind her, Spiridon Terentevich Khorobrov cleared his throat.

"Colonel Kimball?" he said in English, his heavy voice overlayed with a flawless British accent. "Colonel Kimball, I am grateful that today's exercise has displayed none of the . . . technical difficulties . . . that seem to have plagued American disarmament in the last two months. Your own crew apparently has regained its competence, and I congratulate you for inspiring this miraculous recovery."

Ben Kimball swiveled around in his chair, and grinned. "Fuck you, comrade," he said.

But Khorobrov did not even flinch. "May I assume that tomorrow's program of dismantling the link to "K" complex will be equally successful?"

"No sir, you may not," Kimball replied, the grin maintained. "As you know, our interpretation of the schedule calls for the airbases at Offutt and Hill field to stand down on their stockpiles. Tomorrow we get to relax; it's the Cold War all over again here."

"Indeed," said Khorobrov. "That is not the proper attitude, Colonel Kimball."

Kimball shrugged, and did his best to look bored. "Take it up with Obawata," he replied, pointing to the team leader of the U.N. observers. The Senegalese did not even look up.

"No instructions," he murmured.

Kimball smiled again. "There you go."

Khorobrov said: "This field is to be rendered wholly inoperative by eleven A.M. eastern standard time on September 16th, Colonel Kimball. You are four days behind."

"By whose reckoning? Yours? Or your government's?" Clearly Kimball was enjoying this. "Say, how do you know so much, Khorobrov? I thought you were just a reporter for *Izvestia* . . . or are you something else? A person of more . . . intelligent persuasions, perhaps?"

And Kimball, in mock seriousness, wagged a finger at Khorobrov and frowned.

In spite of herself, Avdotya smiled. It was common knowledge that Khorobrov was KGB, but the unspoken rule

that Kimball loved to flout was to ignore the fact. Avdotya cautiously relished the occasional confrontations.

"Avie the Red," Kimball called her, admiring the color of her thick hair. The American officer was in his middle fifties, but he moved like a much younger man, and always had a smile ready for her. When he spoke, he spoke to her; he insulted Khorobrov and ignored the drunken pilot Kirsanov and the boy Siromakha, who looked so frightened and overwhelmed. Among his own people, he acted the part of a genteel father figure, and indeed, when he was not around, the American technicians and soldiers referred to him as "Pappy K." He was a colorful man, an amazing attribute both rare and discouraged in Avdotya's experience. She began to feel warm towards him, particularly after he presented her with a pair of cowboy boots with a red star emblazoned on each toe.

Eventually he took her out, boots and all, to a bar in Wahoo. When Khorobrov objected, she told him to kiss his own ass. She could do that, she assured Kimball; she was the favorite niece of the party secretary of the Ukraine. Kimball had laughed and unexpectedly slapped her on her shoulder.

Avdotya was still daydreaming when the klaxons howled throughout the operations center. Immediately the screens surrounding her went dead, and then flashed on again, but this time the displays were different. Unfamiliar symbols and combinations flickered on some, while others showed data-enhanced maps and tabular graphs. She reacted with surprise, having no idea what was going on, but Kimball was shouting above the bray of the alarms, and Khorobrov was edging slowly into the shadows beyond the consoles.

If anyone knew what was happening, it would be Khorobrov, Avdotya thought. He glanced at her, apprehension and dismay on his face.

Thereafter, events seemed to take on a hideously entropic quality, as though lives were lived in the space of minutes, drained of consequence.

Ben Kimball shouted at someone to shut the klaxons off. In the consuming silence, he asked, "Is it real? Daggett, is it real?"

"Those alarms are tied to the environmental sensors," one of the technicians answered. "There are anamolous indications of top . . . pressure fluctuations, albedo disruptions, frequency distortions on most bandwidths . . . gamma radiation . . . x-rays . . . infrared . . ."

"What do we have from the SACSIN link, Stiles?"

"Nothing . . . just noise, sir. I think the net must be down."

"What about MEECN? Nightwatch?"

"Nonoperational, sir . . . you remember, the receivers were taken down under 242 provisions two months ago . . . wait . . . yes. Something from Offutt on the TQ frequency . . . it's garbled . . . now it's gone."

"Hell. What was it?"

The technician turned around and faced Kimball. "Sounded like an API scramble code . . . sir . . . is this real?"

Avdotya suddenly remembered her child in Novosibirsk. She found herself unconsciously slipping slowly toward a shadowed side of the bunker. But a gun barrel prodded her in the back, and

when she looked, she saw a determined looking guard with an automatic pistol.

"Nyet!" the American hissed.

"But what is it?" the U.N. team leader was demanding. "Colonel Kimball, what is going on?"

"If he opens his mouth again, put a bullet in it," Kimball said, to no one in particular. "Go to a DI-3 operational alert . . . and get me NORAD or somebody. Christ, I am not going to launch because of bad sensors and a thunderstorm . . . bloody hell not now, after all we've been through."

"Colonel Kimball, you cannot declare an alert." It was the boy from the foreign ministry, Siromakha. His voice was shaking. "You'll endanger everything . . . the negotiations . . . my government—"

"—has probably started a war," snarled Kimball. "Shut up! Daggett! Wake up! Talk to me."

"Radiation . . . moderate levels . . . unfocused, I can't get a fix. Pressure fluctuations are consistent with the mach fronts of several airbursts in the kiloton range . . . a rise in surface temperature . . . hell, sir, we're under attack, don't you see?"

"Shut up, now, mister. Stiles, what about SACSIN or NORAD?"

"No change. Nothing on cable, either, just noise . . . more noise . . . now I have pulsed harmonics on the higher frequencies . . . I don't think it's artificial."

"All right," said Kimball. "Dean? What do you think?"

"Could be a counterforce strike. They might've shut down our people already. Offutt was the last central command and control for SAC . . . if that was a scramble code, I'd say we're screwed."

"Then why haven't we been burned yet? Why airbursts instead of ground-level detonations?"

"I dunno . . . we've been half shut down by 242 . . . maybe we aren't considered important anymore . . . a series of timed low-yield airbursts above the field could hold us down for a while until more important business is finished."

"Listen," said Kimball, his voice taking on a thin edge. "I got thirty-two megatons, and every operational missile out there is venting on the racks. They aren't Titans . . . I can put a W87b warhead through the Kremlin's front door."

"I'm sorry, sir. I just don't know."

There were a few seconds of silence, and then Siromakha tried again: "Colonel Kimball, I respectfully request—"

"Son," interrupted Kimball, "I may apologize to you later, or I may have you shot. Right now it looks like the latter. Now be quiet. Sssssh!"

"PACCS!" the technician Stiles shouted suddenly. "I got PACCS! On cable link EVI . . . a confirmed verbal encode . . . I'm routing it to you, sir."

The blue phone on Kimball's desk buzzed. Kimball picked up the receiver and listened. His face went white.

Bastards, thought Avdotya, an unexpected rage welling up and overwhelming her sick horror and longing for Nickolai. All over . . . all over . . . nothing left . . . nothing to go home to . . . bastards . . . a trick . . .

"A trick," she said. Kirsanov the pilot gaped at her.

"A trick," she repeated.

Kimball turned and slammed the phone down. A gun was in his hand, pointed at her face. Anger suffused his skin with a deep red glow.

"Damn right, comrade," he said. "You're going to die for it, too."

He gave the orders to launch. Avdotya shuddered in physical pain when the earth around her rumbled, as the operational portion of the wing was ejected from the silos by pressurized gas. There was a second of silence and then a deep thrumming hiss from above, as the boosters ignited and the missiles soared into a threatening sky.

Omsk, Temirtau and Karaganda, Pavlodar, Petropavlovsk . . . Novosibirsk. . . .

The sound of automatic rifle fire replaced the evil thrumming, and she twisted to see Khorobrov, teeth clenched, shooting wildly. Ben Kimball suddenly disappeared. She flung herself on a blood-spattered rifle that clattered to the carpeted floor by her feet, and it was then and there that her long journey really began.

VIII.

"Avie, we couldn't find any detonation sites out there. None. Carmichael and Assad did find some minor blast damage in Omaha before they died, but the tapes we recovered from Offutt indicated that base command maintained a link to NORAD, and no one there knew what was going on. They had pretty well decided that the chain of events did not fit the profile of command and control decapitation before a counterforce strike, however. What little NORAD could get from the Russian-watchers after the low-orbit satellite network died appeared to show that your people were having similar problems. SACSIN never gave a launch-sequence order . . . it came from Post-Attack Command, and was initiated after a heavily-shielded satellite gave a degraded identification of multiple booster ignitions in the Pacific Ocean off Kamchatsky . . . your submarine base, you know?"

The image of Ben Kimball on the monitor in the generator bunker looked haggard and cold. Avdotya could see cracked and open sores on the American's lined cheeks.

"So," she replied in her awkward English. "You expect me to believe this? Perhaps you expect me to congratulate you because America won the war? Because a . . . trick, a betrayal killed my country, my child? You expect me to throw down the barricade and open the airlock, and let you in here? Then maybe we have a party, yes? You bring wine coolers, perhaps? Beer?"

"Avie . . . please. I don't expect anything, I merely ask." Kimball sounded exhausted. "Understand me. It's been five months, and the portable heaters we have out here in the corridor have had it. We can't scrounge for food and fuel anymore because the temperature outside has dropped below the operational limits of our tractor. We're the only ones left, Avie . . . six of us huddled here by this monitor. I doubt if there's anyone else out there. We're malnourished, suffering from prolonged exposure to radiation, and we're sick. We're cold. When we die, you'll be alone. Have you thought about that?"

"You sent thirty-two megatons into

the heart of the Soviet people, Ben. You wish me to be sad when you die?"

"Avie, I've told you . . . we found eight of our missiles in the Omaha area, and one more near Wahoo. I don't believe anything we launched reached Siberia, and I'm sure no inbounds from your people fell around here."

"Oh, so now you are going to tell me there was no war, is that right, Ben Kimball? You are going to convince me that not your people or mine committed acts of barbarous aggression and suicide? It was all a big mistake, yes? What evidence do you have to present today, please? Will you explain for me the pressure fluctuations, the blast damage from airbursts, the radiations?"

Kimball shook his head. "I don't know, Avie . . . nothing makes much sense anymore. Pauley died last night, did you notice? Stress, scurvy, who knows? You've got food, heat, light, books and tapes in the strategic supply bunker . . . give us a break. We're all that's left. Save our lives."

"I cannot. You murdered my child."

Kimball bit his lip.

After a minute, Avdotya asked, "Why do you want to live, if there is nothing out there?"

"Me?" Kimball seemed surprised. "I don't want to live . . . I don't have the desire. But I have a bunch of twenty-four year olds who do. They really do. I guess they need me."

He shrugged and stared into the monitor's camera. "Why do you want to live, Avie?"

She did not hesitate. "I am going to wait until the . . . climate improves, and then I will go home somehow."

Days passed, and the Americans hardly moved in their nest outside the thick airlock doors. Ben Kimball looked worse.

"You are going to stay here and die?" she asked.

"As long as there's a chance," he replied hoarsely.

"There is no chance. Go home, Ben Kimball."

"Wish I could, Avie . . . but home is in Oregon. Medford. My kid lives there now. Real political activist, especially since it became fashionable again. Good, solid husband with her . . . a real bore. Two children. Call me 'grandfather' . . . hate that. Call me Ben, I say. Call me anything, but don't call me old. My wife's buried in Medford, on Pinery Way . . . she looked like you, Avie, did I tell you that?"

"Many times, Ben."

"Good, solid . . . capable at whatever she wanted to do. Stubborn . . . strong. Shock of red hair, green eyes that noticed everything. Hated to see her go . . . took the life out of me, made me rude, a bore . . . hollow inside . . . sorry, just rambling on . . ."

"You were a good person, Ben. I liked you."

"Save us, Avie."

"No." Avdotya put her hands to her face. "I will tell you why, yes? My son, Nikolai . . . I am a little crazy most of the time. My husband, Gregori . . . he was a party official in Moscow. He drank a lot and beat me, even when I was pregnant. But he loved me, too . . . I think he loved me. In my second year at the Frunze Academy, I became very tired. I broke his jaw. There was a scandal. Gregori divorced me, and took my son. I was dismissed from

Frunze, and posted to Karaganda for three years.''

There were tears on her cheeks. She did not notice them.

''I wanted my son. I wanted a career . . . to be good at what I do. So I think, if only I work very hard. I do everything I can do, and someday I have everything I want again, you understand? Nikolai . . . they do not give the son of a Central Committee alternate back to a soldier-wife unless I am very, very good.''

''I was good,'' she continued, haltingly. ''Gregori . . . he made some mistakes. He retired a year ago. My uncle in the Ukraine talked to some people in Moscow . . . by that time I was a major assigned to one of the rocket regiments near Novosibirsk. The psychologists went to see Nikolai . . . they said he was not . . . healthy. He had no zeal. He was not interested in acceptable social organizations. They said it was Gregori's fault. It is all bullshit, as you say . . . yes? But I take him anyway. He came back to me a month before I was assigned here.''

She looked up suddenly, and gritted her teeth.

''You took him away from me, you bastard. You took him away, you took everything away again. Everyday I wake up and I say, 'Avdotya Nazarovna, you are not a murderer, you must give those bastards outside a chance. They did not know your son, they did not willingly do this to him.' But I am crazy . . .''

She shook her head. ''My hands do not obey my mind. I cannot pull the lever to open the airlock. I get sick . . . I hate you, and the thought of living with you, breathing the same air with you makes me ill. I must go home. When the weather breaks, I must find a way to go home. Please. Tell me this, Ben Kimball. Would you let me live, if I let you in here? Would you let me go, when I wanted to?''

Ben Kimball had been silently staring at her for many minutes. He did not move. The flush in his face had paled, the beads of sweat on his brow had frozen.

''Ben Kimball? Ben?''

When he did not answer, she slumped to the floor.

IX.

When she awoke, she lay on a cot in a ruined casino in Wendover, Nevada, and a giant duck sat by her bed.

''Hello, Daffy Duck,'' she said.

''Daffy Duck? The animated cartoon waterfowl? How shall I take that?''

She laughed quietly and fell asleep again.

Later, she opened her eyes, and saw Daffy and Dewey bending over her.

''How do you feel?'' asked Dewey.

''Better,'' she replied. ''I've been a lot of trouble to you, haven't I?''

Both ducks straightened and looked at each other.

''You were close to death when we found you,'' said Dewey. ''I believe you have recovered now. There is a bone splint on your left ankle. It is not very good, and the bone may heal crookedly, but I believe you will be able to walk. It was the best I could do.''

''Thank you, you've been very good to me . . . what happened to the biologist? The one I found out there in the desert?''

"Dead," replied Daffy. "I am sorry."

"Why? Why suicide? It isn't the first time, is it?"

"Would you like to sit up?" asked Dewey.

"Thank you. Can I have a glass of water?"

"Yes."

"Will you answer my question?"

"Yes," Daffy said, and sat down beside the cot.

"There are certain factors that I have failed to comprehend," it began. "There are others that I have hesitated to talk about. You have slept for several days. You spoke in your sleep, and told me a great deal. I did not realize how difficult it had been for you."

The duck rocked back and closed its eyes. "Poor us . . . poor us. We were so curious, so willing to help. We wanted so much . . . we desired a meaningful dialogue with your people. Voyagers at the very dawn of the loneliest voyage, looking out over the vast sea of stars, longing for any safe haven among the myriad lights, any port with friendly natives. Any comrades we could find . . . what have we done here? See what we have done."

Dewey Duck moaned softly and tucked its snout under an arm. Daffy paused, and opened its eyes.

"There was no war. At least, no nuclear conflict. You were mistaken."

Avdotya chewed on her thumbnail and thought. "Someone told me the same thing a long time ago. But I was in it. I witnessed an order to launch a large number of missiles. The missiles flew . . . I was there."

"Yes. They flew. We scanned the wreckage."

"What happened?"

"The missiles went up. I do not believe that any reached a target, however. We did find some rare detonation sites, perhaps where warheads exploded when the malfunctioning boost vehicles impacted the surface. Guidance systems were destroyed or scrambled by radiation, or the vehicles themselves were knocked down by massive detonations high in the atmosphere."

Avdotya shook her head in confusion. "I don't understand. What caused the radiation? What about the airbursts?"

"Dust traveling at relativistic speeds," replied Daffy, staring at her with a shockingly contorted expression. "Several days ago I told you a little bit about how our ships operate . . . and about the accident one of them had while decelerating into this system."

"Yes? Explain, please. I still don't . . ."

She felt her throat constricting violently. The throbbing numbness in her ankle suddenly slashed at her.

"You. . . ." she choked. ". . . you. . . ."

"I am so deeply, so terribly ashamed," said Daffy.

"How? Why?"

"When the ship misfired its load of dust from the ground-up fuel tanks, hundreds of thousands of metric tons were hurled at a velocity exceeding nine-tenths light-speed in a grazing trajectory toward your sun. Three months later the dust blew away much of the outer solar atmosphere, and drastically distorted the spin, magnetic fields, and internal structure. A small amount of dust, very small, disintegrated upon colliding with your planet's atmosphere

. . . the planet was contraposed to our ships when the dust blew through your system. As a result, your planet was blasted and irradiated. Since the impact had altered the energy output of your sun, the planet's climate was transformed and the biosphere eliminated. All this we watched, as we made the final approach.''

''You bastard,'' she whispered. ''Do you know what we had almost achieved here? Do you realize what you have done?''

''We have had seventeen suicides since we landed here,'' Daffy replied. The duck did not move, did not even breathe. It looked like it had been turned to stone.

Only the mouth had life. ''We know what we have done.''

Avdotya closed her eyes. ''Get out,'' she said.

X.

When she hobbled through the casino lobby a few weeks later, she found the truck carefully parked by the curb. The fuel tanks were filled, the lockers stocked with food and water, and the tread that had been damaged in Cheyenne was repaired. The engine was warm and ready to be turned over.

She sat in the cab for an hour, silently staring at her lap. Then she started the engine and backed the truck down into the heated parking garage and climbed out.

Limping back to the lobby entrance, she stopped and unhitched her pistol, and fired several shots into the garish, neon-lit cowboy waving above the street. The glass and plastic face shattered, and the glittering shards rained down into the snow.

XI.

''Where is Dewey Duck?''

She confronted Daffy, the pistol still in her gloved hand. ''The one who set my ankle. Where is Dewey?''

Daffy looked away.

''I see,'' Avdotya said. ''No more of this. Do you understand me?''

She turned to the rest of the ducks crowded into her small room, the translator still on the battered wooden table.

''I consider suicide a dishonorable way to express shame and sorrow. You insult many memories here. No more. You will simply have to suffer it through.''

She put her pistol away. As an afterthought, she added, ''I will be here to help you.''

XII.

The days began to grow a little warmer as the ducks labored to fine-tune the lander's fusion reactor and process enough hydrogen fuel from water-ice. Then one evening a violent sou'easter rolled out of the mountains and across the playa. The wind screamed in the broken windows and walls of the hotel, and by morning a thin layer of carbon dioxide flakes had buried the world.

The sun returned and the afternoon became quite warm. As Avdotya sat on a rock on the jumbled slopes north of the town, she could see the billowing mists of melting ''snow,'' red-tinted in the westering light, far out on the desert floor. A bitter tang was in the air, and she was reminded of the sea.

Below, the ducks held an elaborate

observance among the grey mounds where their dead lay. She understood none of it, but something in the slow, ritualized movements and sonorous murmurs took her back to her childhood, and caused her to reminisce about a Christmas evening spent listening in the dark recesses of the orthodox cathedral in Kiev. The priests in their ornate golden habits had moved with the same calm, considered devotion to the martyr crucified high on the damp wall.

Later, as the other ducks moved from grave to grave sprinkling handfuls of sand from home, she and Daffy stood and wrote to one another on a pad of paper.

How can I judge you? she wrote. What options do I have but to forgive you? I myself have murdered, and not by accident, either. I am far more concerned about the messages that you transmitted to home after your ships injected into orbit here. The psychosis of guilt you've described to me must be dealt with.

The question is how, Daffy wrote. At best we will return home seven years after the messages arrive. By then, the worst will have happened. Suicides will be epidemic, apathy endemic. Science and art will be in decline, governments will have fallen in anger and despair. We will return to a society threatened by psychological chaos, as each one of my people seeks an individual answer to personal guilt. I doubt if anyone will want to listen to the murderers themselves.

They will not welcome you, Avdotya replied, but they'll listen to you. When you tell them about all that has happened here, and about me, and what I have said, they'll listen. No species develops successfully without the desire to survive. Count on that. It is a fundamental point of communication between cultures. Most of your people will want to survive and prosper. You will give them that option by using me.

And you will not come back with us? We need you now.

No, you don't. It is better that I stay here and make the ultimate sacrifice. They'll remember me forever if I do that. Besides, I'll be an invalid in your society, eternally dependent. Not an impressive martyr, you know. Not a cultural icon for the ages.

Then let me stay with you, the duck wrote. Show me Russia. We will go and find your child together. I am responsible. I wish to pay my debt.

My friend, Avdotya answered, no living creature knows me better. No one can interpret my life and the meaning of my words with more feeling and accuracy than you. And no one I know of better understands the problems of translation and comprehension between my people and yours. We are going to create a myth, you and I, a social frame of reference that will save your people. It requires you to go and me to stay.

Both the duck and the human stared at each other. The rich light of the evening sun caught the reflective facets of the duck's eyes and illuminated Avdotya's visored face in a red-gold glow.

Strange, wrote Daffy, to think that we plan a strategy now, to meet a crisis that will not occur for eighteen years.

XIII.

"Tomorrow morning, you'll be going home," Avdotya said to the ducks who

had gathered around on the floor by her feet. "I won't be going with you."

"In the last few weeks I've tried to give you some insight into myself and my people," she continued. "I've told you about my life, and each of you have described a little of your own. I don't know what sort of understanding we have created. I suspect we sympathize with each other. I don't think we comprehend each other. And yet . . . I feel very close to all of you."

She looked around. "You know what you will be going home to. By the time you return, the messages you sent four years ago will likely have caused a general collapse of social values, behavioral patterns, and institutions. You yourselves will probably be outcasts, shunned and despised. You are literally escaping exile here to fly into the face of violence and chaos, and perhaps even death."

Avdotya paused. The intensity of their attentiveness awed her.

"When you finally come home, I want you to remember a few things. Remember that you were here, a witness to everything that occurred. Remember that you were among those who met a human being, and that you learned from this creature what had been lost, and the price that can be exacted for innocent mistakes. Above all, remember that you will be most able to explain what has happened and what must be done about it. There will be many among your people who will want to know . . . seek them out, and discuss it with them.

"It has fallen to me to absolve you of the loss of my own people, and I do so willingly and with great relief. I forgive you. No one need feel guilty, nor be ashamed for their part in what has happened here. No one need pay with their own life, nor give up their initiative out of a sense of debt. The debt is excused. I forgive you.

"But even as I forgive you, so shall I always be with you. You must remember what you have done here, and shape your own destiny by what the experience has taught you. I caution you to take constructive lessons. You have a responsibility to my people to become wise and benevolent seekers, to achieve the things we once aspired to. You cannot reject such an obligation. But what happens to you from this point on is your own responsibility, and you will have to suffer the consequences yourself.

"Life is rare and very precious. In all the vastness of space that you have only begun to search out, you have discovered but one other oasis. You will find another, someday. When you do, do not avoid the inhabitants. Remember how much we wanted to meet you, or someone like you. But when you attempt to contend with the circumstances, whatever they may be, remember —life is very precious, and will not be repeated in the same way ever again. Save it. All decisions should devolve from such a memory."

Avdotya stood up.

"The things you have gathered from this planet, you should take them home. The tapes and books . . . all of it. Take my words, and your memories of me, as well. You are emissaries of another culture to your own, and you are the last, best hope for both."

She stepped away. "Long day for all of us tomorrow," she said. "Goodnight."

XIV.

Before the sun rose, she pulled the truck out of the garage and drove slowly around the huge lander in the street, up to the top of the knoll beyond. She walked back through the stirring frosts of the early morning; her boots crunched loudly in the snow. The sun suddenly leaped above the eastern horizon, momentarily turning the great playa into a roiling lake of oranges and electric blue.

The ducks waited at the base of the lander. For a long time they were still, and then one by one they filed past and clumsily shook her hand. To each, she recalled something personal, some memory they shared. At last she stood alone in the snow with the anthropologist. Daffy scribbled something on its pad and held it out.

Спаси́бо и не том. Мо́жешь успоко́иться.

"Just a minute," she said, and grabbing the pad, wrote: You've never told me your real name. What is your name?

It would not mean anything to you, the duck replied.

Please. It is important.

Daffy chimed and blew softly. It sounded pleasant, and somehow lifted her spirits.

They stood there for a minute, and then the duck extended its hand and she took it and held it in her own.

Above the town, from the interstate highway, she watched the ship lift off on a pale blue pillar of flame. Blocks of asphalt and masonry flew through the shimmering air, and the ruined casino rang with the roar. The ship dwindled to a blue dot in the luminous salmon sky, and then disappeared.

That night the sky was very clear, and the stars shone in such multitudes as she had never seen before. At midnight she rolled to a stop just west of Elko. She lay in her bunk when the darkness outside was burnished with a deep red glow, and she scrambled over into the passenger seat and stared out through the windshield. In the sky a fierce, pinkish point arced quickly toward the meridian, brightening and blurring as its color changed to white, and then to blue, and finally to a searing violet. She watched for an hour as the violet streak slowed, reddened around the edges, and faded away. She knew they were gone then, and she was alone.

She felt calm as she crawled back into her bunk. She was very tired, and as she slept she dreamed of the vast oceans of ice, terrible and beautiful as the light of myriad stars reflected off their sculptured surfaces.

XV.

One hundred and fourteen years passed, and on the planet, the season remained the same. Then, on a day like all the rest, the ducks returned in a great fleet of ships, hundreds in number. The night sky was filled with gracefully arcing points of light, and immense landers constantly thundered down onto the flats south of Wendover. Thousands of ducks disembarked. A city was built, and equipment was designed and manufactured from available materials. Exploration commenced.

Nine weeks after the arrival a small skimmer was cruising far to the north, several hundred meters above the western sea. The pilot noticed a dark spot down amidst the jumbled ice, something

made of metal and plastic that tripped the monitors, and circled lazily to investigate. Below, a large, treaded vehicle lay overturned on a steep incline.

Strange, thought the duck, to find that sort of machine so far out on the ice. A human being must have come out here after the sea froze, months or years after the Accident. Who could it have been?

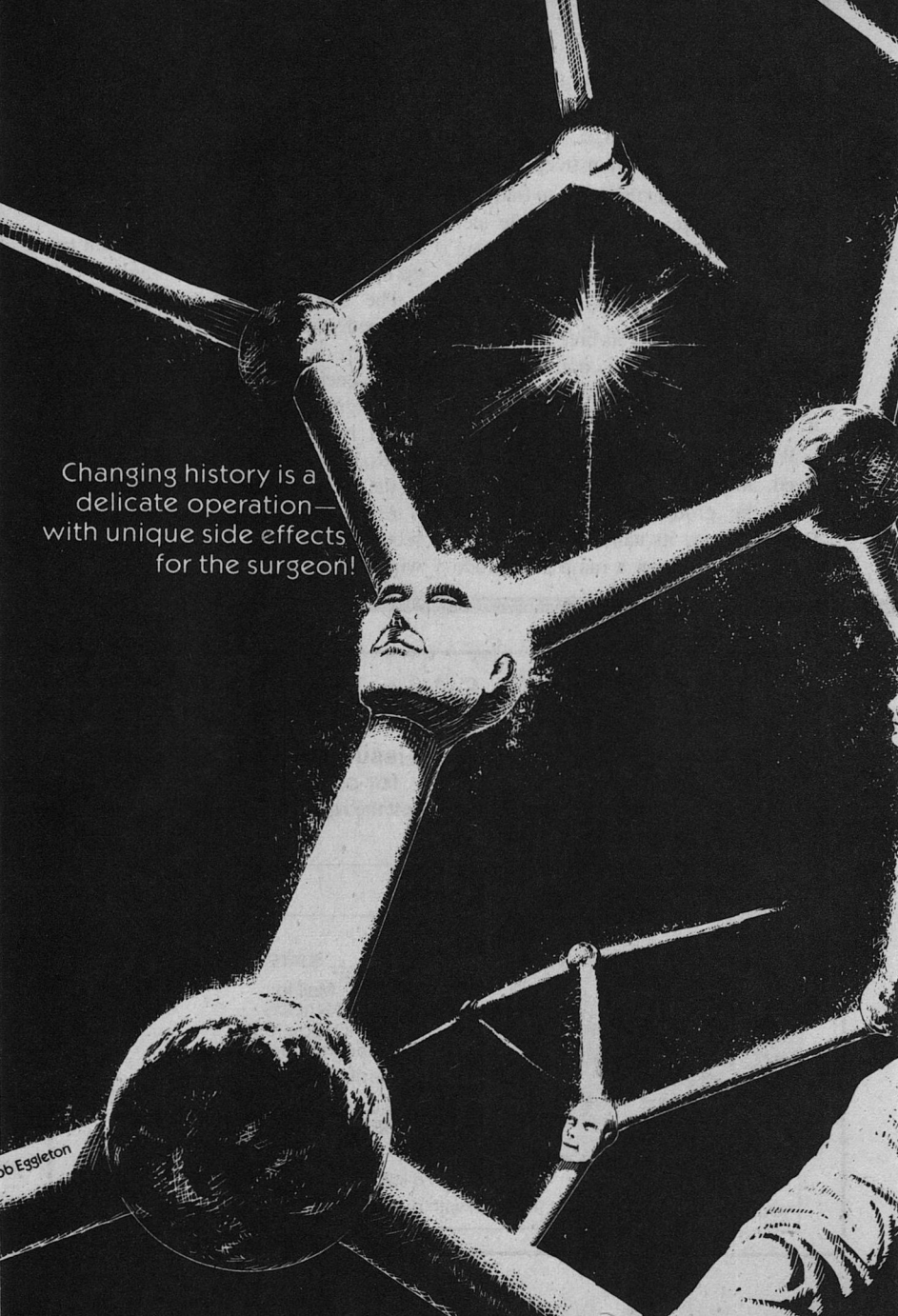
The sudden hiss of its breath was loud enough that the traffic controller monitoring transmissions in Wendover broke in to ask what was wrong.

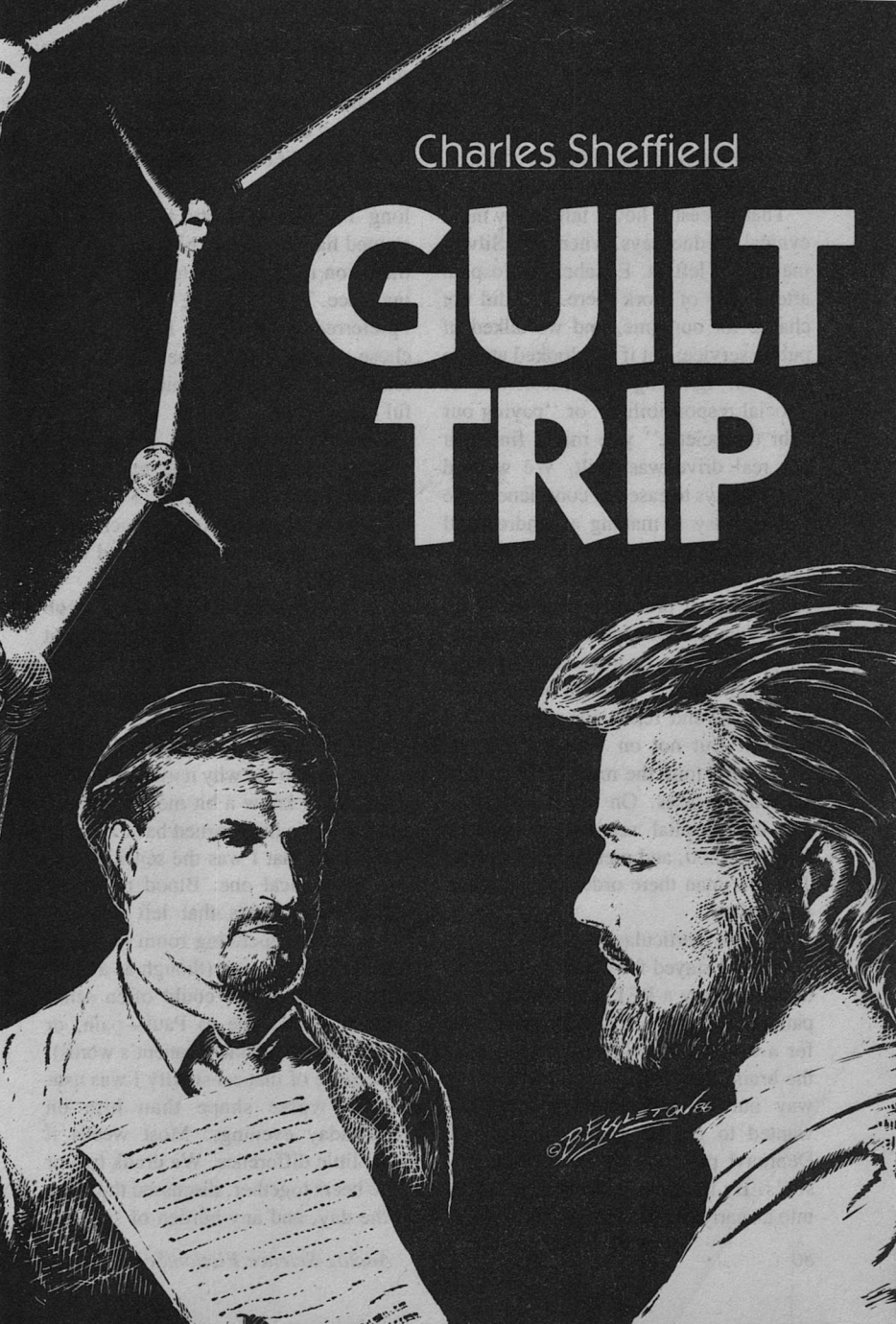
Within an hour a huge transport arrived, and set down on the ice just beyond the grounded skimmer. Daffy Duck (it knew its name on this world) stepped down from a ramp and strode through the shallow snow toward the truck. It motioned to the skimmer pilot, who squatted quietly nearby, and the duck reluctantly got to its feet and loped after the anthropologist.

"It is hers," the pilot murmured in subdued tones. "It is. I do not want to go up there again."

The anthropologist gave a short, chopped gesture to the pilot and clambered up onto the truck. It pried open the ice-encrusted door, and peered at the rigid figure slumped over the steering wheel inside. It knelt on its knobbly knees, resting a gloved hand on the back of the figure's head.

Above, the wan sun guttered in a deep bronze sky, like a candle in a sudden wind. ■


Changing history is a delicate operation—with unique side effects for the surgeon!
ob Eggleton


Charles Sheffield
GUILT TRIP
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Madness takes many forms. Perhaps one of the most insidious is the belief that it is no more than a sickness—that madness can be treated, cured, and banished by the right combination of drugs, arm-waving, and incantations.

That at least is how I felt on my more cynical Wednesdays, when Paul Silverman and I left St. Elizabeth's Hospital after a day of work there. We did not charge for our time, and we talked of public service; but if you looked at deep motives, ignoring any assertions of "social responsibility" or "paying our debt to society," you might find that our real drive was guilt. We worked Wednesdays to ease our conscience. We were uneasy at making a hundred and fifty dollars an hour the other four days of the week. For those days, a patient's psychological problem was usually no more than a desire for attention, an unhappy marriage, or a stressful working environment, and we went home pleasantly tired and ready for a party or a concert. But not on Wednesdays. St. Elizabeth's took the most obdurate and intractable cases. On Wednesdays we left the hospital separately, between 5:45 and 6:00, and met at Anson's Bar. The first man there ordered two beers, and waited.

On this particular Wednesday evening I had stayed for an extra five minutes to review a PET scan of a woman patient undergoing radiation treatment for a tumor in the left parietal lobe of the brain, and then I was caught on the way out by Johnnie Donovan, who wanted to get my opinion on a new Deprenyl protocol for treating Parkinson's. By the time I finally ducked out into an early November rainstorm it was nearly ten past six, and I was more than ready for a drink. I scurried along the sidewalk, coat over my head, to the darkwood doors of Anson's and on into the brightly-lit bar. Inside it was all plastic, chrome, and neon, except for the long bar itself, thirty feet of dark, stained hardwood that had survived the transition from old pub to yuppie meeting place. The rest of the week Paul and I preferred an older style. But we always chose Anson's on Wednesdays, for its loud optimism and unremittingly cheerful decor.

Paul was waiting, his glass three-quarters empty. A double martini, on the rocks. Strong medicine. I slid onto the next stool, nodded, and reached for the pint tankard of beer that stood waiting for me.

"Did you spend any time with Jacob Lansdorf?" Paul asked his question at once, before I could take even the first mouthful. "The new patient in Ward Five."

I turned my head and looked at him in surprise. To see why it *was* a surprise, you have to know a bit more about me and Paul. We had learned back in graduate school that I was the sensitive and he the practical one. Blood made me queasy, and sights that left him unmoved in the operating room made me feel like throwing up (though as a compensation for that I could often sense something invisible to Paul—pain, or guilt, or fear—behind a patient's words).

Because of that sensitivity I was usually in worse shape than him on Wednesday evenings. Most weeks it made little difference. We drank two or three beers together, discussed the work of the day, and any burden of sickness

or unhappiness that I had dragged with me from the hospital gradually evaporated. By seven-thirty I felt fine and could laugh and joke as well as he could when we headed off for home and dinner.

As I said, that was most weeks. But there were bad Wednesdays.

On *those* evenings the cloud from St. Elizabeth's was not so easily dispersed. Sometimes I would lift my tankard, with its faceted glass sides, and see through it into the shattered, prismatic world of distortion and discontinuity where the worst patients lived. When that happened I set my hands flat on the polished wood of the bar, and Paul put an arm across and gripped my shoulders until the world steadied. It did—eventually. But on those nights I wondered long and hard about my own sanity.

Paul admitted no such doubts. He saw our work as a natural extension of general medicine and he had expounded his philosophy to me long before we began to practice. "It's simple enough, Mark," he said. "The brain is a working organic entity, the same as the kidney or the spleen but a bit more complex. Remember, a hundred years ago doctors thought that tuberculosis might be an emotional problem. That's what some idiots say today about depression, or schizophrenia. But it's not true. When we learn a bit more about biochemistry and neurotransmitters, we'll be able to cure every condition in the mental hospitals."

He was positive and persuasive. So it was doubly disconcerting to hear in his voice tonight an echo of the same uncertainty and ambivalence that I often detected in my own thoughts.

I put down my glass without drinking. "Lansdorf? Sure. I did a physical on him."

"You didn't talk to him?"

"No more than you'd expect. I had to rush over to Isobel Skinner in Ward Eight. Did you know she's been looking for ways to kill herself?"

"What did you think of his condition?" If Paul had heard my question, he gave no sign of it. He was fidgeting with his glass, and rubbing nervously at condensation rings on the bar.

"Lansdorf? He's generally in good shape. Mind you, he ought to sue his dentist. I've not seen such lousy fillings and bridge work for years."

My shot at cheerfulness didn't work at all. Paul just went on nodding to himself, and polishing the top of the bar with his index finger.

"What's wrong, Paul?" I said after another thirty seconds.

He shook his head. "I'm not sure." He reached forward, picked up the glass, and drained it to the ice cubes. "It's a pity you were busy all afternoon. I looked for you about four, because I wanted you to give me an opinion. Anyway . . ." He reached down to where his briefcase was leaning against the bar by his feet, and hoisted it up to his knees.

"I spent an hour and a half with Jacob Lansdorf first thing this morning," he went on. "He was transferred to St. Elizabeth's by the D.C. Police Department five days ago. They picked him up down on the Mall, wandering around on his own. He had no idea where he was, and he talked gibberish."

"Why this hospital? Is he violent?"

I wanted Paul to keep talking—the frozen look on his face was disturbing.

"No." He sounded sure of himself again. "I'd be amazed if he tried to harm anyone, except possibly himself. But he told them some very strange stuff. What he said didn't make much sense to them—but they played it safe."

"He told them strange things—but what did he tell *you?*"

Paul pushed his glass forward across the bar for a refill and shook his head. He didn't answer at once, but instead placed his briefcase flat on the bar. He opened it and pulled out a sheaf of yellow legal-size paper, covered with neat pencilled handwriting.

"What he told me this morning was fairly incoherent. Most paranoids give a description that's logical and complete, at least on the surface. But Lansdorf rambled all over. So before I left I asked him to write out what he had been telling me as fully as he could. He must have gone at it non-stop. By the time I saw him at three o'clock he had this" —Paul tapped the yellow sheets—"waiting for me. You'll do me a big favor if you'll read it now, and see how it strikes you."

I looked at the pad dubiously. There must have been at least twenty sheets there. "Before I begin," I said, "do you want to give me some idea what's wrong with him?"

"I'll tell you how he was described to me. Delusions of grandeur, coupled with a monstrous guilt complex."

"And your own view? Where do you place him?"

Paul didn't hesitate. "You'll see when you read it. But he's a two—or worse."

It was our own informal scale for describing the human condition. On a scale from one to ten, anyone who scored ten was unusually happy. A one had given up all hope.

"Then he's reached despair," I said. "Which either means this document describes his *internal* condition, not a set of experiences; or else the man breaks your pet rule."

Silverman's Rule, established after ten years of observation: A human can make another human *unhappy*, but happiness or despair cannot be induced; they come from *within*.

"I know all about that." He waved his hand impatiently at the manuscript. "Read it, Mark, then let's talk."

I took a draught of beer, fished my glasses from an inside pocket, placed the papers where Paul could see them too, and finally began to read.

"My name is Jacob Lansdorf. I am twenty-eight years old, and I was born in the town of Wolverhampton, England. After attending grammar school there, I went up to Oxford and did a degree in history, followed by two years of post-graduate studies. My special subject was national political trends during the first half of this century."

(I looked up at Paul over the top of my glasses. "I know. Keep reading," he said. "I suggested he put in some general background, to help him get going. Not that he needed it.")

"It was during my first year of graduate studies that I met Jon Blackburn. We had both rented furnished rooms in the same lodgings, and we moved in on the same day. We soon began to eat together occasionally—not because we

thought we had a lot in common, but because neither of us had much money and it was cheaper to cook for two. We seldom talked about our studies. He had done his undergraduate work at Bristol, in physics, and was now doing a dissertation on quantum processes. Any comments he made to me about that were totally unintelligible.

"After three months, we suddenly found that we had more in common than we had suspected. To be specific, we had both been involved during our undergraduate days with the Homeland Movement."

("I didn't know, either," said Paul. "But it becomes clear later on. According to Lansdorf, the Homeland Movement is an organization trying to create a country for the Jewish people to settle."

"But there's—"

"Yeah. Keep going.")

"Jon had been much more active than me, and he was still in touch with the Movement. When the term was over, he persuaded me to drive over to Cambridge with him, and meet some of his old Bristol cell who were now graduate students there. We went in his old Armstrong-Sanderson, which he kept in dreadful condition. The weather was foul, and the roof leaked. Past Bedford the main road had flooded, so we didn't arrive until after eight at night. Jon took us straight out to a house on the Grantchester road. By the time we arrived the meeting was going strong. Eight people, but enough noise and pipe smoke for twenty.

"It was a new experience for me. The Cambridge cell was filled with activists, and their talk sounded very wild. They wanted to take action at once. I just watched and listened for the first hour, almost ignored—until Jon Blackburn told them my field of study. Then all heads turned to stare at me.

" 'Has he met Simon yet?' asked a thin-faced woman who looked ten years older than the others. Her name was Barbara, and the meeting was taking place in her house.

"Jon shook his head. 'I wanted you all to meet Jacob first. Will Simon be here tonight?'

" 'Late. He had something to finish at the lab. You know Simon.'

"I didn't, but in the next half-hour I heard a lot about him. He was the cell's resident genius, and his work formed the basis for the Grand Plan.

"I'll describe the Plan, but I can't give a good decription of Simon Fischer's work—even Jon couldn't do that, and he had a scientific training. It was all based on something called the Moseley-Redpath hypothesis, but that doesn't help. I looked the reference up in the Hospital library here. Moseley is in there, but the encyclopedia says he died in 1915. Neither Redpath nor the Moseley-Redpath hypothesis is listed.

"According to Jon, the only way to understand that hypothesis is through a quantum theory description. At the quantum level the position of any particle is not known with absolute precision. Instead, it is described by a probability distribution. So a particle "extends" over a region in space—in principle, the particle could be anywhere in the whole universe, but the probability becomes negligible except within a small volume. The Moseley-Redpath hypothesis suggests there is a

small but immeasurable coupling between the probability distributions of particles.

"A research professor on Simon Fischer's dissertation committee had extended the hypothesis to cover the time domain. There should be a coupling between the state of particles 'now' and 'then.'

"That coupling might be big enough to measure. Simon had tried to measure it, as part of his research work, and he had succeeded. The effect was real. In principle, an action taken in the *present* could affect a situation in the past.

"It was hard to believe any of that when I met Simon Fischer. He was small and dark-haired, and he would not look me in the eye. He responded to Jon's question with a shifty, sideways glance at Barbara, and a jerk of his head upward and backward. 'The instrument I've been building ought to allow changes to be made,' he said. He sniffed. 'Changes to the past, but *small* changes. And the amount of energy needed to do it grows rapidly—exponentially—as you go farther back. And most small changes simply damp out as you move forward in time.'

" 'But some do not?" asked Jon—I suspected for my benefit. "There are little things in the past that could make the difference we want?'

" 'That's right. There are critical nodes—space-time events that cause a major bifurcation of space-time. What we need is a way to detect those. That's outside the field of physics, of course. If you want to produce a social change, you need an expert in history and politics.'

"The others all turned to look at me. For the first time, I understood why Jon had insisted on driving over to Cambridge. I was the advertised 'expert.' What the group wanted sounded simple enough, if it was stated in broad terms. A German anti-Semitic influence had been the main block to Homeland Movement progress. And German industry and technology were powerful forces all over the world—Simon's own equipment had been manufactured in Stuttgart. The cell wanted to find something, some critical past event, that could be changed and propagate forward to lessen German world-influence.

"I thought the whole thing was ridiculous at first. But the situation offered a curious challenge to my ego. It was quite a change to find I was the center of attention of a group of people—and a group of individuals, I soon suspected, who were all of superior intellect to me.

"I promised to look at the problem. We drove back to Oxford, and I set to work. Jon pushed me along by frequent questions as to how I was doing, but his prodding was unnecessary. The project became my own obsession, to the neglect of other studies. My phone bill to Simon Fischer's lab soon exceeded the amount I spent on food and rent.

"I found an answer. It took me four months, but I found what we needed. After another two weeks of verification, Jon and I again drove over to Cambridge and visited the little suburban house on the road to Grantchester. The whole cell was there. With the exception of Barbara Ashworth, who taught French and German in a Grantchester school, the others were all physicists or mathema-

ticians. I had to explain the whole historical background to them.

" 'You have to read the actual field despatches to know what was going on,' I said. 'All wars are a lot more confused at the time than they seem to be either before or afterwards. Beforehand, it's all plans and calculations, and when the war is over the historians come in and do nice, detailed analysis. But during an actual battle everything tends to be muddled and hurried. Now, the Schlieffen Plan had been dreamed up long before the war. In fact, Schlieffen himself died in 1913, the year before the war began—'

" 'That's over seventy years ago!' The protest came from Walter Jason, one of the more impatient of the group. 'Surely you don't have to go so far back?'

" 'I think we do.' (I didn't care for his question, because it reflected my own worries. My knowledge of more recent events was certainly less good than my knowledge of the first half of the century, and my analyses might reflect that. But criticism only made me keener to defend my conclusions.) 'Remember, I had to find a point where a small change could propagate rather than damp out. And 1914 is the absolute best place for a critical point. You see, the Schlieffen Plan worked but it came very close to failure. The idea was, Germany would take France by surprise. The French had prepared for a German attack through Alsace-Lorraine. If the Germans wheeled through Belgium instead they would bypass the French defense lines, and could then go on to take Paris. After that they would be in a position to dictate strong economic and political terms to the rest of Europe. But timing was crucial. The French had lots of military power in 1914, but they must have no time to deploy it. Then the war would be over before they really knew it had started.

" 'That's the way the Germans planned it, and that's the way history books show it. But it came within hours of failing. The advance through Belgium worked like a dream, and the German forces led by General von Kluck were dead on track for Paris. But the overall German commander, General Moltke, was back at German High Command Headquarters, and he wasn't sure what was going on. Finally he received a message as to von Kluck's situation, and he sent back instructions to go ahead and advance on Paris.

" 'Now, suppose he hadn't done that? Von Kluck would have followed the British forces as they retreated, and been led *around* Paris. And the French would have had the time to get their second wind, and mount a better counter-attack. If that had happened, the war would have been changed. The French and British had as many troops as the Germans. Without the surprise factor, an easy German victory would not have occurred. And the German influence across Europe would have weakened enormously.'

"I had started to explain my analysis with a bit of hesitation. But as I got into my stride I found my enthusiasm growing. It was only a theory—but it was *mine*. I very much wanted the group to believe what I was saying.

"They didn't. Not immediately. Simon Fischer himself was the first sceptic. 'Seventy years!' he said. 'Don't you

realize that the energy required to induce coupling is *exponential* in the time? I can tap a megawatt line—but you're asking for a lot more than that.'

" 'I don't think I am.' I turned to Jon. 'Didn't you tell me that the energy needed depended on the mass shift, too? Well, I'm proposing a tiny change there. All I want is a tiny burst of energy, enough to evaporate *one drop* of ink from Moltke's pen, and prevent his signature. It was late at night when he signed, and he was going off to a staff dinner. It was touch and go whether he sent that message to von Kluck at that time. And remember, all I'm looking for is a day's delay.'

"There was a lot of argument and discussion. Simon agreed—reluctantly—that the energy needed to produce the change I was describing would be available in his lab. He could calculate the necessary coordinates and apply the energy thrust. When he agreed, the rest of them fell in line.

"It's odd, but up to that point I had somehow been seeing the whole thing as an interesting and exciting exercise, but not a *real* experience. The cell I had been in at Oxford was more like an offshoot of a debating society. We *talked* a lot about the Homeland, and about the oppressive effects of German influences. But we never *did* anything. I had assumed that the Cambridge group would be the same.

"I was wrong. That same night, the cell voted to act. I was to provide Simon with as much detailed information as I could get on the time and place, and he would fine-tune it from there. Jon and I drove back to Oxford. The next morning I called Simon and told him everything that I could about the Moltke signing. I made copies of eyewitness reports from the General's Chief of Staff, and mailed them off to him at the Cavendish Lab.

"And then? Anticlimax. Nothing happened. For three weeks, life went on as usual. Jon and I studied during the day, and at night we would wonder what was going on in Cambridge. Jon called Barbara and got the same message each time. 'Simon is working on it.' Our trips began to seem unreal, part of an adult fantasy in which the whole cell had been carried away.

"Five days ago, I was sitting in the kitchen of our Oxford lodgings, spooning scrambled eggs from a frying-pan onto two slices of toast. And then I was standing on a crowded street, watching cars of totally unfamiliar and futuristic design sweep past me. The passers-by were strangely dressed. Half of them were negroes. It was terribly noisy. An incredible aeroplane was sweeping by, far overhead. I looked around me at the buildings. It was not Oxford; now, or anytime—"

The next yellow page was crinkled and the handwriting on it was oddly smudged. I riffled through the remaining sheets, and estimated maybe half a dozen were still unread. Paul was watching me closely.

"Well?" he said.

I shook my head. "Classic delusions. The man who can change the world. Notice the way that he makes it clear that he was to blame, but he doesn't have the knowledge necessary to make the machine—the one that would *prove*

he's not making all this up. Any history of mental illness?"

"Nothing. He's an only child, both parents dead. They came here as teenagers in 1937, from Germany, so we have no records of their early childhood. But everything after that was normal."

"Did you check any of the facts in this?" I tapped the manuscript. "About the events of 1914, I mean."

"I took a quick look in the hospital library after I read it this afternoon. The general facts are right—von Kluck could have captured Paris, but Moltke didn't tell him what to do in time, and he swung south of it. If he'd taken Paris, the First World War would have ended in 1914 instead of 1918."

"So it's delusions of grandeur on a big scale. But for him, there would have been no major world war. No bloody battles on the Somme, no trench warfare, no millions dead. And no wonder Lansdorf has a guilt complex, if he blames himself for all of that."

"A *big* guilt complex."

"Well, he *is* Jewish. So he made the war go on for a long time. He's just like the rest of us. Show me a nice Jewish boy who says he feels no guilt."

I was going to finish, "And I'll show you a liar," but Paul was shaking his head and looking serious.

"Not quite like the rest of us. Go on, Mark, finish reading. Lansdorf spells it all out for you, his version of history. In his world, there was a quick end to World War One. Germany won—they took Paris, then retreated voluntarily back to their own border. Naturally, they wrung concessions from the French and British. And that was it."

"So he made the war go on longer, and that cost millions of lives."

"Worse than that. In his world, Germany won. So, no long bloody war. And no Versailles Treaty at the end of it, to 'squeeze Germany until you can hear the pips squeak.' No collapse of the German economy in the Twenties . . . no rise of Hitler . . . no *Second* World War." He sighed. "No Holocaust."

Show me a nice Jewish boy . . .

We looked at each other for a long time. "Let me go and see him," I said at last. "I'll make an appointment and do it first thing tomorrow morning."

But I didn't. During the night Jacob Lansdorf overpowered two orderlies, each twice his size and trained in handling violent patients. Then he threw himself from the seventh floor of St. Elizabeth's Hospital. There was a vague suggestion of mismanagement by the hospital, but since Lansdorf had no surviving relatives the official case ended there.

Curiously, it seemed to end for Paul, too. He had somehow passed all his worries on to me. Now I could not help putting together odd little facts and surmises about Jacob Lansdorf . . .

. . . a strange photograph that he had carried in his wallet.

It showed him with his arm around a girl, standing on the London Embankment. The Houses of Parliament are visible, and look the same as always. But some of the other buildings don't match the London I know—or anything I can find in earlier photographs. And the car next to Lansdorf looks like an antique.

"Futuristic" automobiles, and an

"incredible" airplane in Washington? Certainly. War is a great spur to technology. Without the First World War, or the Second, what would our cars and planes look like today?

. . . *the Moseley-Redpath hypothesis.*

Moseley is in the encyclopedia—killed in action at Gallipoli, in August 1915, at the age of twenty-seven. He was one of the brilliant minds of his generation. And Redpath? Who knows. A whole generation of European youth was wiped out on the battlefields of northern France.

. . . *Lansdorf's odd abilities in martial arts, attested to by the two hospital orderlies whom he had overpowered and knocked unconscious.*

. . . *the strange and primitive nature of his dental fillings.*

I can imagine a man who would go to the trouble of faking a photograph, even though that would be a lot of work. But a man who would drill his own *teeth*, to support his delusion?

And then logic reasserts itself. The hospital orderlies were justifying their own incompetent performance. The dental work had been done by some unqualified dentist in a Third World country. If Jacob Lansdorf and Simon 4ischer *had* changed the past, this present would be Lansdorf's present. His memories would be of this world, and only of this world. There is no way that he could somehow drag in bits and pieces from his alternate existence, photographs and tooth fillings and memories.

Is there?

I think there is not. And many lurking doubts about my own sanity have been eased now. I believe I lack the *certainty* that usually goes with madness.

But I am not sure, even of that; for madness takes many forms.

And so, just perhaps, does history. ■

● In questions of science the authority of a thousand is not worth the humble reasoning of a single individual.

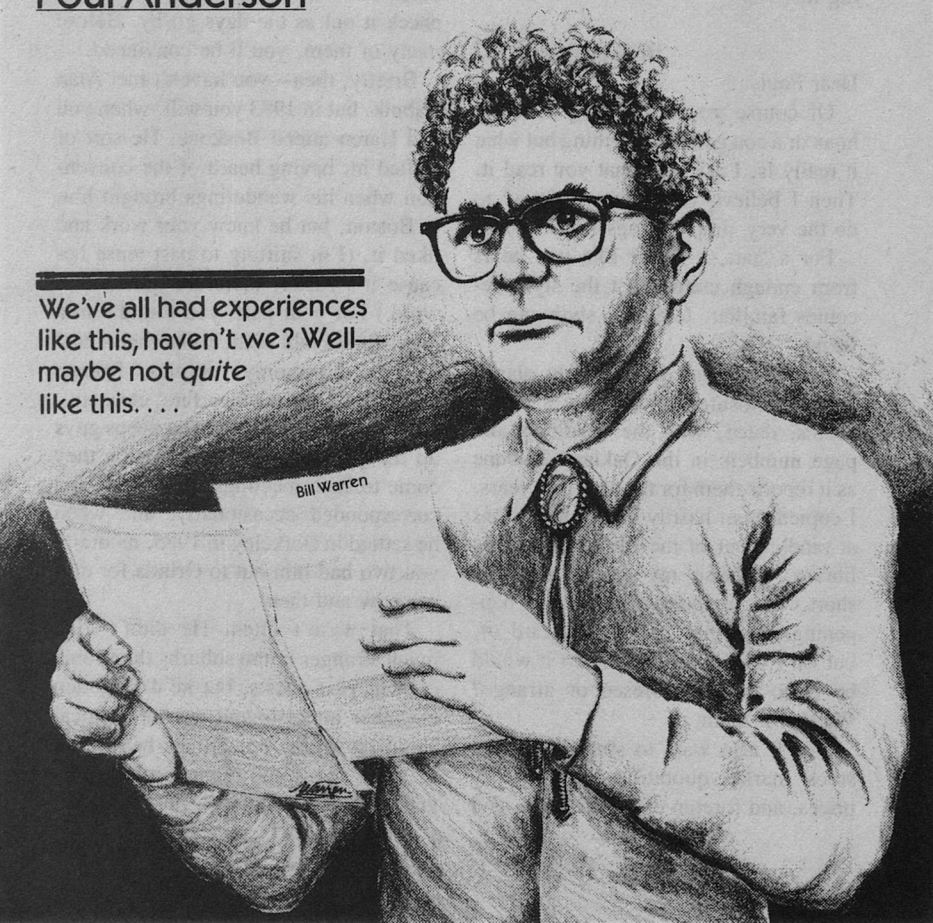
Galileo Galilei
Submitted by Dave Humm

● I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me.

Isaac Newton
Submitted by Dave Humm

LETTER FROM TOMORROW

Poul Anderson



When I saw the envelope in that day's mail, addressed to me with my own return in the corner, for a moment my heart jumped and thudded. Grimness followed. I carried it up the driveway to the house and into the room where I work. There I dumped the rest of the batch—bills, pitches for worthy causes, notices of prizes I had already won, invitations to weekends at resort hotels where I would learn about incredible real estate buys—onto the couch and sat down at my desk with the letter. My hands shook so that I had trouble opening it.

16 September 1987

Dear Poul,

Of course you're thinking this is a hoax or a con game or anything but what it really is. I ask only that you read it. Then I believe you'll be overjoyed to do the very simple things I need done.

For a start, a writer like you hears from enough cranks that the style becomes familiar. Granted, style can be faked.

Why don't you immediately glance at the enclosures? You'll see a list of events, dated, with the headlines and page numbers in the Oakland Tribune as it reports them for the next five years. I copied them hastily and more or less at random out of the file in the public library, because my time is terribly short. Most are quite insignificant, happening to people you never heard of, but isn't that precisely the sort it would be impossible to foresee or arrange? Watch for them.

You'll also want to study the dated stock market quotations, commodity prices, and foreign exchange rates, and compare what the financial pages will have to tell. How well I know that's a section of the paper you never look at! You will, my friend, hereafter you will.

You see, the threadbare fantasy has come true. That "1987" is not a lie or a typo. I really am writing to you from five years in the future.

It might add credibility if I composed this like a short story, full of conversations, descriptions, and characteristic turns of language. But as said, I'm under urgency. Besides, I needn't fear you'll just throw the material in the circular file. Curiosity will make you check it out as the days go by. Before many of them, you'll be convinced.

Briefly, then—you haven't met Alan Rabnik, but in 1983 you will, when you and Karen attend Boskone. He sort of drifted in, having heard of the convention when his wanderings brought him to Boston, but he knew your work and liked it. (I'm shifting to past tense because it's easier, therefore quicker, to write.) For your part, you found him a lot of fun to talk with, about theoretical physics, astronomy, politics, Roman history, the future of warfare, etc., etc., etc., the sort of melange that keeps guys up till dawn and is a main reason they come to such meetings. Afterward you corresponded occasionally, and when he settled in Berkeley in 1985, naturally you two had him out to Orinda for dinner now and then.

That wasn't often. He didn't look much stranger in the suburbs than some of your past guests, but he'd forgotten his other interests and grown fanatical about his work. Sometimes he'd be at it, alone, days and nights on end, forgetting to eat or sleep, till he keeled

over. You can't find him in the phone book; he refuses to have a phone in that ratty little house he rents. Besides, he isn't in California yet, your time. Could be practically anywhere. He graduated summa cum laude in physics, said to hell with it, and went on the road. Eventually an inheritance came that would keep him in expensive equipment and himself in poverty for a few years. He went to Berkeley mainly to be near the University library, but also because nobody there would notice or pester one more unkempt weirdo.

Yes, the solitary, eccentric genius. Have I no more originality than that? I do, and wouldn't touch this cliché except that here life has chosen to use it.

To you he confided his dream, insofar as he could explain to a professional dilettante who's let his tensor calculus rust away to nearly zero. You did know that a black hole isn't forever. Quantum tunneling makes it evaporate, very slowly if it's big, faster and faster as it diminishes, till at last it disappears in a flash of energy. You'd encountered the notion that a lot of miniature black holes may have formed in the Big Bang. Those would long since have vanished, but perhaps the singularities that were at their centers survive, tiny regions where the continuum is so distorted that the laws of nature don't apply. In their neighborhood, *anything* can happen. Indeed, you stole some ideas Frank Tipler had developed about related phenomena and put them into stories.

Alan convinced himself the cosmos is full of naked singularities. His approach was more intuitive than mathematical and his papers were rejected by every professional journal he tried. Basically, he's an experimentalist rather than a theoretician.

Suppose, he reasoned, such a singularity passed near Earth. That is not outrageously improbable if the density of the things is, oh, two or three per cubic astronomical unit. It should have certain effects, optical, electronic, and so forth. They'll be very slight and limited in range, because a singularity is of infinitesimal size, but the right instrumental array, automated to keep watch, will register them. He proposed to develop that apparatus.

No reputable scientist would pay him any heed. Partly that was his own fault, his lack of social skills. His enthusiasm came on as arrogant dogmatism of the worst "true believer" kind. You tolerated it, in spite of your private doubts, and so it was you he called, stammering into a pay phone, when the miracle broke upon him.

He'd built a small, crude, breadboard model of one of the huge devices he wanted, to check out circuits. And . . . it not only detected a naked singularity, it captured one!

Never mind the odds against that. By definition, the improbable has to occur at least once in the lifetime of the universe. Otherwise it would be the impossible. This event may well be the sole collision Earth has ever had or ever will. Left to itself, Alan said, the singularity would have zipped through the atmosphere, perhaps through a slice of ground also, and continued off into space. It would have perturbed what it met, just a little—a sudden brief breeze, a faint tremor underfoot. However, his detector was turned on for a test. Down at the quantum level of reality, the sin-

gularity "sensed" this and interacted. It changed course and came gently to rest at the focus of a hyperbolic mirror in the rig.

What Alan saw and showed you was an eerie, flickering, buzzing spot of light. Spectroscopy indicated that electrons in air molecules around that point were making energy-level jumps that should have been impossible. He'd already thought of more tests. For instance, a metal rod, brought close, developed electrical properties which were flat-out incompatible with each other. It reverted to normal when moved a few inches away.

In the course of the next several days, Alan worked as crazily as you expected, inventing and performing more experiments. His results seemed explicable only by the hypothesis that this was in truth a naked singularity, snared by a fantastically lucky accident. You were almost as excited as he was, and Karen likewise after you told her. She brought coffee and sandwiches in every day and made sure he swallowed them. Meanwhile you collared a physicist friend at the University and, with considerable difficulty—he'd heard about Rabnik—persuaded him to come see for himself.

That was vital. Alan's funds were running out. He could never pay for the development, construction, and operation of the big instruments that must conduct the astronomical search. In fact, he'd be broke long before he had a model that would impress any professional as anything but a Rube Goldberg contraption that did nothing worthwhile. Nor could you finance him, assuming you'd have wanted to. A man of ordinary common sense would have foreseen this, and probably given up before ever starting. It was an additional piece of blind luck that Alan had not an atom of common sense in his makeup. Now, after the demonstration he could offer, the scientific establishment must change its mind. Overnight, he'd have gigabucks to play with: for the uses of trapped singularities outrun imagination.

Unlimited pollution-free energy—an antimissile defense that really works, since it won't let nuclear warheads detonate—in fact, a field that chokes off all unwanted explosions—space colonized, because this is necessary to finding more singularities—instantaneous communication and, eventually, transportation, the stars open to us— You see, within range of the effect, we can make what we will of nature's laws; and one of the factors that drove Alan to his work in the first place was that he'd thought of ways in principle to extend that range in what amounted to a controlled beam.

The physicist came. I'm afraid he will lose considerable respect for you, Poul. You were shocked too when you entered that junkyard-like building with him and saw no light, heard no noise. Some of the meters did feebly twitch as Alan put his test probes through their paces. The physicist—I won't name him, because you may as well enjoy his friendship meanwhile—pointed out how easily this could be due to "bugs in the instrumentation." It was clear that what he meant was deliberate fakery. No, he would not waste his time, which was reasonably valuable, examining the setup or schematics. He would advise his col-

leagues against similar gullibility. Good day, gentlemen.

For a long while, you and Alan stared at each other. Then you employed bad language. He was near tears—

Until in an abrupt burst of excitement he yelled, "I know what's the matter! Why didn't I see it? Quick, go after him— No, no point in that, not till I've got the system adjusted and recalibrated." A groan: "Is there time? Get out of my way!" He flung himself at the lab bench.

For the next week you heard nothing. Worried, Karen went back to feed him. She found the door locked. You wondered if you had been suckered by some transient freak of things, mimicking what Alan—not you—had claimed was a reality.

The phone rang in the small hours. "Come immediately." His voice was hollow with exhaustion, ashiver with tension. "Like, now. This won't hang together long. But it is my proof."

"What is?" I mumbled out of half wakefulness.

"Would you believe time travel?"

We were there inside an hour.

He babbled his explanation the moment we arrived. Had he been better at theory, he might have anticipated the problem, though I don't know as how any scientist has yet suggested this possibility. Not only are black holes mortal, the singularities they leave behind are. The continuum strains to relieve itself of the stresses imposed on it, and gradually succeeds. A singularity decays at an accelerating rate, until nothing remains but a wave-mechanical function which quantum fluctuation soon annuls. That's how Alan put it, and I'm not qualified to correct his phrasing.

The phenomenon doesn't destroy hope of harnessing singularities for human benefit. If Alan is right, a good many drift around in the Solar System, and most are doubtless sufficiently large to last for centuries. His fortune in catching one here on Earth was balanced by the misfortune that it chanced to be near

the end of its life.

Its ever-swifter dwindling had shortened its effective range and enfeebled its powers. He hadn't noticed earlier, because the change fell within the substantial probable errors in his primitive experiments. But below a certain threshold, these no longer worked worth mentioning.

Aware that his time was short, he staked everything on a bravura gamble—and won. His little captive should, for a while, remain capable of at least one truly spectacular deed. He scrambled together a circuit which looked like a jumble of wires, transistors, portable computer, and God knows what else, surrounding the original detector to which it was connected. All I can tell you is that it did what he hoped. Activated, it emitted a beam of force (?) that cast small objects on which it was concentrated backward in time.

The demonstrations he gave us I leave as an exercise for the reader. You can imagine. As an example, a sheet torn from a notebook and bescribbled with some identifying words appeared, out of nowhere, on the floor. An hour afterward, he prepared that sheet, laid it down, aimed the apparatus—not big nor heavy; one man could handle everything—and pressed the main switch. The sheet disappeared . . . except that it stayed in Karen's hand.

He extrapolated the range of projection as being five years at full charge (?). He couldn't increase that, or scale up in any fashion, because irony denied him time. At the rate the singularity was decaying, it would be gone in less than twenty hours. I hadn't a prayer in hell of getting a scientific witness back here that soon.

The answer leaped into our heads. We pounced on it with a shout.

I'm sure you see it for yourself. You're probably holding it. We didn't dare drive out to Orinda, as flimsy as Alan's lashup was. However, while I toiled in the library, Karen obtained uncanceled stamps whose designs went far enough back. After I finish and seal this letter, we three will take it and, very carefully, the projector to a nearby mailbox. We've checked to see when that one will be emptied; no sense in messing up the contents. The minute the carrier has left, I'll post my message. Alan will focus his device on the interior and give it a dying-gasp activation. The box has stood on the same corner for decades. A certain amount of air and this letter will appear in it sometime in 1982.

Once you've convinced yourself it's genuine, your simple duty will be to become filthy rich. Engage a number of brokers, and on the appropriate dates instruct them what to buy or sell. Set aside a few million dollars; the rest is yours to enjoy. Come 1987, you'll give Alan Rabnik a grant. He'll make his big astronomical singularity detector and put it to work. Within a few years, he should have evidence that will absolutely vindicate him. From then on—stars, here we come!

If you want to expedite matters, and incidentally save money, copy this material, then seal the original and deposit it in a bank vault or some such place, where you can establish a certified guarantee that nobody will touch it before today, *my* today. When it's opened, that, as well as the marketplace triumphs

of a man whom finance bores stiff, should make a number of influential people pay attention.

Meanwhile, relax in the knowledge that you, Karen, and the world have at least five certain years of life ahead. I'll even divulge that in 1986 we'll become grandparents. Because, of course, I am you. The cliché has come to pass, and we shall live happily ever after.

You may wonder about the paradox involved. Alan shrugs it off. "So time is mutable," he says. "So what? We've already thrown traditional causality out the window, haven't we?" Still—

If you do as I expect, clearly, I will not have spent the years from 1982 to 1987 as I now remember them. That's quite all right. My memories will be a good deal more interesting and opulent. Just to stay on the safe side, Karen and I will live quietly. I'll even keep on writing. We'll be discreet to the point of secretiveness about our investments. Internal Revenue shouldn't look too closely, when we don't go in for tax shelters. We can afford the extra bite, and take our vacations incognito. Whenever we are with Alan, we'll pretend we have no foreknowledge. We aren't actors, but he's not the sort of chap who'll notice anything odd in our manner.

To be sure, I don't suppose Karen has seen my letter yet. Today, as we wait, she worries more than I do. "I can't help thinking that somehow nature, the universe as it is, will protect itself," she has said.

"Short of smiting us with a thunderbolt on our way to the mailbox, how can it?" I have retorted. "And you know how often this area sees lightning."

The hour is upon us. Over to you. Good hunting!

The signature was "Yourself," in my own hand.

I sat for a spell and stared at the paper in my lap. Suddenly, savagely, I crumpled it and threw it in the wastebasket. My calendar told me it had been delivered on 25 November 1987 by the United States Postal Service. ■

● The ordinary scientific man is strictly a sentimentalist. He is a sentimentalist in this essential sense, that he is soaked and swept away by mere associations.

G. K. Chesterton (1908)


"We have nothing to fear but fear itself. . . ."
But the most dangerous fear may not be your own.

LIGHTNING ROD

W.R. Thompson

Paperwork, Inga Cardiff thought in disgust. The lunar colonists claimed that *they* knew how to keep it under control, but at the moment the cyborg couldn't believe that. She had spent much of the past few days in an effort to become a permanent resident of Port Goddard, but the NASA hierarchy had thrown up an obstacle she might never overcome. In all fairness, Inga admitted, it was a problem which nobody could have anticipated—but that meant there was no procedure for handling it.

The latest bend in the bureaucratic maze had brought her to the office of the colony's Director. "I hear you're having trouble," Bob Dubois said. He gestured for her to take a seat in front of his desk.

"Yes, sir." Sitting down, Inga pushed a sheaf of papers onto his desk. As she did so, she felt an odd, rapid pulsation in her hand and arm. The desk had a computer and intercom built into it, and their electronics interfered with Inga's circuits.

She had learned to live with that problem. Beneath her human-looking plastiskin, her body was packed with electronics and cybernetic units. Her shielding was less than perfect, and she never knew when other circuits were going to interact with her systems.

The Director skimmed through the papers, then gave the astronaut a confused look. "These are medical forms."

"That's the problem," Inga said. "I can't get residency up here until after I've taken—and passed—a standard medical exam."

"You'd think people would know better," Bob told the cyborg, in a tone of resignation. "How long has this been going on?"

"Three days, now. Your staff has been helpful; the trouble is down on Earth. They *know* they can't apply normal medical standards to me, but they insist on doing everything by the book." She smiled wryly. "I've tried to accommodate them. Yesterday I went through the motions of getting a check-up. The doctor didn't mind writing down that I have no pulse and zero respiration, but he couldn't figure out how to take a blood sample from me—at least, not without electrocuting himself—"

Bob laughed helplessly for a moment. "All right," he said at last. "Let's see if we can't find a regulation to cover this." He fed instructions into his desk computer.

Inga got up and looked over his shoulder. A series of regulations marched across the screen. "Nothing," she said, as the last of them rolled past.

"Uh-huh." Bob frowned—and typed in a new regulation. "*Now* you're covered."

"Can you *do* that?" Inga asked, astonished.

"I just did it, didn't I?" He clicked off the computer, took the papers, and scrawled something across them. "The regs are meant to be guidelines, not straitjackets. Within limits, I have some flexibility with them."

"To the point of rewriting them?"

"If necessary, although it's not as simple as I'd like. Every time I make a change, I have to notify the Council, *and* post it on the computer's bulletin board. The Council could veto it, or somebody could raise an objection and call a referendum. It could get voted

down then—but don't worry. Nobody ever objects to common-sense changes like this. You're in."

"Thank you," she said in relief. It was a pleasant shock to have her problem solved so swiftly. "Uh, I'm not complaining, but it seems like an odd way to run a planet."

Bob scratched his chin. "It's not all that odd. For one thing, our philosophy is that the administration is here to serve the colony's needs. More importantly, this colony isn't just a research and mining facility. Here, we're learning how to run deep-space colonies—and how *not* to run them. Part of the experiment requires us to correct our mistakes as quickly as possible.

"Now—" He handed the papers back to her. "I've waived the physical section of the exam, but you'll still have to complete the psychological questionnaires."

"No problem." She tried to sound casual.

"I agree." Bob leaned back in his seat, and Inga found that something in his manner put her at ease. "I had a call from your chief therapist last week. Dr. Richards informed me that some of your responses would fall outside the standard psychological limits."

"Standard limits," Inga repeated in amusement. Both the phrasing and the understatement were typical of her senior therapist. Aside from her brain, Inga's entire body was an artifact; even her spinal column had been replaced, with a neuristor array. Her organic brain had more than adapted to its computer prosthesis; the two systems had fully integrated themselves.

Inevitably, that had made changes in her. Part of Inga's personality now lay in the array's software, and functions which had been performed by neurons now took place in the crystalline lattice. Her intelligence and memory hadn't suffered, but her emotional responses had become toned down.

"I'm not worried about it," Bob said. "If NASA trusts you to fly its spacecraft, then you can't have any problems that matter here. If the Selection Board makes a fuss, I'll just write a new reg." Bob shifted around in his chair. "Speaking of NASA, they're sending us a VIP guest tomorrow. They want you to give him a guided tour of the settlement."

"Me?" Inga blurted. "They're kidding. I make a lousy hostess, and I don't know my way around Port Goddard that well. *I* might end up needing a guide. Why not tag somebody else?"

"Simple. Our guest is Representative John Drayton. The fellow is on the House Appropriations Committee, and NASA wants to keep him happy — especially now. The vote on our five-year budget proposal is coming up very soon." Bob ran a hand through his graying hair. "Inga, there's going to be a hell of a fight over this budget. Lately there's been a lot of complaining about the colony's expense. The complaints are groundless, but we can't ignore them, and we can't afford to lose this vote. The colony's long-term expansion depends on this. Without it, Port Goddard will stagnate."

"So the Congressman gets the red carpet," Inga said. "But will that do any good? The last I heard, Drayton opposed spending money on research and development."

"He may have changed his position. Politicians do that, y'know. At any rate, he informed NASA that he wanted to meet you while he was up here, and they tripped over their feet to please him."

Inga was openly puzzled. "He wants to meet me? Why?"

Bob laughed. "Oh, really! You're the same Inga Cardiff who kept those loony-tune terrorists from destroying Los Angeles. You were some damned heroic, and politicians like being seen around heroes."

Six months earlier, a small group of radicals had stolen a large amount of radioactive wastes, and threatened to poison Los Angeles with them. Inga had been part of the search effort which hunted the terrorists, and she had located them just before they could put their plan into action. It had been a near thing; they almost killed her, but Inga had managed to stop them . . . and kill them in the process.

"I don't know how to explain this, but down on Earth I'm not a hero. I've got a reputation as a killer machine. Somebody must have misunderstood Drayton."

"Nonsense. I've seen a copy of his letter. Now, I know that some cranks have made unkind noises, but that sort always attracts undue attention. If they were anything more than a fringe, would Drayton *want* to be seen with you?" He grinned wickedly. "You can be sure this won't hurt him—and it won't hurt Port Goddard, NASA, or you, if *you* got some publicity. You've kept a low profile lately, haven't you?"

"I've been busy." The excuse sounded lame, even to Inga, but she saw no point in arguing with the man—or in fighting a NASA request. "I've flown four missions in the past six months. That doesn't leave much free time."

"No, I suppose not." He sounded unconvinced. "Well, I suggest you think of this as another mission, and do your best."

Back in her cubicle in the spaceport hotel, Inga had raced through the standardized psych test, checking off answers to hundreds of deceptively simple questions. She didn't feel too worried about the test; its real purpose was to determine if she could endure life in the enclosed, artificial world of Port Goddard. Inga didn't run into trouble until she hit the final question.

Why do you want to become a colonist? Answer on a separate sheet of paper; use as many pages as necessary. Be as specific as possible. All answers must be handwritten in ink. Inga found herself facing a blank sheet of paper, not knowing what to write.

The intercom buzzed. "Cardiff listening," she answered.

"Inga? Janet. Are you busy?" The geologist's voice was somewhat garbled. More damned interference, Inga thought in irritation. When the bionicists had engineered her body, they equipped it to handle the electronic environments of NASA spacecraft—and after that, she thought, they must have assumed that she would never run into any sort of electrical gear.

"Right now I'm looking for an interruption, Janet. What's up?"

"Mac wants to invite you over. He just finished polishing a new composi-

tion, and he can't wait to show it off. Interested?''

''You bet.'' Janet Bedford's husband was a mathematician and a musician, and a creative genius in both fields. ''When does the show begin?''

''Whenever you can come over.''

''Okay, give me five minutes. 'Bye.''

Gladly, Inga dropped a paperweight onto the forms and left her room. By the clock and overhead lights it was late evening. Most of the people she encountered in the passageways were off-duty, out to enjoy the straggling night-life of the lunar settlement. They gave Inga respectful, almost awed looks . . . a thing she found odd.

I'm just not used to it, Inga thought. Over the past six months she had spent much of her between-missions time on Earth. Despite Bob Dubois's opinion, the hostility she felt on Earth was a widespread thing, and it had little to do with isolated extremists.

The Bedfords' apartment was a good deal larger than Inga's hotel cubicle, but it was still too small for a married couple with two growing children and a third on the way. Inga rapped on the hatch—there was nothing subtle about colonial architecture—and waited for somebody to open up.

The latches popped and the door swung in. ''Come on in,'' Janet said.

''Thanks.'' Inga looked around the apartment, sensing an unusual calm. ''Say, where are Lee and Harry?'' As an honorary aunt, Inga felt a vested interest in the younger Bedfords.

''They're at a slumber party in one of the farm tunnels. Peace and quiet at last!''

''And the first thing you do is invite over company. You're getting space-happy.'' They sat down on skeletal, low-gravity chairs.

''Could be, but I'm enjoying it so far. So. How's this world treating you, girl?''

''All right. I've almost been cleared for residency.''

Mac came out of the bedroom. ''Almost? Are you still hung up on the paperwork?''

''Yeah. I've just got to finish the psych exam, but—'' Inga shrugged. ''It's that last question, the one about why you want to migrate. I don't know how to answer it. Moving here wasn't my idea in the first place—''

''Richards,'' Janet stated. Then: ''What's going on? Don't you *want* to live up here?''

''I do. It was Richards's idea for me to move here; he thinks I'm better off away from Earth. He's right, but—I don't know. I don't want to write down that I'm running away.''

''Running?'' Mac asked. ''Running from what?''

''Plenty. It isn't the death threats that—''

Janet started. ''*What* death threats?''

''Most of them are from cranks,'' Inga said. ''But do you know what it's like to pick up a paper and read about the 'killer machine'? People say that I killed those terrorists because I'm not programmed to care about human life. . . . and that if I hadn't interfered, the Counter-Terrorism Office would have captured them right away. It's supposed to be my fault that they almost wasted Los Angeles.''

Janet opened her mouth, closed it,

then opened it again. "That's the opposite of what happened."

"Try telling that to anyone down there. Somehow, those terrorists have become martyrs, and I'm the villain. I can't fight it and I can't ignore it. I can't even figure out what's going on."

"You wouldn't like the answer," Mac said.

"I don't like the question, either," Inga said. "What have you got?"

"The thing is that environmentalism is still a big thing in America," Mac said. He held up a finger before Inga could speak. "It isn't just simpering anti-rationalism, although you can track its roots back to the old ecology movements . . . and the old American distrust of 'eggheads,' from way back when. Modern environmentalism is mainly a product of the Depression of the Nineties—a reaction people had to being out of work and hope, while the economy had a convulsion and the government screwed around with half measures."

"You mean that people sympathize with those terrorists?" Inga asked. "Even though they tried to kill a city?"

"They sympathize with their goals. It's safe to do that, now that the danger is past. You see, 'environmentalism' doesn't just mean going back to nature. Not many people ever took *that* crap seriously. To most folks, it means cleaning up the whole 'environment' of society. It's easy to see the cities as one of the sources of our trouble—we've always made a big deal about good, traditional, rural values. That made it a lot easier for environmentalism to spread into the social mainstream.

"So those terrorists are misguided martyrs. You, now, you're a lightning rod." Seeing the blank look on Inga's face, Mac explained, "A lightning rod is some issue that works up a real emotional storm, something that attracts a lot of wrath. It's a term we used, back when I was in the Golden Circle—"

"You were in that? You?" Inga was taken by surprise—although the bitterness in his words might have tipped her off, she thought.

"Yeah, I used to be a hot-shot revolutionary." A fond smile ghosted across his face. "I surely have changed . . . Anyway, you can imagine how anyone with environmental leanings feels about you. You're the Great Satan, lady, the epitome of modern technological humanity. Ignoring you is like ignoring gravity. You can't help but get hit like a lightning rod."

"Could be. God knows I feel like I've been zapped hard." Inga shook her head. She would have asked for a different answer, something that told her—what? How to change things, turn the world around? Too bad life didn't work that way. "Listen, I didn't mean to turn this into a therapy session. Where's this new song I hear about?"

"It's not just a song," Mac said, in mock indignation. He got up and uncovered the family computer. It was one of the late-generation machines, built in an orbital factory, and far more capable than even the best machines of the twentieth century. Those machines had hit a plateau in the late Eighties, brought on as much by the limits of ground-based manufacturing as by the effects of the Depression. Computer technology was on the rise again, and the new

machines were so sophisticated that they made Inga feel a bit antiquated.

"It's a symphony," Mac said to Inga. "Have you ever played around with the Bach 5.0 software?"

"No. I used to play the flute, but I never was any good at composing music."

"I never knew you played the flute," Janet said, while Mac fussed with the computer.

"I had to give it up," the cyborg said. "You need lungs to play those things." Suddenly aware that she might have embarrassed Janet, she changed the subject. "Say, how long has Mac been playing music on the computer? I never thought those musical softwares were much good."

"You should keep up with the times," Mac chided her. "Bach 5.0 doesn't just let you do nice things with a few melodies. You can do whole compositions with it, orchestrate them and conduct them. Do it right and use a decent sound system, and you can't tell it from a top-line recording. You want some headphones?"

"No, thanks." Unless they were specially wired and shielded, headsets filled her ears with static. As it was, Inga could feel some mild interference from the computer, even though the machine was on the other side of the room.

"I call this *Starflight Overtures*," Mac said, as he loaded a memory cartridge into the computer. "The idea for it came from my flight up here from Earth, of course, but it's really the story of a journey to another star. These days the Solar System seems so small, so familiar—"

Inga, who had been to Mars and Saturn, laughed merrily. "Play it."

"Got to enable the speakers first—okay." Mac backed away from the computer, and sat down next to his wife.

In later years, Inga would recall that her first impressions had nothing to do with what she heard. Instead, she became conscious of the interference from the computer, which smoothed out as the music began—and became pleasant. On reflection, she found that made sense. Much of the interference her neuristors sensed was not random noise, but electronic data transmitted at high speeds. Now, however, the computer was reproducing music at a fairly low speed . . . and musical patterns are inherently pleasant.

Inga found herself so intent on enjoying the digital interference that it was a long moment before she listened to the music itself. She had no doubt that the first movement was a description of the ascent to orbit. Inga recognized the tension of a countdown in the opening moments, changing to the sudden blare of a Valkyrie-ride into orbit. The fluttering of engine exhausts, the jolting separation of booster stages—Mac had found musical idioms for the entire launch experience, right up to the shift to weightless flight as engines burned out.

The composition's second movement employed three themes, each easily recognizable, yet unrelated to any clichés. One theme suggested the pioneering days of the American frontier, while another hinted at clipper ships sailing for distant, exotic ports. As for the third theme—there was something elusive, a tiny spacecraft, gliding through the

space between suns. The three themes wove together with a mathematical grace, linking the dreams of spaceflight with earlier frontiers.

The final movement, with its exotic rhythms, grew with a compelling intensity. To Inga, it was as if she were entering an orbit around an alien world . . . and unknown craft were coming up to greet her, bearing messages that could not be defined.

The music, and interference, ended. To her undying surprise, Inga found herself sitting close to the computer. Quite unconsciously, she had moved closer while it played the symphony, drawn by the electronic sensations like a moth to a light.

It had surprised Inga to learn that Mac was a one-time revolutionary, but it overwhelmed her to know that he had had *this* in his soul. She heard herself speaking inadequate words of praise for the symphony.

"I knew you'd like it," Mac said. "I'm going to put it on the main computernet in a few days, but I thought I'd share it with some friends first."

Inga felt flattered. "Thank you," she managed to say. "This—I haven't heard anything like this since the second time I listened to Beethoven's Ninth Symphony."

"The *second* time?" Janet asked.

Inga nodded absently, still lost in the afterglow of the music. "The first time around, I didn't understand it well enough to appreciate it. It was just pretty noises. Later on, after I'd learned something about music, I heard it again and it bowled me over."

Drayton, Inga thought suddenly. He would have to hear this music when he arrived. She couldn't think of a better welcome.

It wasn't the most formal welcome ever given to an important visitor, Inga observed, but the colony lacked the resources for any ruffles and flourishes. Drayton left the lander and entered the transit chamber through an extensible airlock, just like any new colonist. The only concession to propriety came when the lander's pilot toted the Congressman's suitcase for him. Inga hoped that Drayton appreciated the honor; pilots stood high on Port Goddard's social structure.

Bob Dubois was there to greet Drayton with something Inga decided was a stock speech. While he shook hands and swapped words with Drayton, Inga stood aside and studied the man. Like the Director, Drayton was a handsome, engaging fellow, somewhere in middle age, but he struck Inga as more aggressive than the affable Director. That made sense to her; Bob had found his level in life, but a politician like Drayton would possess a large stock of ambition.

". . . and this is Inga Cardiff," Bob was saying. He brought her forward: a plain, unprepossessing woman in a daysuit. "She's just joined us as a permanent resident—well, as permanent as any pilot can get. She'll show you around our little world."

In an instant, the Congressman's expression had turned distant, almost hostile. Inga had never put any credence in tales of psychic experiences, but now she felt something pass between her and Drayton. . . . something akin to a declaration of war. Knowing perfectly well what would happen, she stuck out her

hand. "Pleased to meet you, Mr. Drayton."

"Colonel," he acknowledged coolly, ignoring her hand. Inga held it out a moment longer, then shoved it into a coat pocket. The moment had given her a malicious sensation of pleasure.

Bob barely kept his flustered expression under control. "Mr. Drayton, uh, after your trip I'm sure you'd like a rest. Our hotel doesn't rate any stars, but it does have its points. This way, please."

Drayton had been given a brand-new suite: three standard cabins, their dividing walls knocked out and the scars hastily covered over. While Drayton settled into his quarters, Bob spoke with Inga in the corridor. "Lady, you look like you're spoiling for a fight."

"Maybe I am." Months of frustration had built inside her; now Drayton offered her a chance to release the pressure. I'm not the only lightning rod in town, she thought. "Bob, you saw how he reacted to me. I'd like an explanation from him."

"So would I, but—" He let out a sigh, and Inga suddenly saw the dilemma he faced. Whatever he thought of Drayton's churlishness, he still needed the man's support to maintain his colony. It was that damnably simple—and Inga realized that she shared the dilemma.

"Okay," Inga said, without reluctance. "I can take a lot of crap, in a good cause. But, Bob, he isn't here on a friendly little junket."

"It shows. I wonder what he has in mind?" His frown was a fierce thing to behold. "I have some contacts in Washington. They might know something. Until then, are you sure you can handle him?"

"Don't worry, Daddy, I'm a big girl now." Inga glanced at her watch. Janet would be at work in the geology lab now. "If you'll excuse me, I have to make a call."

"Okay. Let me know if you need anything." Bob went away.

Inga returned to her cubicle, and tapped Janet's office number into the intercom. "Geo department. Bedford listening."

"Janet, Inga. Can I ask a favor?"

"Sure, but if it's Mac you're after, I'll want him back later."

Inga laughed. "Some other time. We've got a guest, Representative Drayton, visiting the Port—"

"I thought that was scheduled for next week?"

"You should pay more attention to the news. Anyway, I've been assigned as the fellow's tour guide. I thought he might like to meet a typical family—"

"Say around nineteen hours, tonight?"

"Mind if I finish talking first? There's something odd about Drayton. Unfriendly. I don't think he has a high opinion of Port Goddard." Understatement and euphemism, Inga thought. Now I'm beginning to sound like Dr. Richards.

"That's even better. How often does Mac get the chance to argue things with a genuine Congressman? I have to go now. See you tonight." She broke the connection.

Drayton emerged from his room late in the afternoon, appearing rested but no friendlier than before. "Well, Colo-

nel, I trust you have an interesting day in store for me?''

''Yes, certainly.'' His words were more of a challenge than anything else, Inga felt. She thought about asking him to use her name instead of her Aerospace Force rank, but decided against that. She didn't want to get on a first-name basis with the man.

Inga led Drayton to the farming tunnels. With the exception of the spaceport hangar, Port Goddard was a compact world of corridors and compartments, and most newcomers found it intimidating. While no one would ever mistake the agricultural tunnels for Earth's outdoors, they had a soothing lushness.

''Interesting,'' Drayton said clinically, as they entered a tunnel. ''I was under the impression that you people used hydroponics.''

''Hydroponics are a dead end,'' Inga said. ''It takes a lot of work to keep the nutrient fluids mixed properly, and if you have a leak somewhere, you'll lose a lot of valuable chemicals. You could lose a whole crop, too, if anything happens to the machinery.

''On the other hand—'' Inga knelt, and poked her fingers into the dark loam that covered the broad tunnel's floor. ''Plants evolved to grow in dirt, and dirt is a lot easier and cheaper to handle than hydroponics. Why not take advantage of that? Besides, a garden is much nicer than a sterile food factory, wouldn't you say so?''

''Yes, I can see how much you colonists enjoy nature.'' His ironic tone was almost overdone. ''But dirt or hydroponics, these farms represent an enormous capital investment. I understand that there's almost no hydrogen, nitrogen, or carbon on the Moon, so all of the organic material here had to be hauled up from Earth.''

''Of course.'' Inga got up and slapped her hands together, knocking the dirt from the teflex skin. ''We brought up some loads of fertilizers, and mixed it with lunar dirt.''

Drayton nodded. ''A rather expensive effort, to feed twelve thousand people. By the way, I'm curious about that figure. You'll excuse me if I drone on a bit? You need three thousand people, here and in orbit, to run the mining operations. Another three thousand or so are engaged in various experiments, which may or may not pay off one of these days. Two hundred people take care of the farming, maintenance, administration, and other support needs of the colony. That leaves some five or six thousand people who, frankly, contribute nothing to the colony's mining or research missions. Financial consultants, pediatricians, hair stylists, appliance technicians, school teachers—in other words, frills. Why should they live on the Moon?''

''You're asking why we should have a permanent colony, instead of a base for transients.'' Inga didn't even hesitate to tackle the question. She *knew* that she had the answers to it. ''One good reason is economics. It's cheaper to do everything up here—to make the Port self-sufficient—than it is to have an austere base that depends on Earth for everything. Can you imagine running back to Earth every time you need a haircut?

''But there's a better answer, and it doesn't depend on economics.'' Last night, instead of sleeping, she had read

the notes Bob had given her. After that, Inga had gotten on the computer net and done some research. Now it would pay off. "You see, this colony is a *community*, a place where people spend their lives. It's a unique experiment in social science—"

"Ah, the Thoughts of Chairman Dubois," Drayton interrupted. "Don't tell me that you colonists can give the psychologists and sociologists new insights into their fields. I won't buy that. This place—" He looked around, at the curved bulkheads and overhead lights "—is too alien to be relevant to any society in the world. Your *average* colonist is a genius, has two college degrees, and uses a computer two-point-three hours per day. This colony is top-heavy with engineers and scientists, and—but why drag it out? You can't draw any conclusions about *normal* societies from this place."

"You can," Inga protested. "It's a matter of social parallax. The differences are what make the Port so instructive. When you look at something different, it gives you whole new perspectives on familiar things. That's how we've learned so much about Earth's weather—by going into space and studying alien climates."

Drayton grunted, and kicked at a lunar stone poking through the dirt. "I hate that kind of analogy. People aren't inanimate objects to be studied like lab rats."

"True. Speaking of people, would you like to meet some friends of mine? The Bedfords have—"

"I'd rather have dinner first."

"It started out as a mess hall," Inga said, as she and Drayton entered the cafeteria. "But that was awfully impersonal, and most people didn't like that. It spoiled their appetites."

"It's still impersonal," Drayton said, as they sat down at a simulated wood table. "Oh, granted, the decor is cheerful enough—somebody calculated the human factors quite nicely—but *this?*" He tapped a finger on the table's mini-terminal. "What's so personal about a robotic restaurant? Don't you colonists like the human touch?"

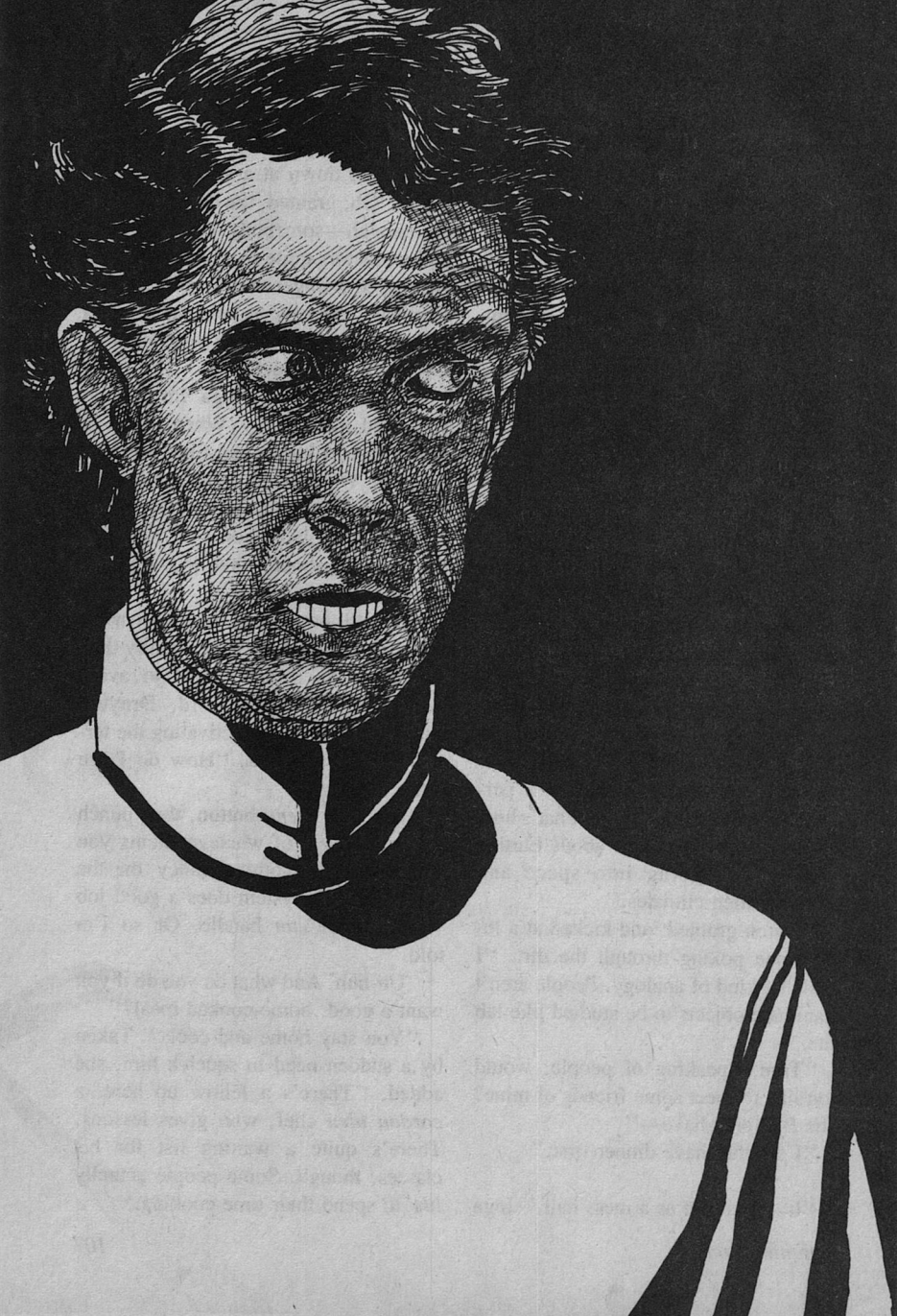
"We do, but—" Inga frowned at some old memories. "When I was in high school I had a part-time job as a waitress. Waiting tables is hard work—and as 'human contacts' go, it stinks. It's the sort of work you *want* robots to do. Nobody should have to waste her life in a dead-end job."

"It's still better than unemployment. Any sort of work has more dignity than welfare." As if determined to avoid giving Inga the last word, Drayton changed the subject. Activating the terminal pad, he asked, "How do I use this?"

"Press the *menu* button, then punch in the numbers of whatever items you want. There's nothing fancy on the menu, but the system does a good job with what it *can* handle. Or so I'm told."

"Uh-huh. And what do you do if you want a good, home-cooked meal?"

"You stay home and cook." Taken by a sudden need to squelch him, she added, "There's a fellow up here, a *cordon bleu* chef, who gives lessons. There's quite a waiting list for his classes, though. Some people actually *like* to spend their time cooking."



Drayton snorted, and poked a few buttons. "How do I pay?"

"My treat." Inga pushed her ID card into a slot. To her surprise, a message replaced the menu: *Ms. Cardiff, please call Director Dubois at his office.*

That made Drayton laugh. "This system doesn't do much for your privacy, does it?"

"It has its drawbacks." On the other hand, Inga reflected, it gave her a convenient escape from the worst blind date of her life. She excused herself, and hunted down a corridor intercom. "Dubois listening," a voice answered.

"Bob, Inga. What's up?"

"I've got some hot data on our guest. First, did I mention how eager he was to meet you?"

"Yes, although he hides it well."

"I'll say. After the Los Angeles incident, you received a promotion and a couple of medals, right? But did you know that several people tried to pressure the Aerospace Force into scrubbing the honors? Well, Drayton was one of those people."

"Really?" That was hard to believe. "Any idea why?"

"My sources couldn't say, and I can't figure it out. Drayton is highly pro-defense, I'm told. But there's more." She heard papers rustling over the intercom. "I got an, ah, *acquaintance* to hack into his secretarial computer. Drayton has a complete copy of your psychological record, and he shouldn't have *that*."

"No," Inga agreed archly. "It's a terrible invasion of privacy."

She heard Bob laugh at himself. "*Touché*. The thing that I find interesting is that his database contains almost a thousand articles on Port Goddard—scholarly works, mainly. No lightweight junk. Our boy has done his homework."

"So he knows a lot about the way things work up here. Interesting." Drayton seemed a study in contradictions, Inga thought. He was hostile to both her and the colony, yet interested enough in both to come to the Moon. Shaking her head, Inga said goodbye to Bob and returned to Drayton.

He gave her a speculative look as she sat down. "Would you mind answering a personal question?" he asked.

"No." Several years of therapy had inured her to such questions—and she was curious to hear what he would ask.

"Does it bother you to watch people eat? I'd think it would remind you of everything you've lost."

Inga shrugged. "Sometimes it makes me a bit nostalgic, but it doesn't bother me. Anyway, being a cyborg has its compensations."

"Such as?"

"Take music." She leaned forward, resting her forearms on the cafeteria table. "My neuristors are sensitive to electronic interference, and sometimes that can be a problem. But last night I listened to some music—a computer-synthesized symphony, and—" Suddenly she couldn't find the right words. "It was—I mean, I could *feel* it, like having a new sense. The music was *solid*, it had dimensions, textures—" She cut herself off. "Sorry. Maybe there's a way to describe it, but I can't do it." She had tried to describe it to Mac and Janet, but even with their determined assistance her descriptions had fallen flat.

Drayton seemed taken aback by her

flight into esthetics. It must have been the last thing he expected, Inga thought; no doubt he had expected her to rhapsodize on other, more prosaic "advantages."

Now he was shaking his head. "You mentioned visiting your friends."

"There's no rush. You can finish eating—"

"Forget this." He pushed the tray aside. "It *tastes* computerized. I may as well see your friends now."

I love enthusiasm, Inga thought. "Let's go, then."

Drayton followed her into the corridor, moving cautiously in the low gravity. "I'm surprised at how tiny this place is. It's hard to believe that you have twelve thousand people crowded into here."

Inga chuckled sourly. "Crowded? I grew up in Queens. I can tell you all about crowded, and this isn't it." She went on, "The Port has sixteen levels right now, and a radius of two hundred meters. It's an arcology, a city-machine, designed to accommodate its inhabitants. A lot of urban planners have taken an interest in the way we do things up here."

"So I understand." Inga thought she heard sour disapproval in his voice, but it was hard to tell. Like most successful politicians, the congressman was a skilled actor. He revealed and hid only what he wished people to see or not see.

"I'd like to know something," Inga said, as they drifted down a stairwell. "After that Los Angeles thing, I got a promotion and a pair of medals. Why do you think I didn't deserve them?"

His face twisted with contempt. "The whole idea of honoring a machine is ludicrous—especially giving you the Purple Heart."

"I got shot."

"Tanks and planes get shot up, but we don't give them medals."

That isn't the point, Inga thought. He had to have some other reason for not wanting to see her honored . . . and nobody would have given a mere machine that hot look of contempt. "I suppose you think I enjoyed killing those terrorists."

"*Colonel,* I don't think you felt anything at all."

"I did." Logically, she had no cause to feel troubled by events. The terrorists had tried to poison a city, and they had almost killed her. She had stopped them, and defended herself, all in the line of duty . . . and the sight of three cooling, newly-dead bodies still haunted her. No matter how much of her personality was wrapped up in electronics, she wasn't that far removed from humanity.

And that's all in my psych record, she knew. Drayton couldn't have missed it—but he could choose to ignore it.

Drayton behaved cordially enough when Inga introduced him to the Bedfords. The banalities of introduction passed without incident; Drayton learned that Janet was a geologist and Mac a mathematician, and that both of their children had been born on the Moon.

"You're missing one," Inga said, looking around the room where they sat. "Where's Harry?"

"He has his reading lesson today," Janet said.

"At seven o'clock?" Drayton asked. "Isn't that pretty late for school?"

"It's not a classroom thing," Mac

explained. "It's a mixture of hypnotherapy, biofeedback, and cybernetics. A computer handles the lesson. It takes most of the day, though."

"I see," Drayton said.

"It's a lot easier than the old-fashioned way," Inga said. "The kids don't have so much hassle learning the basics—" She stopped. Drayton's tone had provoked her to defensiveness—a feeling she fought down. He couldn't cause any trouble here, and Inga wanted him to learn about colonial life. He couldn't do that without asking questions. "Lee, you learned to read that way, didn't you?" she asked the eight year old.

"Yeah. A few hours in front of a screen isn't hard. Dad says it took him months to learn reading, and he didn't get to do it until he was *six*."

"How old is, uh, Harry?" Drayton asked Janet.

"He just turned five."

"Isn't that a little young to learn how to read?"

"Not for the Terror," Janet said.

"Maybe he'll damp down now," Lee put in. "Can't use the computers unless you know how to read, y'know. Say, mister, how long you going to stay here?"

"Just a few days," Drayton said. "I can't afford to stay away from Washington much longer. Besides, I like to get back to Wisconsin whenever I can. It's too beautiful to miss, this time of year. You might like to see it some day."

"I'd rather go to Mars first," Lee said.

"What's on Mars?" Drayton asked.

"Who knows?" the youngster said. "Used to be there was nothing *here*. We only made one trip to Mars. We oughtta go back and see what we can find."

Mac was grinning. "That's my boy. He's been like that ever since you told him about the Mars flight, Inga."

Drayton glanced pointedly at Inga. On the way back from Mars, her expedition had been caught in a massive solar flare. She was the sole survivor, thanks to Richards and his bionics experiment. "Exploring space is dangerous, isn't it?" he asked Lee.

"Uh-huh. So what? Dr. Trang told me that John Glenn had to quit space because he fell down and hurt himself. In his own home, too."

Drayton shifted around in his chair. "Who's this Dr. Trang?"

"Nonong Trang runs the school system," Mac said.

"Ah." Drayton turned his attention back to Lee. "You still should visit Earth some day. You can't imagine what you're missing."

"Gravity," Lee said. "I've ridden the hospital's centrifuge. Gravity sucks."

"Lee—" Janet said chidingly.

"I want to go places no one's ever been. Dr. Trang says that's what it's all about here. You don't get anywhere if you never take chances. Right, Inga?"

It dawned on Inga that Lee had a bad case of hero-worship. That made her responsible for extracting the Bedfords from an embarrassing situation. "Earth would be a new experience for you, Lee. There's no telling what you'd run into down there."

"I guess so," he conceded. Lee graced Drayton with a bored look, then turned to his mother. "Can I go over

to Tommy White's place? He just got new plug-in for his Digidyne."

"Okay, but take your pill first," Janet ordered.

"He appears healthy enough," Drayton said, after Lee had vanished through the door. "May I ask what the pill was for?"

"Growth inhibitors," Janet explained. "Youngsters grow too fast in low gravity. That raises all sorts of health problems, so they need something to regulate their growth."

"Gravity," Drayton said seriously. "I've always understood that there aren't any serious problems in adapting to space. But this?"

"There aren't any real problems," Mac said. His tone was relaxed, but Inga sensed an underlying tension in the man, something that couldn't be explained by the way Drayton had queried his child. "We've yet to run into anything that can stop us cold."

"No doubt," Drayton said. "Meaning no criticism, but you handle this particular problem by medicating your children. How can you know that these growth-inhibitors don't have long-term side-effects—ones no one will ever manage to fix?"

"We don't know," Mac admitted. "We're gambling with their futures, even if the odds are good. Still, you do that every time you bring a child into the world. Life's never been safe."

"It's been safer," Drayton maintained. "And better. When you get down to it, this colony is just a large building, isn't it? It doesn't have as much variety as a typical inner city."

"It's better than the pesthole I grew up in," Mac said. "There's no crime, no drugs, and no Soviet missiles pointed at us. My kids don't have to worry about whom not to trust, either."

The vehemence in Mac's voice astonished Inga. There wasn't any chance that Drayton would ever become a supporter of the colony, she knew, but a full-throttle argument could turn him into a formidable enemy. Inga decided to change the subject to something safe. "Mac, could you play that composition? I'd love to hear it again."

"Composition?" Drayton asked. "What's this?"

"Music. It's called *Starflight Overtures*." Mac walked over to the computer. "It's, an ah, a local work." He showed Inga and Janet a sly smile, as if to say he wanted the chance to hear Drayton's unprejudiced reaction to his music.

"With a name like that, it's got to be local. I suppose it's one of those computer-generated things?"

"Computer *synthesized*," Mac corrected him. "The computer can duplicate instrumental sounds, but the composer has to set the melodies and arrangements, and conduct the work—but this is a recording, of course." He powered up the sound system, and the speakers chittered with interference. "Uh, Inga?"

"Sorry." With a sheepish smile, she moved her chair away from the machine. Important social tip, she thought: never sit too close to your host's electronics. Some day, she would have to write an etiquette book for cyborgs. . . .

Once again Inga lost herself in the sybaritic experience of feeling and hearing the music. Only part of her pleasure came from the novelty of sensing music

through her neuristors. The music itself was a delight, with each passage carefully crafted to evoke images of space travel and alien worlds. Even if she hadn't known what lay behind the notes, the music alone had an undeniable, alluring beauty.

When it was over, Inga looked at Drayton, expecting to see appreciation . . . not scorn, not by any means. "What's wrong?"

"Everything! It's propaganda, not art. Workmanlike, calculated propaganda."

Mac almost choked. "What's this?"

"I don't need a college degree in music to see the message. The launch from the Cape, the rendezvous with Columbus station, translunar flight, landing—that piece ticks them off like old clockwork. The brave new world, the final frontier. That's somebody's idea of this place, isn't it?"

"It is," Mac asserted. "It's a celebration—"

"—reduced to bits and beeps in a computer. That's no way to make music for human ears."

"We don't have an orchestra up here," Mac said. "Not yet, at least. Until then, this'll do. It's an instrument, and it's just as artificial as a violin or trumpet." Enthusiasm jockeyed with his dislike for Drayton. "*This* particular instrument lets you compose and conduct. Do you know how expensive a real orchestra is? How long it takes to learn how to conduct one? To get an orchestral piece into production? The costs are making classical-style music moribund, but if everyone who had any musical talent had access to equipment like this—"

Drayton laughed harshly. "My friend, not one man in a million wants to compose. There isn't that much talent on Earth."

"There're eight billion people down Earthside," Mac said. "One in a million makes eight thousand potential composers. That's a hundred times more than there are now. Why shouldn't they get the same chance I've got?"

"To make music?"

"Or do mathematics, or give their families a good life, or whatever they please. I've got it made, Congressman. Why shouldn't everyone else share that?"

"What you're asking," Drayton said, his voice testy, "Is why they all can't have computers, and robots to do their dirty work, and cushy homes where they can enjoy their college educations. Have you got any idea of how impossible that is? It'd devour enormous amounts of resources, demand enormous industrial expansion, education, communications—hell's bells, man, you're talking about turning the world upside down!"

"Why not?" Mac asked. "All the resources you'd need are in space. We have robot factories and other tools. If you need exponential growth to give everyone a decent standard of living, we can supply it."

And Mac says he's changed, Inga thought fondly. He might have given up radical politics . . . but he was still a revolutionary at heart.

"A pipe dream," Drayton sneered. "The start-up costs would bankrupt the world several times over. Doesn't that scare you?"

"The expenses aren't that high. Come on, what's scaring you?"

"Your ignorance. You colonists don't understand economics—especially when you're spending other people's money. You have no sense of proportion." He gestured at Inga. "Know how much one cyborg costs? As much as a dozen schools, or decent health-care facilities for a good-sized town—"

"Or a jet fighter, or a nuclear rocket. Where's *your* sense of proportion? How can you spend so much on weapons?"

I should stop this, Inga thought. The argument had blossomed into the incident that Bob Dubois had feared, and that Drayton plainly wanted. Yet she was unable to intervene. Inga felt excited by the argument, as if she had taken a seat at a champion prizefight.

"It costs a lot to defend our nation," Drayton said.

"It costs even more to make a nation worth defending."

Drayton gave a barking laugh. "You understand nothing about that. Freedom, justice, dignity—you people are naive enough to hand it all over to your machines—"

"What gives you *that* idea?" Janet interrupted.

"Your voting system. Tell me, what happens when some hacker rigs one of your elections?"

Mac shook his head angrily. "The same thing that happens when any other election is fixed. No democracy is foolproof."

"Especially not when it has literacy tests," Drayton said.

Inga spoke up. "You mean the qualifying test. That isn't the same."

"Call it what you like," Drayton snapped. "Your system won't let anyone vote until they prove they understand the issues. *But*—" He held up a finger, while anger flared in his dark eyes "—who decides when a man understands the issues . . . especially when he doesn't 'understand' them like you understand them?"

Mac forced patience into his voice. "All we ask is that a voter answer a few basic, objective questions, with yes-and-no answers—"

"That can change. Overnight. You should do away with this test. It's unfair."

"Really? Anyone who can't answer the questions we use doesn't *deserve* to vote. Damn it, man, why should an election be decided by anyone who's too lazy to learn what's going on? Or who *can't* learn, or who insists on following his gut feelings?"

"It isn't always that easy to get to the truth," Drayton said.

Mac hooked a thumb at his computer. "That baby costs as much as an average 3V set. It has a small library loaded into its permanent memory, and it's plugged into a network that gets news from all over—"

"—a computer network. It's just waiting for some hacker, or Hitler, to subvert it. What happens when somebody uses it to censor the truth, or to rearrange the facts in your library, or to spread lies? The potential for abuse is horrendous."

"The potential, yes." Both men had remained seated, but Mac had a death-grip on his chair's armrest. For his part, Drayton glowed with the ardor of a crusader. "But we try, Congressman, we try our best. The people up here want our system to work."

"And you're welcome to it." Dray-

ton stood up. "Some day, you'll find out that someone has taken over your hyperefficient system—if it doesn't take control of things by itself. Thank God I'll never see this horror in *my* world." He turned for the door and left.

Mac stared at the door for a long moment. "It's guys like him that made me quit the Golden Circle," he said presently.

"How's that?" Janet asked. "Drayton was never a radical or anything. I always heard he was strictly middle-of-the-road."

"He is," Mac said. "He'd never do anything that might upset his position, but that's not what I meant. Did you ever wonder why the Golden Circle never joined any of the environmentalist coalitions, like the Verdants?"

"I suppose you didn't want to sell out, compromise your ideals," Inga said. She felt distracted. In an odd way, the argument had come as a relief. Now that Drayton had erupted in full hostility, she no longer had to worry about the roof falling on her.

Mac was shaking his head. "That's what we always claimed, but there's a world of difference between selling out and making compromises to get things done. You see, all of us *knew* we had the right answers to the world's problems, so why should we want to cooperate with people who were all wrong? We thought they'd just undo everything we accomplished. So we rioted and planted bombs, while the Verdants got things done. We made ourselves irrelevant, because we couldn't admit other people might know things we didn't. Drayton has the same arrogance I had back then."

"Drayton's making himself irrelevant, isn't he?" Janet asked. "He's keeping himself in one tiny bit of reality. No wonder you could argue rings around him."

Inga saw some of Drayton's logic then. "Drayton wasn't arguing," she said. "He doesn't care what *we* think. He came up here for something else."

Janet looked surprised. "He sounded like he was arguing. If he wasn't, what *was* he doing?"

"Collecting information." Inga got up, feeling alarmed. She didn't have the full picture yet—but when she got it, she feared it would place Drayton as an unimagineable threat to the colony. "I'd better go after him."

Port Goddard had sixteen levels, and its structure was intricate. Newcomers often needed weeks to learn their way around. After leaving the apartment without his guide, Drayton might have gotten hopelessly lost.

He had done no such thing. He must have known exactly where he was going, Inga thought. She found him in his hotel suite, reclining on his cot. "You couldn't have meant what you were saying," she said, closing the door behind her.

"No?" Drayton rose to his feet. "Why not?"

"Because you're too intelligent to believe it—"

"I do believe it," he said flatly. "Every word of it. These colonists are washouts as human beings. This colony has been a parasite on Earth for too long. Space itself is pretty much a boondoggle."

"You know that's wrong," Inga

said. "The asteroid mines have taken care of our resource shortages—not to mention the danger of a war over resources. The research hospital has developed techniques and drugs that've saved millions of lives. There've been experiments in weather control. The orbital factories have revitalized—"

Drayton chuckled paternally, and for a moment Inga thought he was going to pat her on the head. "You *would* take that approach. Colonel, quit fooling yourself. For all of NASA's gosh-wow toys and stunts, space has never given America anything of value."

"Is that a fact?" Inga could feel her mind working like a computer, processing data: Drayton is a politician. Give him facts which matter to a politician. Such facts are as follows: "Communications satellites come to mind—comsats, and hand-held, portable TV cameras, which were developed for the Apollo program. That combination of toys lets you receive news from anywhere on Earth. If you know your history—if you remember from when we were *kids*—you know what effect those *toys* had on the war in Viet Nam. Or that mess in Central America, or the 1986 revolts in Haiti and the Philippines. The news about what happened there influenced public opinion, and that influenced our government's foreign policy, and—"

"Romantic nonsense," Drayton snarled. The look on his face told Inga that she had touched a nerve. . . . a nerve of *fear*, something so unexpected she almost thought she had imagined it. "Comsats and TV cameras can't have any connection with world events."

Inga no longer had dreams, but she could remember what it was like to have nightmares. . . . horrors where nothing worked, nothing made sense, and everything she said went unheard. "The facts are all there, in the history books. You can look them up." She gestured at the suite's terminal. "Things might have happened without space, but they didn't. They wouldn't have happened, either, if a lot of people hadn't worked to *make* them happen. D'you think it's a coincidence that space has done so much good for the world?"

"A fortunate coincidence, at most. Your noble space-pioneers have been working for their own good. That's obvious." He eyed her, and added, "Or perhaps it isn't, to you. Tell me, Colonel, have you ever wondered why the colonists admire *you?*" There was the whipcrack of insult in his final word.

"I think I know why." She was determined to hang on, despite any twists and turns Drayton made in the argument.

"No, you don't know. You think it's because you're a hero. But what these colonists see in you, what really excites them about you, is the fact that you're a brain-damaged, emotional cripple with a mind that's part computer. You don't always respond like a human being, and what emotions you have are muted and watered down. I think you have to *decide* when to love and hate."

"That's true, but my friends like me in spite of that—"

"They like you because of that," Drayton asserted. "The colonists want to become machines! How else could anyone come up with an idea as twisted as turning people into cyborgs?"

"They didn't initiate the bionics project up here," Inga said.

"They support it," Drayton countered. "They've lobbied to have more cyborgs made—a whole series of Iron Maidens. To them, and everyone else for that matter, you're the perfect symbol of life in this city-machine—a kind of cybernetic apotheosis. Their fantasy is to become as cool and rational as you." Drayton looked at the flat metal bulkheads surrounding him, and shivered. "God help you people, the only way you can survive in space is by giving up the things that make you human. You've done that, Colonel, and your friends are going your route."

At last, Inga felt herself becoming angry. She squelched it, knowing it would get in the way here. "Congressman, what gives you the right to decide that my friends aren't human?"

He snorted. "Your friends, such as they are, should have kicked me out of their home. I strained myself out of shape to provoke *one* human response from them. But instead of defending you, your 'friends' engaged in a nice, didactical argument with me."

"They were deferring to your position," Inga said, "And they were showing respect for your opinions." Inga felt a sudden growth in her respect for Janet and Mac. Inga had no trouble in controlling her emotions . . . but the Bedfords, she thought, must have had to work hard to restrain themselves, to meet Drayton's behavior with reason. "You see, that's one of the things they've learned up here. You've got to hear out people's opinions, no matter how much you dislike them. That's the only way to learn anything—"

"Ah, yes," Drayton sneered. "The other fellow just might know something that saves your life. You can't let sentiment get in the way of survival."

"It's more than that," Inga said. "People up here value different viewpoints. They enjoy hearing them. They treat thought and debate like artforms—"

Drayton's smile was as sharp and dangerous as a knife. "Enjoy something that's anti-emotional? You have a deft hand with incongruities. Colonel, I've seen that the folks up here have paralyzed souls. Imagine anyone saying that typing commands into a computer is on a par with conducting an orchestra! But there's worse. It scares me to see them drain the souls from their children, stamp out their passions, their spirit, before they can live—"

The pieces fell into place then—and Inga giggled in helpless amusement. The mocking sound shocked Drayton into silence. "I know what *really* scares you," she said. It was all so clear now—almost self-evident. "Lunar-style politics. Up here, you have to face the issues. You can't get away with dissembling and mud-slinging, and glitzy public-relations gimmicks won't win you a single vote . . . and you're afraid that the same thing will happen on Earth."

Drayton had drawn back from Inga, as if repelled by an irresistible force. Now he began to rally. "That's a nice fantasy. Why should I be afraid of your delusions, you transistorized dimwit?"

"Because it means an end to your career." Was it a blunder to discuss this with Drayton? she wondered. Perhaps so . . . but Inga was certain that he already knew everything she had to say. "It isn't the use of computers in politics that scares you—although it doesn't help, does it? Anybody who wants the

facts and opinions on an issue can get them by running a simple search program. Punching a few buttons can give you a politician's entire record, right down to the last broken promise and flip-flop. It takes a very little effort to inform yourself when you have a full computer network at your service."

Drayton's laugh was a forced, brittle noise—a mask for his fear. "Colonel, personal computers have been around for decades. So have networks, bulletin boards, electronic libraries, and other things. They've never had the least impact on politics."

"Until now," Inga said, with a sweet smile. "You see, they're just tools, and people have never learned how to use them this way. Thanks to the Earthside media, this colony is showing them how to use these tools. The lessons are simple and easy to learn, and people are paying attention."

"And what makes you think that anybody, anybody at all, cares about the way these Loonies play at politics? They don't have any real power up here—just a weak-kneed bureaucracy and a half-assed city council. That's nothing." You silly child, his tone said.

Inga looked up into his face. "Then why did you come up here, and why are you so interested in the colony's government? You're looking for a way to fight what's happening, because you're terrified that average Americans will start acting like the colonists. . . . that they'll demand intelligence and responsibility in their leaders—"

"You're way out of line, Colonel!" Drayton flared.

"Am I?" By God, Inga thought, I've got him on the ropes! "All I'm saying is that people follow the examples their leaders set. People have taken an interest in what happens on the Moon, and that's enough to give Port Goddard a kind of leadership. Americans see the colonists taking a hand in their own government, and they see how easy it is to do that. What's more important, the American public is adopting the colonial attitude about life and politics . . . the idea that you should get involved, think things through, and not let somebody manipulate you through your emotions—"

"I've heard enough," Drayton growled. "Get out."

Inga left the hotel suite. She realized that she hadn't won the argument with Drayton . . . and that this fight had been nothing, compared with the storm that was about to break.

Inga didn't need much time to pack. She had always believed in traveling light, and everything she owned fit into a single duffel bag. She was ready to leave her hotel cubicle long before the time came to board the trans-Earth shuttle.

The medical forms still lay on the writing shelf, where she had left them several weeks earlier. Inga no longer needed to complete them, even though Drayton had given her the answer she needed. She had a place in this society . . . but before she could stay to enjoy it, she had to go back to Earth and defend it.

Inga had spent her time preparing for the coming fight, absorbing all of the facts she could find—and, more importantly, learning about the ideals and attitudes of the colonists. Those were the

things to fight for, she thought, and they would help her win the fight, if anything could help. Inga had held her own in her argument with Drayton, but she was far from sanguine about the future.

Janet showed up to see her off. "Inga, I wish you'd change your mind. Earth isn't a fit place for anyone— especially you."

"I can't stay," Inga said. "Not with what Drayton's been doing down there."

"Drayton." There was simple hate in Janet's voice.

It was there for good cause, Inga thought. Upon his return to Washington, Drayton had hit the colony hard. His political blitzkrieg had turned the colonists' hospitality against them, twisting everything they had shown him into scandals which outraged the public. The colonists endangered their children's health . . . they indoctrinated the youngsters with a cult-like fanaticism . . . they were elitists who despised democracy and human dignity, and wanted to live in a computer-run world. Drayton had fought hard to cripple the colony, and the new budget slashes had accomplished that. Port Goddard would continue to exist, but its life would be a precarious thing. One more cutback might shut it down.

And, along with everything else, Drayton had painted Janet as a monster, a woman not fit to raise her own children. The Congressman had mentioned no names, but that point hardly mattered.

"Don't hate him," Inga said suddenly. It pained her to see Drayton have that effect on her best friend. "That's what he wants: your hate."

"You can't expect me to *forgive* him."

"I don't. I'm not asking you to 'understand' him, either, or to say he isn't worth it. I'm telling you that Drayton works on an emotional level . . . lying, distorting things, playing on gut feelings. When you let yourself hate him, you make yourself vulnerable to anyone else who's as manipulative as him—and then he's won."

"He's already won," Janet said. "It's only been a few weeks, but there's already talk of running him for President."

"He's only won a single battle," Inga said. "Like the Japanese did at Pearl Harbor. They lost in the end, you know. So will Drayton."

Janet sat down on the cubicle's cot and looked her over. "I wish I knew what makes you so confident. Drayton has the entire public on his side, plus most of Congress."

"For the moment," Inga said. "He's lied to the public about us, but I don't believe they'll stay fooled, once they hear our side of the story. I'm going to make them hear."

"How can you get anyone to listen?" Janet asked. Tell it to me straight, her tone said.

Inga's smile was a predatory thing. "Simple. I'm the Iron Maiden, the killer machine. This won't be the first time somebody has used notoriety to make herself heard. I've been given a nasty reputation, and I'm going to use it to our advantage."

Janet shook her head. "But are you sure you can handle the pressure? Richards sent you up here because—"

"—because I couldn't handle it.

That's changed, Janet. Now I know why people were lying about what happened and calling me a monster. You see, they were using me as a symbol of Port Goddard. Drayton even called me that."

Janet nodded slowly. "I guess you are that."

"It's flattering, in a way. Anyway, they were attacking the Port through me. Guilt by association." Inga looked wry. "I suppose it was inescapable. People like Drayton must have an instinctive fear of anything like this colony. We're something new, something unpredictable . . . like the idea of democracy was a few centuries ago. When all you're interested in is maintaining the status quo, anything that might upset the balance is terrifying." She paused, and added meditatively, "Maybe that's why so many people have always been against space flight, without any good reason to back up their attitude."

Janet whistled through her teeth. "I guess we scare the pee out of every politician in Washington."

"No, just the ones like Drayton . . . the ones who'll do anything to get and hold power. They're the ones we have to beat."

"Do you really think there's a chance?"

"Because—" There were any number of reasons, she realized. She owed it to the colonists, who saw her as something special—and to the people on Earth, who deserved something better than what they had. She owed it to herself, too . . . but Janet wanted to know why somebody else couldn't do this.

"Mac said it best," Inga said. She picked up her duffel bag, and slung its strap over her shoulder. "I'm a lightning rod. I'm the one who can stir up the storm we need."

"Storms can be awful hard on lightning rods," Janet said.

"I know." Men like Drayton made formidable, dangerous opponents, and they were skilled at their style of fighting. Somehow that made the battle seem all the more worthwile.

"I know," Inga repeated, and smiled. "But remember—when the storm's over, it's the rod that's still standing." ■

● The effort to reconcile science and religion is almost always made, not by theologians, but by scientists unable to shake off altogether the piety absorbed with their mother's milk.

H. L. Mencken

on gaming

Matthew J. Costello

You just have to believe me when I tell you there's a lot of boring computer games out there. Sometimes, when I survey the stacks of games selling for $30-$40, and their general lack of interest, I get a bit depressed. I mean, I get all the stuff for free and a lot of it isn't even worth the time to play it, let alone the expenditure of cold cash.

Oh, but that's where I get to perform my public service. Namely, to pick out the goodies from Silicon Valley that might actually be fun.

Which brings me to *Portal*. Now *Portal* ($39.95), released by Activision (2350 Bayshore Parkway, Mountain View, CA 94043) who broke new ground with the innovative and dryly humorous *Hacker I and II*, has arrived. It is a multi-disc, mega-adventure that, incredibly, grows more intriguing as you play it.

Portal comes on three discs that should keep you hacking away at your keyboard for a long, long time. The prologue presents the basic situation. . . . It's the end of the 21st century and you have returned from a long space journey to a completely devastated planet earth. Cape Canaveral is an overgrown meadow, cities have disappeared, with the streets of Manhattan littered with abandoned vehicles. You discover that everyone had moved underground—but there's no one there either, just endless empty corridors. Then, just as your own computer is informing you that your psychological adjustment is in peril (due to lack of human contact), you discover Worldnet—a world-wide informational mindlink, restricted to those approved by Intercorp. But a manual tells you that access is allowed in case of a catastrophic failure, including everything from induced madness in the local Artificial Intelligence to a new viral intrusion into the organic pico-electronics.

But since over eighty-eight earth years have passed since you left the planet, it's all foreign to you. Nevertheless, using an "archaic manual input device" instead of a direct "mindlink," you enter the Worldnet.

There are 12 icons, representing different data spaces that you can enter. The most important is Homer, the storytelling artificial intelligence. Homer recalls little at first. After all, a major calamity has occurred destroying the system and life on the planet.

At least, you *think* all life on the planet is gone.

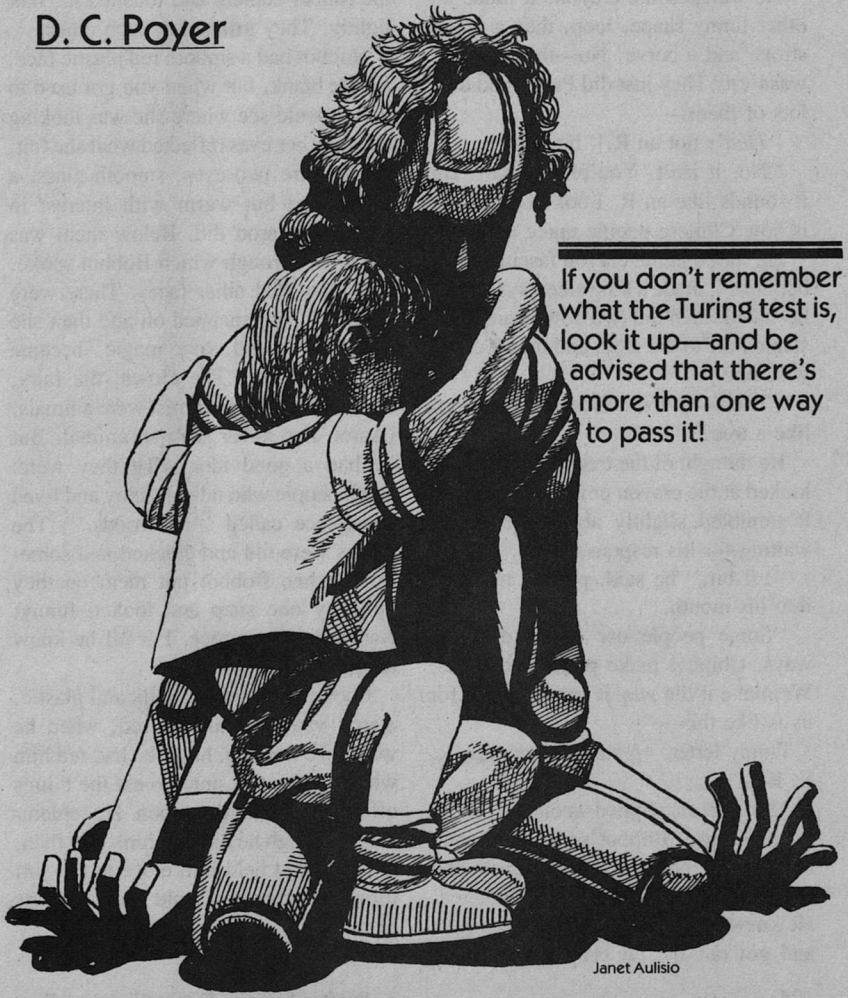
Gradually, Homer begins to rebuild part of his memory, and directs you to the History Data Space where the strange events of the last eighty- plus years are teasingly revealed. The development of genetic disease. The Vega Expedition. The movement to live underground. The wars. And ultimately a name. Peter Devore.

Continued on page 180

TURING TEST

D. C. Poyer

If you don't remember what the Turing test is, look it up—and be advised that there's more than one way to pass it!



Janet Aulisio

"This is an R. Say it now—'R.' "

"Aw," Aaron said, his mind only half on the paper on which he had just scrawled the funny shape, imitating the thing she had drawn. He let the crayon doodle, making nice lines, big curves at the bottom of the sheet.

"You like an R? Look at this. This is how Russians draw it."

He watched the crayon. It made another funny shape, loop, then a downstroke and a curve. No—that was a P, wasn't it? They just did Ps, he had done lots of them—

"*That's* not an R," he said.

"No, it isn't. You're so smart. But it sounds like an R. Look at this! This is how Chinese people make a tree."

He stared at the crayon fascinated. In her hand it made a long sideways stroke, hesitated, then did two downward ones, slanted off to the side, and then a crosswise one.

"There—a tree. Doesn't that look like a tree?"

He thought of the tree in the yard and looked at the crayon poised in her hand. It trembled slightly above the paper, waiting for his response.

"Lil bit," he said, putting his hand into his mouth.

"Some people use letters different ways. Chinese make pictures of trees. We make it the way it sounds. Tree for us is like this—"

Funny letter, up and then across, R, E, E—

The crayon slipped suddenly under the pressure of Bobbot's fingers. It spun across the paper, leaving a red gash, and bounced on the carpet. Aaron laughed. He knew what to do. He ran to the desk and got out the fat brown bottle they used to paste paper cutouts together. It had a brush when you unscrewed the cap and the stuff inside smelled funny and dried quick.

Carefully, not letting it drip on the carpet (Bobbot had scolded him for that) he traced the brush over the worn pads on the tips of her fingers. In a moment she laughed and waved her hands to dry the rubber cement and touched his hair lightly. They grinned at each other.

Bobbot had a smooth red plastic face, a little blank, but when you got used to it you could see where she was looking and how her eyes reflected what she felt. There were two eyes, smooth glass, a little fixed but warm with interest in whatever Aaron did. Below them was the grille through which Bobbot spoke.

Bobbot had other faces. There were "masks" that snapped on and then she told stories and, like magic, became something else. The clown; the fairy; the robot. Most of the rest were animals. (Aaron had never seen an animal. But he had a good idea what they were: small people who talked funny and lived someplace called "the woods.") The masks were old and cracked and sometimes when Bobbot put them on they hung by one snap and looked funny. Aaron did not notice. For all he knew animals looked like that.

Bobbot smelled like milk and plastic. Aaron vaguely remembered, when he was close to sleep, how she had fed him when he was too small to eat the things off the plate with the spoon. He remembered, though he did not think of it then, how she had held him close to the soft fur of her chest and told him the parts of himself.

"This is—"

"Nose!"

"And this is—" putting her hard, smooth fingers to his face—

"This my mouf."

"Mou-*th*."

"This my mouth."

But this evening seemed different. From time to time Bobbot would do, more often, what she had done a few times before: she would stop. Not move, just stay where she was, kneeling or standing or sitting down with him on her lap. If her arm was extended when it happened it would vibrate slightly, held rigid in the air. When it happened Aaron would wriggle in her arms and jump out. She sat kneeling still, her eyes looking off into a corner of the nursery. The comforting hum of her was the same, but the lack of motion disturbed him. Aaron ran away to the corner, looking back, and then stopped. He contemplated the things he might do now; go out the door, into the House; break his toys; Make Noise. But then, overcome by a feeling he did not yet have a word for, he wandered back to her. She was still kneeling, not looking at him, not speaking.

"Bobbie?"

She did not move or answer. He wandered about the room, eyeing the door, uneasy, and then ran and kicked her hard in the legs. At that she stirred, and he saw her eyes readjust.

"Has Aaron been bad?" she said.

"No. I've been good."

"It's twenty hundred. Time for good boys to be in bed."

He knew it was past that because she had told him what the big hands meant, and he could read the Clock. But he did not complain as she went to the bed, turned down the covers, and tucked him in.

His Mother appeared at the nursery door two days later, at bedtime. He saw her watching them as Bobbot moved about the bedroom. He was angry. Bobbot had slapped him that day. Not hard, but unexpectedly. It had not really hurt, and he would have endured it silently, as he usually bore her discipline, if he had understood its cause. He had screamed more from puzzlement and shock than pain.

Bobbot seemed worried. She tucked the sheets and then the soft blanket around him and passed her hand over his face. He felt the slight tremor that her hands had now. He looked toward the door, but his mother was gone.

"Aaron."

"Yes, Bobbot?"

"I had to spank you today."

He was silent. The thought of it made him angry again. He had not been Bad. He had just wanted to see if he could make the thing over the window go away.

"I'm sorry I had to punish you. You know I don't like to do that. It hurts me more than it hurts you."

Aaron was silent. It was not only resentment at being punished. He wanted to make her feel sorry. With part of himself he appreciated the apology. But it gave him a feeling of power to know he could hurt her just by not talking.

"You know I want you to grow up to be a Good Boy. That's why I did it. You'll understand someday."

He did not answer. He turned his face from her, to the wall, and did not speak. But inside him something was warm.

The spanking hurt. But she had come back to tell him she was sorry. Next time, he thought angrily and big with power, she better let me alone.

The next morning when he woke Mother was there. He said good morning, sleepy and a little surprised—usually she was gone to the office when he woke up—and then looked around the room. "Where's Bobbot?" he asked.

"She's not here any more, Aaron."

He got up, sitting on the side of the bed, and took in her face. She looked tired, not like Bobbot, who was always the same. Her hair fell over her eyes and he thought she looked sad. But he did not understand that; he just saw it.

"Where is she, Mother?"

"She's gone. Don't worry, baby, you'll have a new nurse in a little while."

He looked around the room, the familiar nursery, and saw that the walls were decorated with bunny rabbits. *Gone*. The word, and the world, were unfamiliar. It was all the same, but something was missing. What did "gone" mean?

"Where's Bobbot?" he said again, digging his fists into his sleepy face.

"I said you'd have a new one."

Suddenly, not understanding why, he began to cry. Mother said swiftly, "Now what are you crying about? Stop that. Don't be a baby, you're almost three. I'll take care of you, I'm home all day today. Don't you want to play with your teddy bear? Look, Teddy's here all alone in the corner. He wants some loving up. Look, here he is. Hello! Aaron! Teddy's up. Come on, we'll have breakfast together!"

Aaron went to bed that night alone in his room. Teddy snuggled beside him, one touch of the familiar.

In the morning the new nurse came. He looked at her sideways while Mother showed her about the room. She was all new, white plastic. The same shape as Bobbot. But she smelled different. There was a mouth thing over her grille that moved when she smiled. She looked at him with strange eyes. Aaron did not say so, but he was scared of her. She sat in the corner during the day, while he played with his blocks and watched TV, but she did not come near him. When it got dark he let her tuck him in. She murmured the same words, almost the same, but it was as if he was alone. When she went away he lay in the darkness for a long time, listening to the whirr of the room and watching the shadows move on the wall from the tree outside the window.

At last he got up, padding out of the bed in his jammies. The air felt cold.

His closet was full of stuff. Old toys he half-remembered, his sisters' old clothes, a lot of things. The toys called out to him in dim voices, begging him to play or to replace their batteries. He pushed them aside and burrowed down. At last he found it, a smooth oval of plastic, and took it back to bed, holding it tight against his chest.

The room was too dark. He lay in his bed, staring out at the blackness, afraid of monsters. He ducked his head under the covers. It was warm there. He curled into a ball, holding tight to the round thing. The teddy bear lay forgotten on his pillow. He held the round thing tight against him, feeling strange pain curl his stomach. In the cold dark only the rabbit mask comforted him, held tight,

the plastic warm. He curled around it, breathing the hot air he knew he could stand only for a moment. Soon he would have to come out, into the cold.

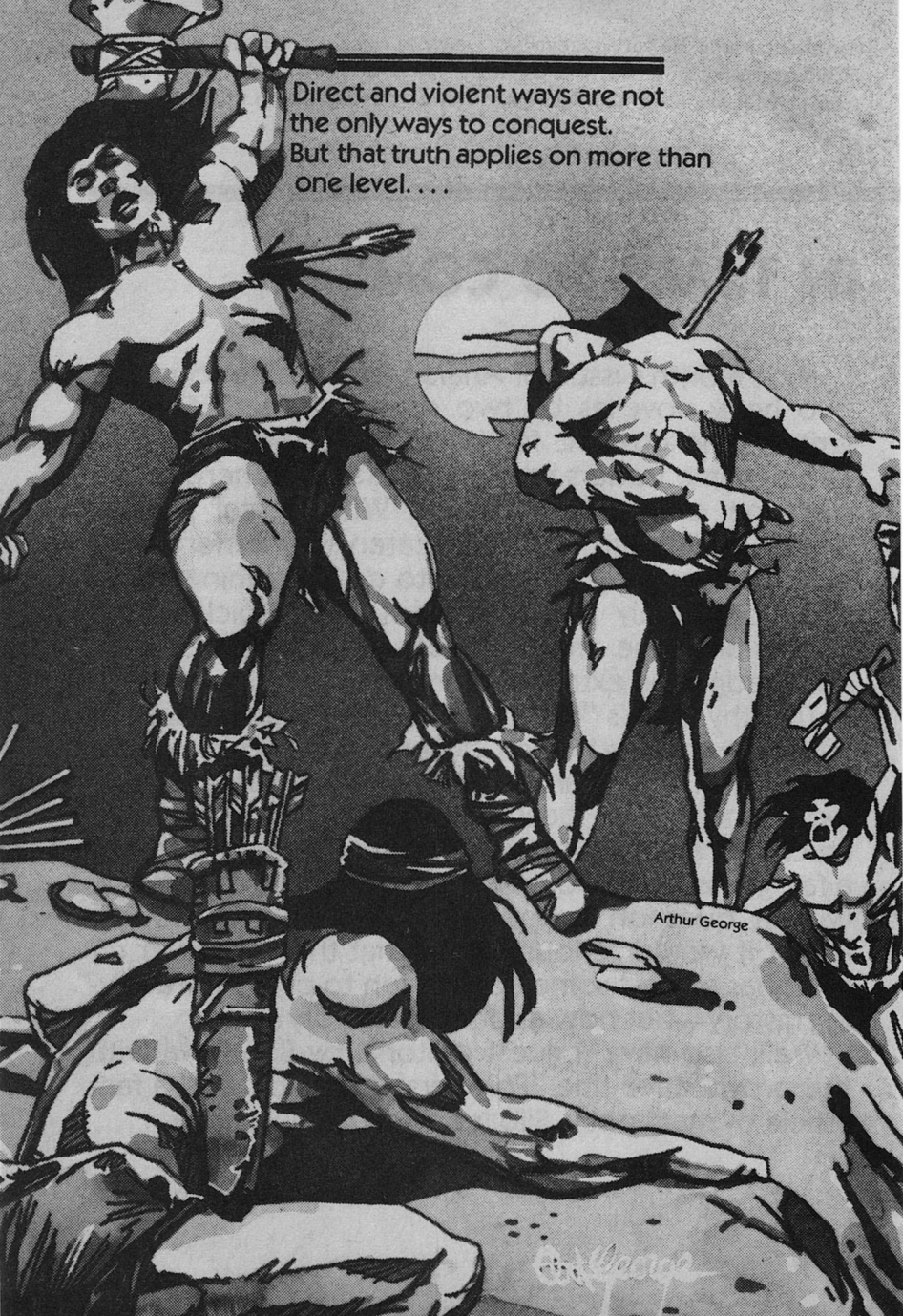
Without knowing why, Aaron Bing, three years old, began to cry. ■

IN TIMES TO COME

Next month's issue of *Analog* features not one, but two hefty novellas by two of our readers' favorite writers. The cover is for Harry Turtledove's "6+," a tale of some traders who don't exactly adhere to the doctrine of noninterference. When local politics among their alien clients threaten to interfere with business, naturally they want to do something about it. Unfortunately this gets them into a pickle from which only the most useless, impractical sort of knowledge can extricate them.

Timothy Zahn's "Banshee" is a completely different matter: a story set much closer to the world we live in, but with a company offering a service you probably won't find in your local yellow pages. I won't tell you much more about it now; you *may* be able to make a fair guess, but I wouldn't bet on it. I'll just leave you with a question to ponder. Few who've thought about it would seriously deny that the "observer effect" has at least some application to presently evolving history—but how about *past* history?

We'll also have a guest editorial by Ben Bova with the provocative title "For Mars, Vote *No*," and a fact article by Margaret L. Silbar on cellular automata.


Direct and violent ways are not the only ways to conquest. But that truth applies on more than one level. . . .
Arthur George

George Alec Effinger

SO SHALL YE REAP

I crouched on a narrow rock ledge beside Eshkatilak the chief and watched the ragged clan troop wearily by. There were one hundred and twelve human beings, eighty-six goats, and seventy-three sheep. The procession raised a thick red dust cloud, so that it seemed as if the world behind us had ceased to exist. All there was to look at was the trail and the empty future. The goats kept up a constant, raucous complaint, but the people just stared ahead in grim silence. Eshkatilak turned to me. "Well, battle commander," he said, "do you recognize this place?"

I nodded. "I was young, then. I fought with my bare hands. I didn't have this." I hefted a short, obsidian-tipped spear.

"Another day's march will bring us to those clay pot people," said Eshkatilak. "When we fought them years ago, Shūk-Imun, you remember there were just too many of them. They drove us away. My father died in that fight. I'll make them pay for that. I'll make the clay pot people tremble at the name of Eshkatilak. I want you to be ready."

I cradled my spear in the crook of my elbow. "I've already begun thinking of a plan. Tonight after sunset, I'll give my orders to our fighters."

The chief was satisfied. He took a deep breath of the dry, warm air. There was on the breeze the scent of baking rocks and earth. "I want more than just to defeat them, my friend. I want to disgrace them the way they disgraced us. I want *slaves,* not enemy corpses."

I gazed toward the silver ribbon of water that tumbled toward the eastern horizon. "It's a good place to fight," I said thoughtfully. "Our warriors recall when the clay people forced us back into the hills. We know how black the seasons were after that, how the gods mocked us and made us wander in hunger. This time, we know what will happen if we fail. We'll fight harder and fiercer than we ever have before."

"Good," said Eshkatilak. "When you've made your plans and given your orders, you and I will sacrifice a lamb to the bloody-handed god. Then he'll choose our fates as he pleases." The chief and I stood up. He put his strong, rough hand on my shoulder and looked into my eyes. Neither of us said anything more, and we joined the slowly moving column as it climbed down into the river valley.

Later that night, while the chief and I watched our nomad folk making camp by firelight, two of the clan's scouts arrived. They were slick with sweat and breathing heavily. The first scout saluted Eshkatilak. "We've seen them," he said, grinning with excitement.

"The clay people," said the second scout hoarsely.

"They have a village about an hour from here, where the river loops back on itself," said the first scout. "They've built square huts out of mud brick, with roofs of branches and boughs slopped over with more mud."

Eshkatilak nodded. "They stay in one place long enough to harvest all the wild barley and wheat in the neighborhood, and fish out a stretch of the river. Then they pack up and find another place. Instead of hunting like warriors and men, they kneel in the dirt and play with mud like children."

"That's just what they were doing," said the second scout. "We crept up and

spied on them from high on a slope. They were all crouching in the dust and patting red clay into little ugly shapes of monsters.''

''That's what they think the gods look like,'' I said.

The first scout grinned again. ''Will we attack them soon?'' he asked.

''That's up to Shūk-Imun,'' said the chief.

''I'll pass the word to our fighters,'' I said. I felt the same taut excitement that I always feel before a battle. I like to be tested.

Eshkatilak gestured to a tall, thin-wristed slave. ''Gather my spears and arrows,'' he said. ''String my war bow.'' The slave gave a quick salute and went to search through the chief's sacks and bundles for the weapons.

After the lonely night passed and the sun rose again, fire hot and fire bright, the clan's warriors, armed with clubs, spears, axes, and, in a few cases, bows, stood and listened to Eshkatilak exhort them. He told them the story of the previous battle between the two tribes. He made his clan thirst for vengeance. It was clear that there would never be peace in the river valleys until one of the groups of nomads conquered the other. ''And I don't feel like being conquered today,'' shouted Eshkatilak. ''How about *you?*''

''No!'' cried the warriors.

''Will you submit to death and disgrace?''

''No!'' screamed the warriors.

Eshkatilak smiled grimly. ''Come on, then! We'll storm their dung-crusted village and trample them into the mud they love so much. Take for yourself anything they have of value, and smash to pieces everything else. If a woman pleases your eye, claim her as your slave, but kill their husbands, fathers, and children. The World-Father is offended that they worship clay dolls. The heavens and the earth don't *need* the clay people. The rain will fall without them, the sun will rise! Tear down their mud houses, and they will toil for us!''

The fighters shook their spears and stone axes. Eshkatilak and I led the small army eastward along the bank of the rushing river. ''Their village is just around this bend,'' I said. ''The river will be at their backs, and where they've built their huts the water is too deep to ford. We'll cross the river here and climb that hill, then go on along the crest of the ridge. Then we'll attack them, swooping down through the tall wheat, leaving the clay pot people nowhere to run.''

''Good,'' said Eshkatilak. ''When you give the signal, then.''

I nodded. ''For the honor of our clan,'' I cried, ''and the glory of the World-Father!'' I turned and splashed across the stone-strewn shallows and up the gentle, golden grain-clad flank of the hill. Eshkatilak and the others followed, making as little sound as possible.

I halted them before we cleared the top of the hill, so we wouldn't be spotted by the clay people, who might have guards posted to keep watch. I crept forward through the tall wheat grass until I could see the enemy village. Everything was just as my scouts had described. The ground between the mud huts had been cleared and stamped flat. Men and women went about their chores, and naked children played in the bright

morning. More adults worked bent over in the waving grain beyond the village. Their voices came to me on the breeze, cheerful, suspecting nothing. Buzzing insects flitted around my head, and the warm sun felt good on my shoulders. It did not seem like a morning for slaughter. I made my way back to the others.

"Their huts are below us, at the foot of the hill," I said. "There's a small party of hunters following the river away from the village. We will run along the back face of the hill, and attack the hunters and kill them. Then we'll return to the village and see what we can carry off."

"In a little while," said one of the spearmen, "our clan will have all the clay pots it will ever want."

"Pots!" laughed Eshkatilak. "It will please me to have a couple of their women. If you'd rather have pots, then take them, but we'll all know what a fool you are."

We ran at the front of the fighters. There were only five clay people warriors below, and they fled when they saw Eshkatilak's band running through the bending wheat. Two of the clay men abandoned their weapons so they could run faster. I gave a contemptuous laugh. "Kill as quickly as you can," I yelled to my men, "and don't forget to take a man's weapons when you've finished him."

We were gaining ground rapidly when our quarry ran away from the river, down into a dry ditch that opened into a ravine. When we emerged into a small, blind box, I realized I'd been tricked. The five clay men were climbing out of the canyon, helped up by their clansmen. Other clay people stood along the edge of the rock walls and flung spears or fired arrows down at Eshkatilak's trapped fighters. "Back, quickly!" shouted Eshkatilak. I tried to force my way through the panic-stricken men. The rock underfoot became slick with bright blood, and I stumbled over wounded men writhing in agony. I heard the shrieks of my friends as they were cut down in a storm of enemy arrows. I could hear the clay people laughing and taunting us. I paid little attention to my torn feet and bleeding hands, and clambered to safety. Then I ran back through the ditch and up the peaceful hill. I sat down in the whispering grass at the crest and waited for the other survivors. I prayed to the World-Father that there *would* be other survivors.

The men of Eshkatilak's clan who had not been killed in the raid staggered back to the hilltop, alone or in groups of two and three, those who weren't seriously hurt supporting the wounded. Eshkatilak came last, a broken-off arrowhead still imbedded beside his shoulder blade. More than a third of the party had been left behind, dead. There was a heavy mood of defeat and shame hanging over those of us who'd managed to escape. "Even worse than the jeers of the clay men," said a fighter with a scarlet head wound, "will be the things our own women will say to us."

"I wish we could stay here," said another. "I don't want to tell the rest of the clan what happened."

"It's my responsibility," said Eshkatilak. "I have privileges as chief, and so I also have hard duties. I take all the blame. All of you were brave warriors. Our defeat was my fault alone."

"I have to take some of it, Eshkatilak," I said. "I'm the battle commander. I did not foresee the clay pot people's trickery."

"'Another defeat," murmured Eshkatilak. "It makes the first one even harder to bear."

After a time, we all limped back to our camp. The women of the wounded men wept and bound the injuries. The women of the dead fighters wailed and mourned and began the funeral rituals. Eshkatilak sat apart, sick with frustration. He had dreamed of having his revenge on the clay pot people for many years, since the first fight when he was still a young man and his father had been chief of the clan. How could those clay men, who preferred laboring in the hot sun to hunting and fishing, how could those weaklings who worked the very dirt underfoot overcome a clan of warriors, not once but twice? Maybe they had a strong magic helping them. Maybe—and I shuddered to think of it—their evil clay gods were stronger than the World-Father.

I sat down in the grass beside Eshkatilak. Birds twittered nearby, and I could smell the sweet fragrance of wild herbs. It was as if nothing terrible had happened that morning—but the gentle stillness of the day could not soothe me. "I learned something important about being a battle commander today," I said. "Next time, I will send my scouts farther. Instead of just making contact with the enemy, I'll learn everything I can about the place where we will fight. I won't let us get trapped again. That's why we lost. None of the blame is yours, it's all mine."

Eshkatilak shrugged. "We must go away from here, Shūk-Imun. The clay pot people may attack us, knowing we've been weakened."

"Yes," I said.

"Just as we ran away the other time. But I am getting an idea; I think I see how we can dominate them *without* a battle. They will be our slaves, and none of our warriors will lose a drop of blood."

"That would be a miracle," I said. "A battle leader hates to lose any of his men."

Eshkatilak smiled for the first time since the disaster in the canyon. "Find that beardless slave and bring him to me."

"Zagr? The one we took near the Other River?"

"Yes. In this bloodless battle, he will be our commander without warriors."

I got up and did as I was ordered. A few minutes later, the slave knelt in the grass in front of Eshkatilak. He was a young man with a broad back and strong arms. He had odd green eyes and wore his hair cut short and his face shaved clean. That had been the manner of his tribe, but his tribe no longer existed. Most of them had been killed in battle against Eshkatilak's clan, and the few survivors had been taken as slaves. In the year of his captivity, Zagr seemed content to make a new life for himself as a nomad. He had taken a wife, one of Eshkatilak's nieces, and he was accepted and generally well-liked by the rest of the clan. "O Chief," he said in a quiet voice.

"I want you to tell me about your people," said Eshkatilak.

Zagr looked surprised. "We were the tribe of Athnegam, but Athnegam is

dead. We lived beside the Other River, which we called Pelu. We had fields of barley and millet and wheat and we kept sheep and goats. Many of our people had learned to make skillful use of wood, stone, and metals, and others could make pots that rivaled the products of the clay people."

"You taught us to herd goats and sheep. Do you think you could teach someone to make the grain come out of the ground?"

Zagr smiled. "Yes, O Chief. It isn't magic. It's no more a mystery than why a woman brings forth a child."

Eshkatilak frowned. "I don't understand that, either," he said.

"As to the grain, if you follow the stars and do the necessary labor, the earth will reward you with generous harvests."

"Our clan prizes its liberty, Zagr. The labor you speak of is offensive to a nomad, who must be free to wander where he chooses. What you describe is slavery—bondage to the dirt."

"Our full bellies let us sleep comfortably nevertheless."

"Let's not argue about this," said Eshkatilak. "I want you to take your wife and a few goats and sheep, and go among the clay pot people. I want you to teach them your ways. Give them the knowledge to bring the grain out of the ground, so that they won't need to search for it growing wild on the hillsides. Let their mud huts become large, enduring houses. Let their food-gatherers become cultivators, and let their hunters become keepers of animals. Then they'll have more time to make even more wonderful things out of the clay, just as your people learned to work with wood and stone. Teach them everything you know, Zagr, and surely you'll soon rule over them."

"Why do you do this for your sworn enemies?"

Eshkatilak's eyes narrowed. "Because they'll become like the tribe of Athnegam. Without a need to hunt for food, they'll put aside their hunting weapons. They'll grow comfortable. After a few years, they'll grow soft. And then the clan of Eshkatilak will return for a third time, and we'll serve them just as we served the tribe of Athnegam. And, as you say, the tribe of Athnegam is no more."

Zagr nodded slowly. "You are very wise, Eshkatilak," he said.

"Go in a few days, when they've put our futile attack out of their minds."

"It will be done as you say, O Chief."

Many years passed. Boys who had been born after the second fight with the clay pot people were now nearly grown men. I longed to put aside my duties as battle commander, but Eshkatilak made me promise to wait until after the only conquest that had ever eluded him. For his part, Eshkatilak was now by far the greatest elder in the clan. He had won many battles, had taken many slaves, had fathered many children. Already his older sons contended among themselves to see who would challenge their father for clan leadership. Eshkatilak watched them with a parent's fondness. They were no threat to him yet; soon he would choose a successor and give over all the power he had gathered during his long life. He would do that soon—after the

final confrontation with the clay pot people.

One morning, I sat in the shade of a tree and watched my young daughter, Ikalla, playing in the dust. Listening to her childish laughter and feeling her dirty, sticky fingers on my face gave me more happiness than anything I'd ever known. Sometimes I wished I could give her more—more food, more security, more time to enjoy the simple pleasures of childhood. It occurred to me more than once that if the clan of Eshkatilak lived a more settled life—like, for instance, that of the clay pot people—then my pretty brown daughter, Ikalla, might be spared the hardships I had known at her age. Maybe, as I got older, I found a nomad's life less exciting and more needlessly cruel than I wanted for myself and for my daughter.

While I watched her patting her hands in the bare, dry dirt, a scout came up to me and waited respectfully until I looked up and nodded. "The village is just beyond where you said it would be," he told me.

"Good," I said. "That means old Eshkatilak's plan may have worked. The clay pot people have given up their wandering ways and tied themselves to the soil. What does their village look like?"

The scout shaded his eyes from the sun. "There were nine or ten long, low buildings made out of mud brick, and a lot of smaller huts, all around an open courtyard."

"Did you see animals?"

"Yes," said the scout. "There were some goats wandering about in the open place between the buildings, and there were larger flocks of goats and fat sheep grazing on the hillside. Then further on there were large fields of ripe wheat and barley marked off by little ditches filled with muddy water. I watched men and women harvest the grain, thresh it and winnow it, then carry it back to the village in baskets and pots. They put it in one of the small buildings."

"Ah, they have plenty of food stored away. That's good for them: the gifts of the World-Father are many, but they are unpredictable. The clay pot people think they no longer have to rely on the blessings of heaven. They think their wheat-summoning makes them a little bit divine, too. They have a hard lesson to learn."

The chief was pleased by the news when I told him. "They are many arrow-flights further downstream then the last time we met them," said Eshkatilak. "But their temporary camps have become a permanent village. They think the river protects them from attack on one side, their fields on another, the hills on the third, and their mud-brick walls on the fourth. They think their old people and children are safe in the middle. We'll show them that the very things they believe guard them actually make them vulnerable."

"They have much worth taking now," I said. "Instead of making something and leaving it behind a little while later, because it's too difficult to carry a load of belongings from one camp to the next, now they can keep their favorite axes and pounding tools and grinding stones. They make as many pots and bowls as they want, and put them in their houses. Their clothes and implements are better than ours, because they take more time making them. They

spend hours decorating their things, and making more and better clay gods. Their magic could be stronger, even if they themselves are weaker."

"We have our own magicians," said Eshkatilak. "We won't have to worry about the magic in their little mud gods. From what I've heard from the scouts, the clay pot people have changed just as I predicted. When would you like to attack?"

I rubbed my chin. "This evening, before the villagers come in from their work. If we cut them into two groups, some working in the fields, the others busy in the village itself, we'll have an easier time of it."

"Good," said Eshkatilak. "Tonight we'll sleep in the mud-brick houses of the clay people." I said nothing more, but went to give my orders to the clan's warriors. Privately, I said a prayer to the World-Father that Eshkatilak wouldn't meet failure a third time at the hands of this stubborn tribe of mud-shapers.

I divided my force into two parties. They traveled together on the far side of the hills until we were opposite the enemy's settlement, and then the two parties climbed the ridge. I looked down toward the river. Everything was just as the scout had reported. Everything was just as it had been—the last time. It was a bright, warm day, and the sun felt good on my shoulders. There was a pleasant, fresh fragrance on the mild breeze. Near us, two squirrels chattered to each other. It was almost a shame to disturb the peace of the afternoon, but I had led these fighters here for a reason. Below us, the clay pot people were busy with their work, and it seemed that they no longer cared about posting sentinels or having guards patrol their borders. Maybe they thought that somehow the village's size and wealth and grandness would protect them all. Along with their fighting skills, the clay people must also have lost their good sense.

I pointed my war spear first at Eshkatilak's eldest son, Eshkilar, and then down at the cluster of rectangular mud-brick buildings. The chief's son gestured that he understood. Then I pointed at Eshkatilak's second-eldest son, Bennesar, and then at the lush fields of wheat, millet, and barley, and the villagers working in them. The two strong young men grinned. They were proud to lead the attack, anxious to prove themselves in my eyes, in their father's, and before the rest of the clan. They both knew how much Eshkatilak longed to possess the village of the clay pot people.

I turned to the chief. "We're all ready," I said.

"Then let it happen as the World-Father ordains," said Eshkatilak. "May my sons work my vengeance on these dirt-eaters."

Eshkilar led half the warriors shouting and laughing down the hill. Eshkatilak ran along behind, his legs and lungs now too old to keep up with the clan's younger fighters. I saw the clay pot people below turn and stare up the hill in astonishment. Men and women ran from their low mud-brick buildings. Children dropped their crude toys and began to howl. For a long moment, none of the clay people knew what to do. It had been many years since they had fought another clan, since they'd had to defend themselves. The younger men

had never become expert with their fathers' weapons. Their fathers' own skills had fallen into disuse, and the weapons themselves had been lost or packed away. And now Eshkilar's warriors were sprinting across the level ground, racing irresistibly toward the terrified clay people.

Bennesar was having the same success beyond the buildings. I followed, proud of Eshkatilak's sons, my best pupils, my lieutenants. The harvesters were caught helplessly in the fields, too far from each other and too far from the village, and they could see that there was no safety even there. The clay people straightened up in the high grain and dropped the sheaves they had gathered. They cried out in anger and fear, but Bennesar only laughed. A woman of the clay people screamed at us, "Why are you doing this? We'll give you what you need!" One of the warriors struck her in the head with a heavy round stone wrapped in rawhide, and she fell out of sight in the rippling wheat.

"Round them up!" I called. Bennesar saluted and shouted orders to the other fighters. Very quickly they made the frightened villagers huddle together in the middle of the field. The woman who had been knocked down was forgotten; if she was not dead already, she would be dead by nightfall. Her soul would go to nourish the World-Father's mad sister, who ruled the Kingdom of Worms.

"Do we kill them all, Shūk-Imun?" asked Bennesar.

"No," I said, "your father wants slaves. We'll take them back to the village."

By the time we arrived, Eshkilar's warriors had collected all the rest of the clay pot people in the open space in the center of the village. Several of the elders had resisted clumsily, using their old spears and arrows. Every one of these men had been killed and their weapons broken in half. The rest of the clay people stood silently, their eyes round and filled with dread. Their expressions were shocked and bewildered. They were making low, desperate noises. I couldn't help thinking how much they looked and sounded like their own sheep.

Eshkatilak relished every sight, every sound. "This is what I've dreamed of for so long," he told Eshkilar, his son. It was the finest moment in the chief's life, because it had been his own clever idea that had brought him victory, and because it had been denied to him for so long.

One of the harvesters stepped forward. "Eshkatilak, O Chief," he said in a quiet voice.

Eshkatilak squinted at the man. "Who are you?" he asked. "How do you know me?"

"I'm Zagr, O Chief. Your slave. You sent me among the clay pot people to teach them the art of winning food from the soil. I taught them well. This clan of Darazha no longer ate only when it found a new hillside clothed in wild-growing grain. I showed them how to lay out their fields, how to till the soil and sow the seeds, how to reap the wheat and millet and barley year after year. I brought them the sheep and goats you gave me, so they didn't need to hunt for meat. And they returned the gift: they kept swine, which my people did not, and they taught me to preserve the

flesh with smoke in one of their mud-brick buildings. The years passed, and the clan of Darazha grew well-fed and content. They discarded their hunting weapons, and their fierce pride dwindled. It was as you foresaw."

"I didn't recognize you, Zagr," said Eshkatilak. "When we took you into our clan, you went clean-shaven after the manner of your father's people. Now you wear a daintily curled beard, streaked with gray. I remember my promise to you, however, and I give you your liberty. From this day forward you're a free man, to remain with our clan in honor if you wish, or to go forth with your wife and children to begin your own clan, with any of these clay people who choose to follow you."

Zagr bowed his head. "Thank you, O Chief. It's been my privilege to serve you."

Eshkatilak waved a hand. "Enough. I'd like to see this village I conquered so easily. Walk with me, then. And Shūk-Imun, you come with us. I intend to reward you, too, for your loyalty and valor, and my two eldest sons as well. I'll give each of you a portion of this land."

"I do not ask for anything," I said.

"Hold your tongue and accept my generosity," said the clan chief.

Eshkatilak, Zagr, Eshkilar, Bennesar, and I walked slowly around the village. Zagr pointed out the purpose of each building. He revealed the riches—stored grain, smoked meat, worked metals, and clay pots of every description—and suggested ways we could best take advantage of our newly won wealth.

"Don't make an enemy of them," said Zagr.

"Make an enemy of them?" I said. "They've been an enemy since Eshkatilak and I were children. Maybe long before that."

"Part of me wants nothing better than to cut the throats of the whole clan of Darazha," said Eshkatilak.

"That would be foolish," said Zagr. "Treat them as slaves, if you like; but treat them as friends and they'll work harder for you. Make yourself king, that's only right; but a king must have subjects to rule over. Corpses make very poor servants."

"You make a strong argument," said the chief. "I'll think on your advice, and we'll talk it over again tonight. I order a celebration, a feast in our honor. That's how I'll let these mud-daubers know that I'll be a good and just king."

Zagr nodded. "I'll take charge of everything. Just tell your warriors to put down their spears and let the villagers go about their business. At the feast, I'll show you yet another gift of these people: wine."

"What is wine?" I asked.

"You'll like it," said Zagr, laughing. He bowed again and went off to begin the preparations for the banquet.

The feast was grander than any festivity in the memory of Eshkatilak's clan. There was plenty of roast pork and mutton, olives and walnuts, dates and almonds, soup made from lentils and beans, wheat bread and barley cakes, cheese made from goat milk, and several kinds of berries in cream. The two clans sat and ate together as if they had never met in furious combat. Eshkatilak was served first by Zagr, who had acted as chief of the clan of Darazha until that afternoon.

Zagr seated himself on one side of the king, and I sat on the other side. We were served by a succession of shy young girls and boys. Zagr signaled to a girl carrying a large, round clay pot with a narrow neck and mouth. "The wine," he said to Eshkatilak. Zagr indicated that the girl should fill the king's bowl. Eshkatilak raised the bowl to his mouth and took a dubious sip. He made a face and put the bowl down again. "It's sour," he said.

"Yes," said Zagr, "a little. But you'll find that the taste gets better if you drink more of it."

"What's the name they call you?" asked Eshkatilak.

"Dyonys," said Zagr. "When I came to this village, the clan of Darazha knew how to make wine, but they did it only when they found a supply of wild grapes. After I showed them how to plant grain, I tried an experiment with grape vines, and it was a big success. Actually, it was when I gave them an inexhaustible source of wine that they made me chief of the clan."

"I still don't understand," I said. "I don't see why these villagers prize this drink so much."

"Have a few more bowls and you will," said Zagr.

Eshkatilak and I gulped down another bowl of wine each. We both winced. Then the chief clapped his hands together several times to get everyone's attention. "Listen to me," he said in a loud voice. "You're all now of the clan of Eshkatilak. This is the village of Eshkatilak. These are the houses of Eshkatilak. Those are the clay pots of Eshkatilak. Over there are the fields of Eshkatilak. If anyone doesn't find all this to his liking, let him get up now from the feast and leave. I want you all to live together as one tribe from now on." He looked slowly around the gathering with narrowed eyes, but no one took the opportunity to excuse himself. No matter how much some men and women of both clans might despise Eshkatilak and what he'd done, none of them could face wandering the river valleys alone again and in want for the rest of their lives.

"Good," said Eshkatilak. He paused to drink another bowl of wine. "You know," he murmured to Zagr, "I'm beginning to feel odd. I like it."

"I told you that you would," said Zagr.

Eshkatilak turned back to his people. "I am king, and I'll be a kind and even-handed king. I give you Eshkilar, my eldest son, who will be king after me. He'll be lord of the storehouses in the village of Eshkatilak. And Bennesar, my next-eldest son, will be lord of all livestock. Zagr—Dyonys—will continue to be lord of the fields. And Shūk-Imun, who has served me well for many years, is my battle commander. Obey them as you would me. Take your problems to them according to their offices. I'll give all my attention to the larger matters of ruling this growing kingdom." Many voices were raised in approval, and I was sure that Eshkatilak needn't fear dissension or jealousy within the two united clans.

Time passed peacefully, and the village was prosperous. More houses went up, and the harvest was completed. Zagr reported that the bounty was greater than ever before, so large, in fact, that construction began on a second granary.

Zagr drafted teams of workers to clear and ready a new field further downstream, where he intended to grow peas, beans, and lentils, which until then had been gathered from wild bushes nearby. In the village itself, Zagr tried planting the seeds of some of the fruit trees.

Winter came and passed, and when the warm weather finally broke up the ice on the rivers and drove the last of the snow out of the shaded ravines on the hillsides, the tribe was still healthy and happy. Eshkatilak had won for himself the loyalty and respect of all his people. The only thing that caused him concern was the superstitions of the clay pot people. They worshipped Gi, the Loving Mother. This in itself was not so bad—after all, it did not take long for each clan to accept the other's god, and soon the village celebrated the miraculous marriage of the Loving Mother and the World-Father. This sacred union did as much as anything to weld the two clans together. What troubled Eshkatilak was that the clan of Darazha enthusiastically venerated Zagr as well. It had been Zagr who had shown them how to cultivate the fields, herd sheep and goats, and tend the grapes necessary for wine. The World-Father was a stern and distant god, the Loving Mother a generous but also distant goddess; the clay people saw Zagr as the son of the heavenly couple, who took the divine gifts and made them available to human beings. Eshkatilak questioned an elder of the clan of Darazha about this. "But Zagr is a man, just like you and I," the king said. "We attacked and killed many of his kin, and took him as a slave."

"Yes," said the elder, "Zagr is a man. But within him is the undying fire of Dyonys, the immortal child of the World-Father and Gi, the Loving Mother. Zagr is the priest of Dyonys, but in a way he's also truly Dyonys here among us."

Zagr was accompanied wherever he went by two young girls wearing the pale green of the spring's new growth, and by two young men carrying rods tipped with pine-cones. "What does the pine-cone on the staff mean?" Eshkatilak asked once.

"It's part of my mystery," said Zagr. "Sorry."

"Oh," said the chief.

Zagr was dressed for his role as Dyonys. "The fields are ready to receive their seed," he said.

Eshkatilak and I left the council chamber and walked through the village with Zagr. Behind him followed the silent young men and women, the attendants of the god of the vine.

When we got to the field, Eshkatilak saw that a wooden throne had been built specially for this service. "You must say a prayer," urged Zagr.

"A prayer?" said Eshkatilak. "I'm not used to making up prayers."

"It doesn't have to be long. It's a custom of the clan of Darazha."

Eshkatilak mounted his throne. He raised his hands to the assembled tribe. "I ask the World-Father to water our barley and our wheat with the rain that falls from heaven. I ask the Loving Mother to nourish our barley and our wheat in the rich soil of the earth."

Zagr nodded his head. "Good," he murmured, "but maybe a little more."

The chief frowned. "May our worship be pleasing to you, our divine par-

ents. I command that no man or woman perform an obscenity that might bring upon the village of Eshkatilak the displeasure of the World-Father or Gi, the Loving Mother."

"Fine," whispered Zagr. Now it was his turn. From one of his acolytes he took a clay bowl painted a dusty brown. "Drink, O King, this barley-water, fruit of the field." Eshkatilak took the bowl, raised it to his lips, and swallowed a mouthful of the barley-water. Dyonys took a second bowl, painted red, and said, "Drink, O King, this wine, fruit of the vine." The king drank a mouthful of the wine. "Now we must symbolically fertilize the ground with the king's blood," said Dyonys.

Eshkatilak pulled back the sleeve of his robe and held out his arm.

"Now I, Dyonys, take the sacred knife and moisten it in a drop of the mystical blood of the king." The priest raised the knife high so that the sun flashed on its polished obsidian blade, then he brought it quickly down and plunged it fiercely into Eshkatilak's heart.

The king's eyes opened wide and he grunted in surprise. He made a feeble effort to clutch at the knife, but his hands only fluttered weakly and fell to his sides. Blood as dark as night pumped from the wound and splashed on the ground. Then Eshkatilak slumped on the throne, dead.

Zagr turned quickly to judge the reaction of his audience. The men and women of the clan of Darazha were on their knees, their expressions wild and ecstatic. The clan of Eshkatilak stood beside them, shocked, dismayed, and helpless. Zagr's young assistants held bows and nocked arrows, in case anyone proved to be violently opposed to the cult of Dyonys, but that didn't seem to be the case. The two boys and the two girls put down their weapons and took up large knives and axes. They began to dismember the corpse of Eshkatilak. "In this way the sacrifice of our king makes certain the well-being of the whole tribe," cried Zagr.

"All glory to Dyonys!" cried the acolytes.

I couldn't watch my friend being cut to pieces. I looked at the dead king's eldest son. "Your father found a way to conquer an enemy without fighting," I said. "Now the ex-slave is having his revenge, repaying cleverness with cleverness."

"Behold your new king!" called Zagr. "Eshkilar! Do him honor, because he will guarantee your prosperity when the year has circled and it is spring in the field again. Guard him by day and by night, because if he flees, he'll bring down the wrath of the gods on all of you."

I saw the horror on Eshkilar's face. I felt sickened.

"Hail Eshkilar!" shouted the villagers.

"What am I going to do?" demanded Eshkilar fearfully.

I clasped the young man's arm. "You've got a whole year," I said. "If I were you, I'd find another tribe, take us into battle again, and *lose*."

Eshkilar nodded, but he didn't have a hint of hope in his eyes. Behind him, the clan of Eshkatilak and the clan of Darazha began walking back to the village. Soon wine would flow from the clay pots. ■

The Alternate View

LASER PROPULSION AND THE FOUR P'S

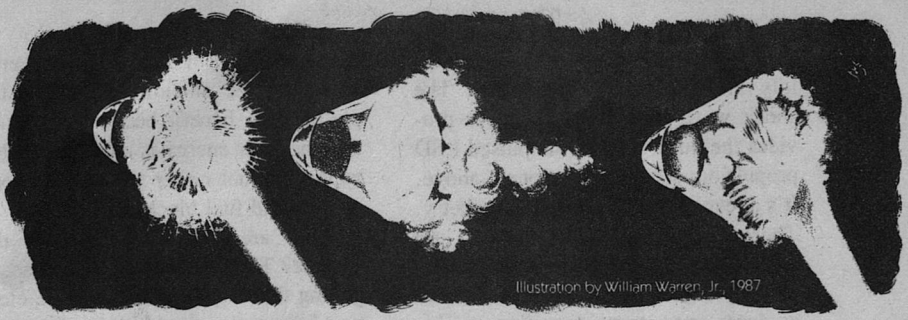
John G. Cramer

We live at the bottom of a very deep gravity well: the lowest part of the well is the surface of the earth and its top is interplanetary space. Each kilogram of mass on the earth's surface has an energy debt of 63 million joules that must be paid to get out of the earth's well. That in itself isn't so bad; at standard commercial power rates 63 megajoules of electrical energy costs less than $1. But this isn't the true cost. Our gravity well has no bucket, no rope, no crank. The lifting can only be done very inefficiently with expensive, complicated, and not completely reliable chemical rockets. Using that technology it costs between $4,000 and $10,000 per kilogram to ferry payload mass to low earth orbit with the Shuttle.

But there may be another way. Laser powered launching to orbit is an emerging space technology that may eventually provide a techno-fix for the large expense of getting payloads into orbit, a way around the high cost of Shuttle payloads. Extremely powerful lasers are now on the hi-tech horizon, and their development promises to make this new technology feasible. In July of 1986 a group of experts gathered at Lawrence Livermore National Laboratory to consider the key issues of laser propulsion. They focused on three basic questions: (1) What laser launching will be possible with the big lasers now under development? (2) What groundwork of research and development is needed to prepare for launch testing when the big lasers are ready? And (3) What characteristics should be pushed for in these big lasers so that they will be more useful for such launching? This Alternate View column follows some of their discussion.

The idea of laser-powered propulsion is not new. It was first proposed by Arthur Kantrowitz in 1972, but recently it has been given a new twist. The twist, which will be discussed further below, is to eliminate engine hardware altogether from the launch vehicle and to obtain thrust instead from the laser-sustained detonation (LSD) of a thin flat layer of inert fuel that pushes explosively against the vehicle's planar rear surface. This new concept emerged from discussions at the Livermore workshop and seems to offer the long sought inexpensive highway into space, the cheap elevator for lifting payloads from our gravity well.

Until recently there seemed little prospect of developing lasers large enough to launch useful payloads from the ground. However, the DOD's Strategic Defense Initiative Office (SDIO, a.k.a. "star wars") is presently spending quite large amounts of money on the development of gigawatt-level free electron lasers for possible use in the military "defensive shield" that we read about in the newspapers. These powerful lasers, while they may never meet the SDIO goals, appear likely to provide a nearly ideal power source for laser launching. It is somehow ironic that an unplanned spinoff of the big federal investment in SDI may be a cheaper way



to put bulk loads and later people into space.

How does laser power propulsion work? Let's start by contrasting it with conventional chemical-fuel propulsion. In conventional rockets the fuel serves two separate and distinct functions: (1) it burns, converting chemical energy to the kinetic energy of the high speed exhaust particles, and (2) the burned fuel supplies the reaction mass of exhaust particles ejected at the exit nozzle. The dual function of the fuel makes any chemical rocket dangerous and expensive because all that chemical energy stored in the fuel is a significant explosion hazard. Rocket design requires careful attention to this problem. The trick in the laser powered launching scheme is to separate the two functions of the fuel: let a ground-based laser supply the propulsion energy, far more energy per fuel mass than chemical burning could supply, while a safe, chemically inert "fuel block" supplies the reaction mass. Kantrowitz (now on the Dartmouth University faculty) and Dr. Jordin Kare, the Livermore workshop coordinator, describe this latest laser powered launch scheme as the "4-P" launch technology. It leaves everything on the ground except "Payload, Propellant, and Photons . . . Period"

How might such a "4-P" vehicle operate? Imagine the launch vehicle as a pyramid about 200 cm high (about the size a pyramid camping tent) made of solid material with about the density of water. The top 91 cm of the pyramid (mass about 1 metric ton) is the payload. The bottom 109 cm (mass about 9.7 tons) is the expendable "fuel block" to be consumed during the launch. This vehicle would probably receive its initial velocity from a Jules-Verne-style launch cannon which accelerates at 10 *g*'s and fires vertically. After the vehicle leaves the cannon it is tracked by the intense beam of the free electron laser, which begins detonating fuel on the backside of the vehicle to propel it into orbit. The laser, probably delivering average power of 100-1,000 megawatts, provides the propulsion energy while the fuel block provides the reaction mass.

The laser must be pulsed in a carefully programmed way. A relatively low energy "metering pulse" from the laser vaporizes a thin layer of fuel from the flat rear surface of the fuel block. The gas thereby produced drifts away from the rear surface of the vehicle. Then, when the dispersing gas reaches the proper density, the laser hits again with a far more powerful pulse, converting the vaporized fuel to a very hot plasma of dissociated electrons and ionized at-

oms. This plasma absorbs energy rapidly and detonates explosively. The shock wave from the LSD wave provides the push. This is the pulsed LSD propulsion scheme mentioned above. It's a revolutionary concept in rocketry. There are no on-board engines, no plumbing, no pumps, no valves, no potentially explosive fuel, no nozzles, no coolants, no stage-separation explosives, no solid-fuel boosters, no O-rings . . .

In a normal rocket engine the explosion of burned fuel is roughly spherical and continuous, so that carefully cooled engine walls and nozzles must convert the omnidirectional pressure of the exploding fuel into directed thrust. But the LSD explosion comes in a pulse and has the geometry of a plane, not a sphere. The exploding gas does not have to be redirected. Half of the gas molecules will push against the surface of the fuel block, providing thrust, and the other half of the molecules will dissipate in the opposite direction. Only at the edges of the plane LSD wave is there deviation from the plane geometry of the explosion, and this has negligible effects. The LSD wave propulsion scheme is a chamber-less engine-less engine.

It is worth noting that the SDI people have some very severe problems to overcome in making their energetic lasers destroy missiles. It is difficult to make free electron lasers operate at the near-infrared wavelengths that SDI needs. But laser powered propulsion works quite well at more accessible far-infrared wavelengths. Another problem for SDI involves the LSD waves themselves: if the target missile has a simple vaporizable coating the laser beam's energy may be dissipated in heating the vaporized coating rather than destroying the missile. But for laser powered launching the shielding effect of the plasma is a benefit because it insures that the laser energy is absorbed by the vaporized fuel rather than the payload or the solid fuel block.

What are the problems with the scheme? The biggest one, of course, is getting that big laser to use. Free electron laser technology will be discussed a bit later. A second problem is finding a suitable fuel block material that will operate efficiently and that will not be eroded too rapidly. Ice, plastic, and lithium metal have been discussed, but more research is needed. The structural and hydrodynamic effects of the detonation waves must be understood. And of course the aerodynamics of the vehicle will have to be carefully considered. It will require attitude-control hardware, vanes or jets perhaps, to keep it oriented properly in the beam. The laser tracking to orbit will also require careful design. When the vehicle had reached some altitude and velocity, it must be turned so that the back surface of the fuel block is at an angle to the incoming laser beam. This allows the proper tangential velocity to be added to achieve a stable orbit. Notice that the thrust in the tilted configuration remains at right angles to the block surface and is quite independent of the laser beam angle. If this technology is to become widespread, the environmental effects of noise pollution from the launch site, the atmospheric effects of the laser beam (e.g., nitrous oxide generation), interference with air traffic, etc., must also be carefully studied. But at present the biggest problem is to find a funding agency that will pay for this research. Unfortunately NASA is reportedly *not* interested.

Let's now turn to the technology of the free electron laser (FEL). It's a spin-off, just 10 years old, of accelerator technology developed for nuclear physics basic research in the past few decades. Basically an FEL is a large electron linear accelerator that accelerates perhaps 10 amperes of electrons to nearly the speed of light, giving them energies around 100 million electron volts. At such energies an electron weighs about 200 times more than it would at rest due to relativistic mass increase. The acceleration of the electrons may either be continuous, using resonant electrical cavities powered by high frequency electrical power, or it may be pulsed with a set of microwave "transformers" that use the electron beam as the effective secondary winding. The latter acceleration scheme appears to be the more useful for LSD wave propulsion, which requires a pulsed laser beam in any case.

After acceleration the electron beam passes into a "wiggler," an intense and rapidly alternating set of static magnetic fields. The wiggler efficiently converts the energy contained in the electron beam to coherent photons and a few hundred megawatts of coherent light energy emerges from the machine. The FEL's conversion of electrical energy to light energy is remarkably efficient. Overall efficiencies of 20% or more have already been achieved with low power FEL devices. A low power FEL was first demonstrated at Stanford University a decade ago, but until the SDIO made FEL development a national priority, it progressed rather slowly. But now with SDI funds as the driving force, two national laboratories and several aerospace companies are in a development horse race. A major facility to test high power FEL devices is being constructed at White Sands Proving Grounds in New Mexico. It's curious to consider that that site, where captured V-2 rockets were tested after WWII, may eventually become our first laser spaceport.

This brings us to the bottom line: the cost of putting a kilogram of mass in low earth orbit with the laser power launch scheme. It's estimated that it will cost a billion dollars or so to produce a FEL installation powerful enough for laser launching. If that cost must be amortized as part of the launch cost, that cost at 10% of maximum capacity is about $180 per kilogram. At 100% utilization the cost drops to $30 per kilogram. If one uses a laser "built for other purposes" such as SDI and does not have to amortize the capital cost, the minimum cost drops to $18 per kilogram. Compared to the $4,000 to $10,000 per kilogram cost of Shuttle freight, laser launching looks very attractive indeed. ■

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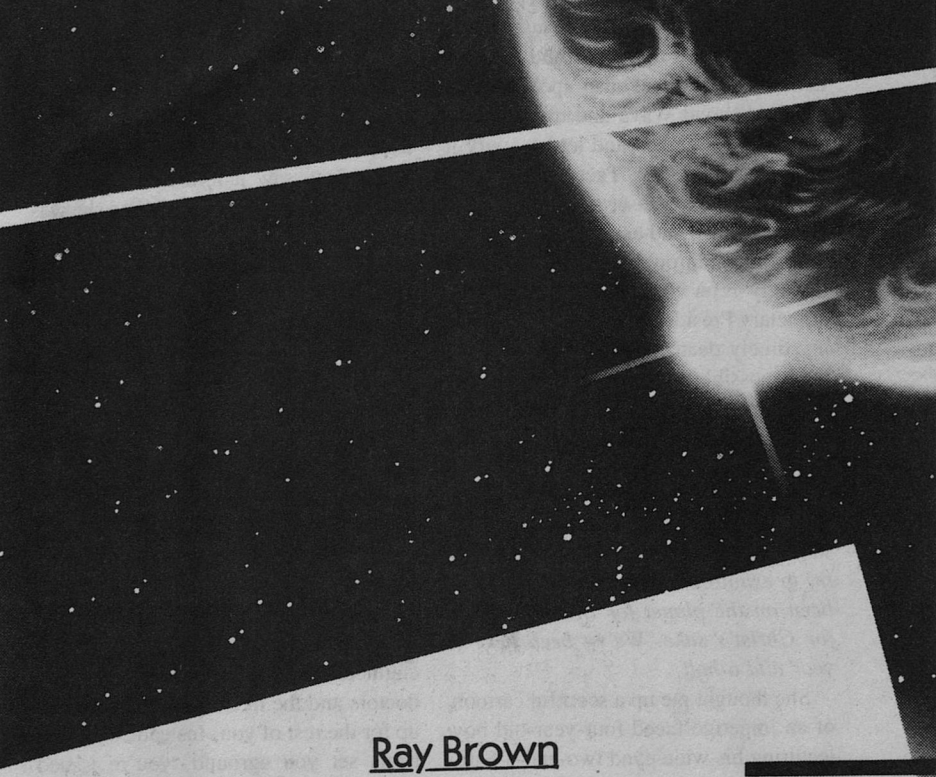
Gary Freeman



Ray Brown

COBWEBS

Some obviously advantageous things have fatal flaws by their very nature, which are quite invisible.

Discovered among the effects of Secretary Henry Dietrich: this unpublished ms entitled, "How We Got Into This Mess: A Primer for Numbskull Kids."

You kids probably don't appreciate it, but there are advantages to being exiled from Earth. One of the major benefits is the low crime rate. You can feel perfectly safe facing someone who's armed and playing with the idea of burning you a third eye.

Mary Kirkpatrick was in just such a state—fresh off the boat and mad as hell. Since she was also spokesperson for the Second Wave and my probable successor, I relaxed and let her work it off in her own way. Tact.

She waved her laser rifle around (the safety was on) and exuded righteous indignation all through the quonset hut we jokingly refer to as the Office of the Planetary President, wondering whether my timely death might not be the best thing possible for the future of the settlement. There was no telling what damage I might do in the two month grace period before the election.

Look, I thought, *I realize the Second wave got a bum deal. But there are reasons. If you'll sit and calm down, I'll try to explain them to you. You haven't been on the planet for two hours yet, for Christ's sake. We've been here a year and a half.*

She thought me up a scornful cartoon of an impetigo-faced four-year-old boy lecturing his wide-eyed two-and-a-half-year-old sister on astrophysics.

Admittedly, I thought, then added, bursting into speech, "but a lot of what I'm trying to tell you has more the character of a lecture to little sister on crossing the street in traffic."

She propped her rifle against the wall next to a chair and sat, still scowling, but calmer. Espers can't stay really mad at each other for very long.

As the murderous red hate-zaps faded into disdain, I got my first good look at her. She was a black-haired, blue-eyed beauty shaped like a pornographer's gold mine. She was literally breathtaking. I gasped, she read me, and her scowl deepened.

Let's try to keep this conference on a professional level, she thought.

I can be professional and lustful at once. We dirty-minded men learn to get used to it.

We both saw it turn into a lie even as I thought it. Even then, when she was not only a threat to our well-being, but full of highly insulting ideas about me personally, I was beginning to feel moony and protective. When it comes to sex and love, I'm afraid I'm a very shallow person. A beautiful face and a great body not only come first and second on my list of desirables, but third, fourth, fifth and sixth. To keep my mind on business, I began talking again.

"Okay," I said, "here's your situation. You wake up from cold sleep expecting to find a city ready for you to occupy. That's why there were two waves to begin with, after all—so the engineers and builders and cops and doctors and the like could get things set up for the rest of you. Instead, when the boats set you aground, you're issued rifles, herded into barracks, and informed that you will be forced by my troops to do communal farming. You can see that the city is less than half-built. You think you've been cheated, at best, and fear that I'm trying to grab dictatorial power. I *know* how it has to look, and I do sympathize."

"I know," she said. "I can read that." Her voice sounded the way silver bells ought to sound and don't.

Look, I thought, no longer feeling the need of speech to help me with my job, *five months after our first ships landed on Clark, humanity made its first contact with intelligent extraterrestrial life. Wanna know the score?*

ET's 846, humanity 17.

Hey, I've already heard some of this, and . . .

They attacked at night, and we were totally unprepared. The robots who scouted Clark for us, remember, had been programmed by numbskulls eager to get rid of us, so there was a lot they didn't find out about. We'd already learned of their failure to discover the strangefruit trees and the jaw bugs, but nobody had even considered the possibility that the robots could miss something like five-foot humanoids armed with cannons and muzzle-loading rifles. Most of the survivors—me included—first found out about them when we were jerked out of dreamland.

In a cold sweat, minds filled with the victims' mental screams of agony and horror. My mind closed a bit, trying to dim some of the clarity of my blood-and-fire memories.

I know a lot of this already, she thought. *But you're well-armed. Why such a slaughter?*

We're well-armed now. *But the First Wave wasn't supplied for any such contingency. Since the attack, many of the hands that should have been working to provide you with indoor plumbing have been working to make you rifles.*

You had hunting weapons.

Yes. And even those were vastly superior to their gunpowder and torches—but it took us hours to get organized. Thoughts were very confused that night. The fuzz was buzzing.

With the sort of hysteria that didn't help clear thinking at all. A bit more of the things-are-all-too-clear iciness of Classic Anxiety would have been a great help, but what most people got was the screaming meemies. When we finally did start firing on them with laser weapons, they caught on fast. Their whole force withdrew into the forest in minutes.

No—it had neither been pretty nor encouraging. Five hundred thirty-one killed, 315 wounded—in total, over a tenth of the first wave. We found eight of the enemy the next morning with holes burned through a vital spot. The other nine had been too seriously wounded to get away from the settlement. So they had slit their own throats.

I was falling into my own, private thoughts again—a common vice among us ex-cops. We'd spent most of our time on Earth using our talent for prying into other people's minds, not for communicating.

I tried to snap myself out of it by focusing my attention on Mary. The hostility was gone. I was far from her favorite person in the world, but she no longer condemned me. Telepathy makes it impossible to avoid seeing the other person's point of view unless you're a prodigy of closed-mindedness. Mary wasn't. In fact, having explored her head for a little while, I began to suspect that her inside was almost as attractive as her outside. It was too bad we couldn't . . .

"You're doing it again," she said aloud, slightly amused.

"Oh! Sorry."

"I understand the syndrome. My brother was an industrial spy and he was the same way. And I talk quite a bit myself—my mother was a numbskull. All us half-numbskulls pick up the habit living with our parents."

I know. Me, too.

And she was a teacher. And her brother had been killed in the Dublin Riots—one of the bloodiest of the anti-esper disasters. Damn! I was doing it again.

"I was going to suggest," Mary said, "that we keep using our mouths. I'm not snobbish about it."

"Yeah," I agreed. "The lust is making it worse than usual, I'm afraid."

"Well, go on. You were thinking something about the extraterrestrials killing themselves?"

"We call them Clarkers. We found out their name for themselves too late for it to catch on. That's because they keep killing themselves to avoid capture. For a long time we knew nothing about them we couldn't get out of an autopsy."

"So they keep attacking, then?"

"Yeah. It averages out to about once every three weeks. They never again did damage anything like what they managed in that first surprise attack, and they only killed five or six of us each of the last three times they raided. Still, they've cut the First Wave down from 8,300 to 6,800. We're in a war we're losing, and I've created this garrison state because I don't see any alternative. If we spread out the way we planned on Earth, we'll be too easy to kill. Our plans for automated farming have been all screwed up, too. We've suddenly got fifty-six thousand people on this planet who have to be fed, but every farm has to have enough people on it to put up a good fight. I'm open to suggestions."

She smiled a lopsided smile. "You score a point, there. I can't see any way to fight an enemy we know nothing about except to circle the wagons."

Which, I saw, didn't mean she wasn't going to oppose me in the election.

"Wait a minute," she said. "You did find out their name for themselves, so you must have . . . you've taken a prisoner!"

I nodded. "In the city jail."

"But you haven't got much out of it."

"Not our fault," I said, picking up Mary's urgent desire to see for herself. Understandable. She was supposed to take the whole story back to the Second Wavers. And if she was going to whup me in the election, she ought to know what I knew.

"We'll go see the Clarker if you want," I said, "but I warn you, it's very unpleasant. No matter how you try to read his mind, the only impression you get is that there's nothing there. And if he's reading your mind, you can't feel it at all. It's a nasty little taste of what it's like to be a numbskull."

She stood up and started walking, so I followed.

"Captured four months ago," I said, as the jeep rounded a corner occupied by the rusty steel skeleton of what was to have been the Sanitation Building. "The damned thing has learned a lot more from us than we have from it. There's not a whole lot you can do with a creature that's willing—no, *eager*—to die to keep you from learning anything about it."

"How about torture?" she asked, letting me know that she'd expect that from a man who solved his political problems with guns.

"Politics *is* guns, Mary. And if I thought torture would do any good, I'd

use it. We're talking about our survival, here. But for this creature, torture's just an opportunity to weaken its body and die that much sooner. We've had to keep it in a straitjacket and a padded cell almost continually since we captured it. We tried untying it once, and within an hour it had torn away a section of padding and was trying to beat its brains out against the wall. And the first thing it asked for when it started talking was a bowl of berries that would have killed it in a matter of minutes. Luckily, we'd learned enough about Clarker physiology from the corpses of their warriors to catch the lie. And enough to keep it adequately fed."

"I'd think it would refuse to eat."

"We use a tube."

"Well, you've learned its language. That should tell you something."

"No we haven't. It's learned ours. We haven't learned enough of its vocabulary even to get a handle on the basic grammar, but it speaks English better than I do." My disgust showed in my voice as well as my mind.

"In four months? Sounds like an esper to me."

We were in the center of town now—the part that was mostly finished and mostly occupied by First Wavers. Room for ten thousand, leaving forty-six thousand out in the cold. We had long ago decided that when the Second Wave arrived all finished housing would be assigned by lottery to the luckiest among all fifty-six thousand, so Mary suppressed her resentment and hoped for a high draw.

"It's true," I agreed, "that mind-reading makes all kinds of subjects easier, and especially languages. So it's possible that the thing's an esper, in which case it can read our minds and we can't read its. On the other hand, it's also possible that it's simply a lot smarter than most of us. Which is the scarier possibility? It's a hard choice."

"You've looked at their brains in autopsies, haven't you?"

"Yes. We can't find anything. But what does that prove?"

I rolled up my right sleeve and looked at my trademark—the cornucopia-shaped birthmark that's part of every esper's genetic package. Back in the days before the Earth government busted up the Corne Company, its genetic engineers had spent generations rewiring the human brain for telepathy. Natural telepathy—if it existed—was something we knew absolutely nothing about.

Then I looked at Mary's trademark. She had the hole cut in her right sleeve that was fashionable then. There had been talk in the early days, after the Corne Company was destroyed, of trying to edit the trademark out, but once the government started in on us, we started investing our pride in the damned things.

I was doing it again. Not even talking stops your mind from wandering all the time.

"I got the point about the Clarkers' brains anyway," Mary said. "Is this the place? It's funny-looking."

The jeep was parking itself in front of the jail—the only civic building we'd finished since the war started. It was small. We'd saved on material and work by squishing its three stories more closely together than the buildings around it. A pedtube that led from our equivalent of a department store on the other side of the street to a big apartment com-

plex a couple blocks behind it went right over the jail, making it look like the jail had hunkered down to get out of the way. Mary and I walked through the arched door. Luke Miller greeted us. Mary gasped.

Luke grinned and pointed his rifle away from us, thinking, *Them jaw bugs don't leave a man too pretty, but you needn't worry. It ain't contagious but for the first week, and I caught it practically as soon as we landed.*

Mary was still dazzled to the point of confusion by his elongated nose and jaw, and by his terrifying emaciation. *Jaw bugs?* She wondered.

Remember? I thought. *Another one of those little items the numbskulls' robot scouts failed to notice.*

It's not fatal? He looks like he should be dead already.

Sometimes it is, Luke thought. *All I can say for myself is I ain't dead yet. Doctors don't think it kills you if you live through the initial stages. Just ruins your chances to be a movie star.*

How's our guest, Luke? I asked.

He jerked his rifle upwards. *Surly as always.*

God, Hank, Mary thought, addressing me by name for the first time, *I wish I'd never come to this hell-hole. Why didn't they just shoot us.* Beneath that was an irrational, unstructured wish that she could conceal her thoughts and emotions when it suited her. There were times when she didn't want people to know that she had unflattering thoughts about them, near as I could make out.

When she calmed down, we went up the stairs.

The Clarker had a big padded cell on the third floor all to himself. He sat on the floor, his leg chained to the wall. He looked like a man, almost, except for the absence of a nose and the grey, Velcro-ish covering on his skin. The straitjacket covered the oddest parts—the bald paunch, and the arms and hands.

"Too bad you can't see the hands, Mary. Palms on both sides. Two thumbs, one going one way, one going the other, and three horny, doublejointed fingers in the middle. Better than what we've got, I suspect. His arms bend more ways than ours do, too."

"You have decided to try to infect me with an Earth disease," the Clarker announced. "I have deduced that there is an Earth disease which affects your brains like a truth serum, and that you are hoping it will affect me the same way."

The Clarker was, understandably, quite paranoid, but usually its paranoia was easy to figure. This one had me stumped.

The Clarker, through smarts or ESP, take your pick, detected my puzzlement after a while and pointed at Mary. "The tumors," it said.

"Oh!" I said. "This is a female." The Clarkers had no outward sexual differentiation. In order to find out what sex this one was, we would have had to cut it open, and, of course, it wouldn't tell us. I explained the function of Mary's "tumors."

"Disgusting," it said.

"Hank, have you asked it why they're fighting us?"

"Of course. But isn't the answer obvious anyway?"

The Clarker made a growling sound that didn't strike me as language. "I'll

be quite happy to tell you again," it said. "You are not *of* this place you call Clark. You do not belong here. We did not invite you, you are not welcome, and we want you to leave. It is not *right* for you to take our land without permission. But you obviously have no sense of right, which makes you even less welcome than you were, if such is possible."

"Can't we make some kind of deal?"

"No deal. You do not belong here. You are uninvited. You are thieves. There is nothing we want from you but to hear you say 'good-bye.' "

"See?" I said to Mary. "How can you argue with someone when right is all on his side?"

Mary zapped annoyance at me without turning from the Clarker.

"If we had a choice," she said, "maybe we would leave. But we don't have that choice. The people of Earth and the other planets that could support human life fear us and outnumber us greatly. They hate telepaths. This is the only planet where those humans who hate and fear us don't live. We had only the choice of being exiled here or being killed, and if we go back they will kill us."

We'd been trying that one on it for all four months—but I let Mary go on. Her own frustration would, I decided, be the most efficient convincer.

"Nor," she went on, "can we go exploring. Our enemies don't want us loose in the galaxy, so they gave us only enough fuel to get here. We must live here, for there is nowhere else for us to go. Can you understand me?"

"Well enough," it said. "It would be a moving tale if you creatures were of the sort that could accept an inevitable death with good grace."

"Inevitable?"

"If you stay here, *we* will kill you. How many ways must I find to tell you that you are unwelcome? How many times must you tell me the same story? Why do you all persist in telling me you have no choice as if that were an excuse for taking what does not belong to you?" It turned to me. "We have accomplished nothing in four of your months. Release me or let me die."

What are *you going to do with it?* Mary asked me.

On the chance that the thing couldn't read our minds, I went along with Mary's mental whisper. *I don't know,* I thought. *It's been doing a pretty good job of convincing me we're not going to get any worthwhile information out of it. Maybe we should do what it wants and slit its throat for it.*

I stopped broadcasting coherent sentences at that point and spiraled back into my funk. I wanted to kill it because I felt sorry for it—because, in a way, it really was in the right. But there was always the possibility, however small, that if we kept it alive it might let something important slip from those tight lips. My sympathy was . . . well, call it unpatriotic.

My thoughts were nowhere near that well-organized, but Mary managed to get the gist of it nevertheless, and thought, *What's wrong with letting it go?*

I was outraged. My thoughts turned back to the carnage of that first attack and I shot Mary a couple of especially bloody images, adding, *I have no intention of being* nice *to the sonofabitch!*

The purpose isn't to be nice, she thought. *That's incidental. This is the only Clarker you've captured. How do you know he's typical? If you let him go he's bound to carry our story back to the others, and maybe they'll feel differently about it. Even if they don't feel sorry for us, they still might realize that desperate creatures fight a lot harder, and are likely to take a lot more Clarkers with them.*

You really believe that!

And I can see you really don't. But you'll have to admit the chances of my scenario coming to pass are a lot better than the chances of getting anything useful out of him here in this cell. What have you got to lose?

Whatever small opportunity might be left for me to win the election, for one thing. I'd be releasing a critter whose highest ambition is to kill as many of us as possible.

Insignificant, Hank. In the worst case, you'd only be adding one to . . . thousands? millions?

Who knows?

Are you afraid it might have pried into all our military secrets?

If the Clarkers can read minds, then we don't have any such thing as a military secret—as you well know, since that's one of the reasons we got kicked off Earth. (Don't bait me, Mary!) But that cuts both ways, you know. If they read minds, then they already know our sad story, and they're still attacking us.

I agree that letting it go only has a point if it isn't an esper. So what? Maybe it isn't.

That was so. The more I thought about it the more the idea of letting it go began to look like what generals euphemistically call a "calculated risk." Mary saw my weakness and pounced.

You don't need to worry about the election, either, since everybody will know it's my idea. We read minds around here, remember? If I think of it and you do it, then we're both going to get praise or blame together, and it shouldn't have any effect one way or another on the results of the election.

What about the possibility of a third party?

I don't sense anything in the fuzz that makes me think this is an issue that would get a third party started.

The fuzz is pretty new to all of us, Mary. I don't think we yet know how certain our interpretations are.

Granted. But I'm willing to take the risk. How about you? When all's said and done, you have to admit that my slim chance is fatter than your slim chance. You're admitting it right now!

She was right. And our combined conviction must have been pretty strong, because Luke, who'd have liked to keep the Clarker locked up just for revenge, was walking towards us with the keys.

I still don't know whether or not we made what can rightly be described as a mistake.

We decided the safest course would be to drive it to the edge of town in its straitjacket and let its buddies in the woods cut it loose when they found it. As the four of us were walking out the jail house door to carry out this plan, we saw a crowd of several hundreds gathering in the street. The thought had gotten around pretty quick. The people weren't hostile—after all, they understood the reason for what we were

doing—but since there weren't many opportunities to study a live Clarker at leisure, they were eager to get a good view of it one last time.

Unfortunately, that meant we had a hard time persuading people to make a path from us to the jeep. It must have taken us five minutes to walk thirty feet.

While we were getting there, we heard a scream from the folks on the other side of the jeep—under the pedtube. The four of us weren't able to see anything from where we were, so I read the crowd. I was in luck. Joe Pappas happened to be on the scene—one of the best physicians in the First Wave. I told Luke to keep the Clarker covered.

Borrow your eyes, Joe? I asked, already doing it. The people near us were forming a circle around a man I didn't know. He had apparently gone to sleep in the middle of doing a contortionist act.

Sure, Joe thought. *My mind, too. It's a broken neck.*

See anything?

No. Nobody did. We were all trying to see the Clarker. And nobody around here broke it for him, either.

I know. I just read that. Look up at the pedtube, please.

My idea was that maybe the pedtube had been as crowded as the street and that the man had fallen when something had given way, but there was nobody up there, and the tube looked okay. Could somebody have broken the man's neck accidentally in the jostling, and been unaware of it? It seemed unlikely. No, impossible. Joe's memory was that the crowd had still been pretty scattered back here when it happened.

Telekinesis? Mary wondered.

There's no such thing, Joe and I answered.

Maybe not in humans. But I wasn't thinking of a human agent.

I pulled out and looked at the Clarker. It was wearing an expression I'd never seen on it before—one that I was tempted to interpret as laughter. But I thought twice.

Hell, Mary, if it could break necks at a distance, it would have done so the first time we had it unchained. It would have escaped. For that matter, the whole lot of them would have broken all our necks by now.

By this time we had made it to the jeep, Luke herded the creature into the back seat, Mary and I got in front, and I told the jeep to start up and back out, very slowly. The crowd made room. I noticed Victor Demarvis, one of my best cops, driving a disorderly drunk to jail about a half-mile away and assigned him the job of trying to get a handle on the mystery.

We started the construction of Clark City in a clearing in the forest a little north of the mountains, and had expanded the clearing outwards. We had always seen the forest from the outside, so to speak, and had no idea what life under those broad, green-and-white leaves was like. I was almost envious, watching our straitjacketed emissary scamper into the dim light and fade away.

I had no urge to follow, though. The few men who'd tried it had never come back.

I let my imagination run wild in the woods for a few minutes, then picked Dave Seelig, my Secretary of State and

maintenance man, out of a bunch of technicians and botanists who were broadcasting a primer on Clarkan farming to the new co-op farms.

ANY TROUBLE DAVE? I asked.

No need to holler, he thought. *I'm not that far away.*

Well?

No trouble, but a lot of resentment. Most of 'em have picked up enough information by this time to see the reason for what we've done to 'em, but that doesn't mean they have to like it. Emotionally, they see these farms as concentration camps. It's just too much like the way we were treated on Earth. You're going to lose this election, Hank.

I know.

And very few of 'em think we've done all we could during our year and a half. The general idea seems to be that even if we were being attacked once in a while, surely we could have got more than a fifth of the facilities ready. Well-meaning, but lazy, that seems to be the verdict. Oh—and it seems we're a bunch of sexists, too! We're going to lose this election, Hank.

I know, I know. G'bye Dave. VIC?

I had to yell a few times to get Demarvis. When I did his answer was short. *Nothing yet, boss. I'll catch you when I have something.*

I pulled out and turned to Mary in the jeep. "Did you listen to any of that?" I asked.

"Every word," she said.

Now, according to numbskulls, I'm supposed to be offended at that sort of thing, so maybe I should take a little time to explain why espers aren't offended, and can't be.

In the first place, we automatically broadcast and receive thoughts all the time—it's our nature. We couldn't stop reading each other's minds if we wanted to, which we don't; if I fail to pick up what's on some nearby esper's mind, it's only because I'm trying to concentrate on other minds, or I'm fading into the fuzz, or something like that.

You numbskulls have this thing called "privacy." You consider it precious, and I respect that. I used to think the idea was just the way you tried to make the best of a bad deal—tried to turn the horror of your isolation into a virtue, or sacred right, or whatever the hell "privacy" is supposed to be, but I learned better on Earth. The main reason people hated us there—and they were far more passionate over this than over the industrial spying, or anything else that might really have done some few of them actual harm—was because of our potential to "violate" their "privacy." I don't doubt that there's something very important going on here.

But whatever it is, we don't have it. Espers sometimes find themselves annoyed when they can't close out the others enough to think something like an independent thought (even though the Esper Insight suggests it's probably really all One Thought anyway) and it's been proposed that such annoyance is the esper version of your feelings when your privacy has been "violated." You all deny this, though, and I figure you'd know better than we would.

But we know better than you would about the way *we* feel, okay? We don't care, and the only reason I asked Mary if she'd been listening was to find out whether she'd picked up the fact that I didn't have anything to do at the mo-

ment. I intended to ask her over to the Presidential Palace for a drink, and that would give her one less excuse for turning me down. She picked that up, too.

"You don't seem to care whether you win this election or not," she said.

"Because I want you to come over for a drink?"

"Seems to me you should have bigger worries than getting into my pants. But just now, when you were talking to Mr. Seelig and he told you you were going to lose, I didn't pick up any but the mildest emotional disturbance. Earlier today, when you saw I was still going to oppose you even after I understood why you marched us out to the farms, it never even occurred to you to try to pry into me deep enough to find out why. Don't you want to win?"

"Well, sure . . ."

"No. I *want* to win. You would *prefer* to win."

I gazed at those pulpy, fat-leaved trees and thought about it.

"You're right," I said at last. "Thanks for pointing it out to me. I only want, uh, prefer to win the election because I want to feel vindicated and think people like me. As far as the job itself is concerned, I think it sucks. You want that drink or not?"

She nodded, pleased. She felt that, having acknowledged my true feelings, I would be that much less likely to fight a hard campaign, and she was right. If the folks really wanted me to continue as President I would. If they didn't, so much the better for me.

You're a smart lady, I thought.

She nodded again.

Luke dropped us at the quonset hut. I left word with Dave to zap me if there were any national emergencies, and we ensconced ourselves in the kitchen of my little apartment in back. I broke open one of the last bottles of Beam's Choice and we sat at the kitchen table, sipping, not saying anything for about a half hour, mostly not communicating directly in any way, but just feeling the fuzz.

I'm not sure how to explain the fuzz to you numbskull kids, but since it's another difference between us that's going to keep coming up, I've got to try.

Telepaths, with a very few exceptions, have a range of from three to five miles. When we were on Earth we were spread out all over the place, surrounded by numbskulls. There were hardly ever any more than three or four telepaths within range of each other at once. Until the government rounded us up for the purpose of shipping us here, we didn't know what the fuzz was, either.

But when you get thousands of telepaths within an area of a few square miles, you get fuzz.

It's well known that numbskulls can't receive esper messages, but the fact is that they're terrible transmitters, too. You have to make an effort to read a numbskull mind. So they don't contribute anything significant to the fuzz. Espers, as I said before, transmit and receive continually, even when they're sleeping. Our only choice is in how much we want to focus it. So when you jam a bunch of us together the air is thick, not only with esper messages, but with dreams, subconscious imagery, somatic static. An esper can never focus tightly enough to close it all out, and

this continual mental background noise we call fuzz.

In trying to explain what it is, I've come to see I can never really describe it to a numbskull. You'll have to take my word for it that you can not only thread your way through it and find someone you want to talk to, but that you can open yourself up to it and get a slight buzz off it. What's it feel like? Sorry, kids. But that's what Mary and I were doing.

It's hard to stay that unfocused for more than a half hour, but that's more than enough time for the bourbon to start kicking in, so when we took up the conversation again, we weren't really losing much.

Mary looked a lot friendlier.

Naturally, I had to ruin it by asking her what Dave meant when he said Second Wavers thought first wavers were sexist.

Jesus, Hank—can you ask dumb questions! How many women were in the first wave?

None. But that was Earth's idea, not ours.

Sure, but we've been prying you some. A hell of a lot of you guys seem to approve of the idea. And you, President Dietrich, don't seem to be totally against it yourself.

That's because there are a couple of very good reasons for it. In the first place, it's not exactly an ideal time to have a kid. Even if we could have stuck to the original schedule, I doubt that we'd have all the dangers pinned down by this time. . . .

Strictly enforced birth control.

That gives the First Wave an extra problem. And how strictly could it be enforced, anyway? We're talking about a task force of 8,300 people, here. And the second reason—not sufficient in itself, but a good additional one, is that most of the First Wave work was donkey work. There are some differences between the sexes, and one is that men make better beasts of burden than women.

Sounds sexist to me.

"You know it doesn't," I said, indignation setting my vocal cords going. "And if you try to make a campaign issue out of it, I don't think you'll get very far in the long run."

I turned my chair so I was staring into her eyes and continued.

"You know espers can't have any such problem. We can be absolutely certain of what numbskulls can only guess at—that when you cut away the intelligence, the ambition, the training and twisting, the race, the sex, all the externals, there's still something there. And that something is exactly the same in all of us. So far, I'm an agnostic on the question of whether there might only be one Person looking out of all our eyes—but an esper can't dismiss it as an unreasonable hypothesis."

"You're right," she said, genuinely sorry. "It's a stupid issue. The people who are raising it are just striking out blindly because they've been disappointed. Terribly disappointed."

Wanna fuck?

That was abrupt! A giggle, then. *Oh! I see. Yeah, thinking about the white light makes me horny, too. I'm not sure how good an idea it would be for us to get that closely involved during the campaign, though. I'd think it would be wearing, loving and fighting at once.*

And I do sense you want more than a one-night—or day—stand.

What about after the campaign?

Would you want to make love with me if I didn't look the way I do?

Sure. Not nearly as much, though.

She checked me out, then laughed out loud. *You are a pig! The answer is I'm not sure yet. Maybe.*

She was right about my order of values. This time I pried her deeply, for several minutes, layer after layer. Some women say maybe and mean yes, and some women say maybe and mean no.

But what can you do with a *real* maybe?

I didn't have time to figure it out. At just that moment, Vic Demarvis zapped me.

BOSS! BETTER GET DOWN HERE! THERE'S ANOTHER BODY!

It struck me—now that the population had increased more than eightfold—that the definition of an "odd job" was going to change. I had been acting in capacities ranging from Secretary of War to Sewer Commissioner, but those days were probably over. If Mary took over the job, she was going to have to sweet-talk some sucker into being Chief of Police.

I knew this one. Pedro Yao—an ex-industrial spy who set up and ran our little paper mill. He wasn't dead, but he was unconscious. Joe Pappas was there and explained, before he left, that Yao had a broken leg and the back of his head had been smacked hard. We couldn't pick anything up from Yao that would give us a clue as to what happened.

"But I *saw* what happened," Vic objected aloud as we were pulling out of Yao's bleached mind. He chewed his lip and tugged on his prematurely grey hair. "He fell from the pedtube."

"How?" Mary objected. "It's all glassed in."

"I know it doesn't make sense," Vic said. "But that's what I saw. We had the roads and the pedtube blocked off while I pried into everybody who was here when the first guy got his neck broken. I didn't find out a thing, by the way. Anyhow . . . I was still down here when they took the horses out of the tube, and I was looking in that direction. Yao fell out of the sky, and he had to fall from *somewhere*."

Could he have been walking on top of the tube for some reason? I wondered.

"If he'd fallen from the top of the tube, he wouldn't have been lying right under it," Vic said.

"So if there's a hole in the floor of the tube, where is it? I don't see it."

I'm ashamed to admit how long we ran around in that circle before we actually went up to the tube to look. It's enough to say that when we did, we didn't find anything to decrease our puzzlement.

The pedtube was a lattice made up of big squares of tough glass joined by laths of metal salvaged from the ships that brought us. As we neared the point above where I'd seen the two bodies, I motioned Mary and Vic to stop, and got down on my knees, pushing on the bottom squares, feeling for I didn't know what.

Then came the scary part. When I got to the square immediately above the

spot, I pushed my hand *through* the glass, as if there was nothing there.

It was a dizzying experience at that height, and I looked up to stop the spinning. When I looked back down, there really *was* nothing there. No glass. The metal joint that had looked solid a moment ago was now twisted and split.

"Look at this," I said to Vic.

At what?

"Okay. Get down here where I am and push against the glass."

"Jesus," Vic said when he'd done so. "It's not there. And the metal is warped. It must have fallen out."

By this time Mary could see it too. "There's the panel," she said, pointing. "Down there. Something's knocked it up against that building."

"Why couldn't anybody see this before?" Vic asked.

"Because the Clarker really *did* do something this morning," Mary said.

"Yeah," Vic said. "Must be. But what?"

The pedtube puzzle was only a two-day wonder. The most popular theory at first was telekinesis and mass hypnosis. The objection to the theory was the same one I'd raised earlier: if the Clarkers could do such things, why hadn't they used their powers to wipe us out in their first attack?

The counter-objection was frightening. People began to wonder whether the Clarker we'd set loose might have discovered this new way to get to us while it was in jail, and be even now teaching its newly acquired technique to some Clarker army. The mystery of the pedtube was forgotten in the hysteria of imagining scarier and scarier powers for the creature. Within a week, not only was there wide disapproval of our decision to let the thing out of jail, but there was talk of a third party.

The reason a third party never got off the ground was that the Clarkers didn't attack us. Since the first attack, we'd never gone longer than a month without having to fight a battle. When the Second Wave landed it had already been three weeks, and by the time election day rolled around people had mostly decided that we must have done the right thing. The panic had disappeared.

The election was at nine o'clock on a warm November morning. The ceremony was simple. Mary walked into the Imperial Residence at nine o'clock and I handed her the keys.

Those early years were good ones—at least, they seemed so to us at the time.

It took about two more months before we decided to begin acting on the possibility that there wouldn't be any more attacks. Full-scale building began again and the co-op farms were gradually abandoned. Within a year after the election we were living in the sort of place we'd originally planned on, modified slightly for greater defensibility. The crops were plentiful, production was up in everything but armaments, and by the second year we'd even begun picking up our cultural lives where they'd left off. We had two moviemakers competing to supplement the tapes we'd brought from Earth. We had a good string quartet and an amateur symphony orchestra that was listenable—they played *together*, at least. Sometime in that second year there came a point when Clark City and environs, by some magic, turned into home.

And there really were no more attacks, although every once in a while we'd catch sight of a Clarker on our turf. However, we did begin to see repetitions of the pedtube incident. People would step solidly on a step that wasn't there, or crash into a downed utility pole they couldn't see, or whatever, and in time, as the accidents were investigated, the fact that the step was missing or that the pole was lying in the middle of the street would become apparent.

As time went on it took longer for the mass hallucination, or whatever it was, to go away. In the eleventh year of the settlement twenty people were killed at a rained-in barbeque when the sun came out and the guests, sick of the smoke, stampeded towards a non-existent balcony. People were tripping over pieces of masonry and cast iron for two months before the illusion of the balcony above disappeared and the trash below could be hauled away.

So it seemed the Clarkers *were* still fighting their war, after all, and had simply changed to an incomprehensible strategy, using incomprehensible tactics. The "accidents" themselves occurred rarely enough that the chances of being killed were no scarier than, say, the chances of being killed in an auto accident on Earth. But the incomprehensibility scared us. What we knew about the Clarkers, outside of basic anatomy, could have been written on a notecard. Parties foolish enough to venture into the forest still disappeared. We left a couple of ships in orbit, but whatever it was Clarkers did, they did it under the cover of the forest which covered most of Clark's single continent.

One of the most scared was Mike Wilner. Mike had been involved, early on, in our attempt to create telepathic movies—the idea was to do an entire production in one head. After it became obvious that nobody was capable of the sustained concentration necessary to bring that off in the necessary single sitting, he turned himself into our equivalent of a TV station. He had the largest collection of Earth tapes on the planet, and thousands of us would share his head while he watched them. Mike took the analogy with Earth TV a little too seriously, though, and began slipping in editorials—sensational, even hysterical ones, constantly dreaming up new powers for the Clarkers in order to explain whatever setbacks we'd had recently. He should have been a science fiction writer.

He was the founder, and usually the candidate, of the party that opposed Mary each election. The threat wasn't serious. Mary won by a large margin year after year—not surprising, since an able telepathic politician can *always* be sure of keeping tabs on public sentiment. Besides, the public was with her on the Clarker issue. Whatever it was they were trying to do, we were a lot better off now than before we let the Clarker prisoner go, weren't we?

Most of the time I featherbedded as Mary's Secretary of War and worked as her Chief of Police. (Salaries, even today, are so low for public officials other than the President that they have to hold two jobs to make ends meet. I'm not sure whether that's a scandal or a great idea.) Being Chief of Police taught me how to be a policeman. None of us old Earth cops were really very good. We all did valuable work on Earth, of

course, but how much skill does it take to find a criminal when you can read minds? Being a cop in an esper society is a totally different job—there's no way to justify drawing your pay except to get out there and make friends with the folks and try to master the real cop's job of stopping trouble before it starts, and in an esper society this is hard work, since real trouble is so rare to begin with.

Mary's maybe turned into a yes right after that first election, and from then on we kept up an on-again, off-again relationship. That is, it was always on with me, but sometimes it was off with her. I looked for other women, of course, and occasionally found them, but as far as I was concerned, Mary was the best looking woman on the planet. And I had grown very fond of her. An irresistable combination.

Like I said, things seemed good then. It may be hard for you to believe now, but I didn't have even a clue to the mess we were in until fourteen years after that first election, at a party thrown by Joe Pappas, the MD, to celebrate the beginning of Mary's new term.

The party was tailing off, and the twenty or so of us who were left were crowded into Joe's den, where the last full beer barrel was. I was loaded enough to have to sit to think, but fortunately, as Consort of the Guest of Honor, I was assured of a seat right next to her on Joe's three-man Snufflerhide sofa. The couple sitting on the other side of me were mentally gabbing about the big news story of the day, which was that a farm equipment repairman who had gone on business to one of the farms east of town had made one of those rare sightings of a Clarker. Joe, who was a Charles Atlas type about twice as wide as me, walked over with two full steins and asked the couple if they minded if he squeezed in. They said sure, why not, and the distaff half of the couple, who had been sitting on the far end, took a seat on the arm of the sofa.

Her boyfriend's thoughts took on an increasingly unhappy, pained flavor, and a minute later, after deciding that Joe might not be in any condition to mend his broken pelvis, he was perched on the arm with her. Joe took advantage of the few inches that gave him to scoot around and face in our direction. Keeping his thoughts as focused as he could, he said, "I'd like to talk to you two about something when you've got a minute."

I wasn't doing anything but sipping and having minutes. Mary, however, was busy admiring the sleepy little four-year-old girl sitting in the chair next to her, in Dave Seelig's lap. Dave was the sort of parent who thought it was wonderful that his daughter could talk like an adult at three and read at three and a half—as if being able to literally pick the teacher's brain didn't make the same accomplishments possible for practically every esper kid. Her latest miracle was quadratic equations, and Mary was oohing while the kid grumpily solved a few simple ones. The amazing thing is that Mary's oohs were genuine. What can I say? A born politician.

Be with you in a little bit, she shot back at Joe.

You look low, Joe thought at me, peering into my stein. He sloshed half of one of his into mine, then finished it in two big gulps.

I gestured at the kid, thinking, *How's business?*

Joe grimaced and went into his usual routine about how we were all too damned healthy and he'd been forced into obstetrics and pediatrics because it was the only reliable source of income. Which was true.

Seriously, he finished, *this planet does seem to be awfully good for us emigrés. Less sickness generally, and even the sick ones seem tougher.*

What about the jaw bugs? I asked.

You know, it's been a coon's age since I've seen a case of the jaw bugs. Oh, I admit we had a lot of sickness when we first landed. But there seems to be something in the very process of Earthmen getting acclimated to Clark that makes us far healthier than average.

What do you mean by "getting acclimated?" You seem to be suggesting that people who are born here won't get the benefit.

That's what I mean, all right. In pediatrics, I can make a living.

Mary cut in. *What do you want to talk about, Joe?*

We're more or less on the subject already, Joe thought. *Childhood disease. Childhood death. From asphyxiation. Not pretty.*

He flashed us a picture of a smothered baby to prove it.

"Jesus, Joe," Mary said aloud, radiating exasperation, "don't come at me with your Clark Infant Death syndrome lectures again. What am I supposed to do to stop it? Pass a law?"

Governments have been known to fund research. And there are plenty of MDs who've been forced into some other line of work whose time could be more profitably spent researching CIDS. But forget that, for now. I've got a different request.

His thoughts became disorganized and almost too fast to follow. He was trying, I think, to pick the best approach.

Eventually he sneezed and thought, *Lately I've been doing a little unfunded research on my own. I've been getting nowhere on most fronts—can't isolate a bacterium or virus or any kind of toxin that might be responsible. But I did come up with one remarkable fact just by counting up the total number of kids I've treated since we landed and comparing it with the number who've died from CIDS. Seven hundred eighty-one in my files, and forty-seven victims. That comes out to four a year.*

I'm afraid Mary and I were unimpressed.

Listen, if that's anything like representative, we've got a death rate from CIDS of six percent! That's screwy. It's just too damned high to believe.

How so? Mary asked. *You've already admitted you don't know anything about the disease.*

Okay. Maybe I can't help comparing it with the old SIDS figures. But I'll tell you what I think. I think it's the Clarkers.

There it is again! I thought. *Are we going to cook up some imaginary ability for the Clarkers every time something goes wrong? You sound like Mike Wilner.*

I haven't cooked anything up. I'm just proposing that we look for a connection.

I'll grant that you haven't gone so far as to invent a telepathic power to ac-

count for CIDS. But the Clarkers can't do such a thing without some means, and whatever means you eventually propose, I'll raise the same objection. If they can do it to six percent of our kids they can do it to all of us. And they haven't.

Joe started arguing that we didn't know enough about the Clarkers to say what they could or couldn't do—that for all we knew, six percent was all they could manage. But the emotional reaction that lay behind the arguments was plain. His forty-seventh CIDS death had been earlier that day, and right afterwards he'd heard about the repairman spotting a Clarker.

We've got your number, the couple sitting on the arm of the sofa thought.

Mary surprised us all by deciding to take Joe seriously. *What do you want us to do, Joe?*

Hank, Joe asked, *does the War Department keep records of Clarker sightings?*

Sure. But only date and place, nothing else. And there have only been fifty or so reported since they started showing up again. I'm afraid you're not going to find out much that way.

Joe was disappointed. *Still,* he thought, *I'd like to take a look at them. Is it all right if Hank has someone zap me the figures in the morning, Mary?*

First thing, Joe.

What gives, Mary? I asked.

Mary yawned. *Let's go home, Hank. We'll be two hours short on sleep as it is.*

Mary didn't feel like thinking about it while we were driving to her bungalow on the edge of town (she had moved out of the quonset hut in her eighth term) so I pried into her a little. When the jeep pulled into the driveway, I had found out only that it had something to do with census figures.

Once in the house, Mary went straight to the bedroom. I followed her in, had a sneezing fit, and started prying again, but Mary—in a very calculated, controlled way—began zapping me with so many lewd and lascivious images that I gave up trying to concentrate on affairs of state. She was really very good at this. One time, I remember, while she was at her office and I was attending a concert of short instrumentless musical pieces across town, she kept zapping me that way until I came in my pants. Mary has a low sense of humor.

This time, however, even though our bodies were tightly pressed together, her heart wasn't in it. (Until the very end, that is. One of the benefits of esper sex is that if one partner has an orgasm, the other does, too. Always. And often, along with the partner, the next-door neighbors.)

It was pure mental manipulation. Don't knock it if you haven't tried it.

I kissed her trademark when it was over, and said, "I've never been stalled more pleasantly, dearest."

"Yeah," she said. "It was a stall, wasn't it? And I'm not sure why I'm stalling. Maybe I'm just tired of government work. Sometimes it seems as if I've had this job forever. Or maybe I'm just tired, period."

It was a thought. She did look tired—a lot more tired than being up a few extra

hours would account for. And even so, she was fantastically beautiful.

"Let's sleep, then. We can talk about whatever it is tomorrow."

"No," she said. "Pry me again. I'll help this time."

So I did, and she did, and this time it all came spilling out.

A lot of it was fear. Fear of failure. Fear of the Clarkers. Fear of being thought ridiculous for being afraid of the Clarkers. Fear of being thought ridiculous for not being afraid of the Clarkers. In the center of it all was fear of death and, nearby, something about census figures.

"So that's it!" she said. "I've associated those damned numbers with my own death. No wonder I didn't want to talk about it." She looked far less tired, now.

"Is it that bad . . . whatever it is?"

'No," she said, shaking her head sharply. "But bad. The biennial figures came in today, and there was another drop . . ."

My disappointment filled the air, but at the same time I said, "That wasn't entirely unexpected, was it?" I thought it over in a plodding way, so Mary would be sure to pick it up. A predictable population boom as soon as the men and women got together again. A peak in population in the fifth year of the settlement, at around 59,000. A slow decline in population ever since—just what you'd expect after a boom. Surprising that the decline had continued this long. And unfortunate that the decline seemed to be accelerating slightly. But . . .

Nothing slight about it any more, Mary thought, flashing the image of a line on a graph zooming parabolically towards zero. *Two years ago we were at 55,300. Now we're at 54,300. We're losing this war!*

Pardon?

We are now 1,700 fewer than when the Second Wave landed! Whatever the Clarker strategy might be, it's successful.

Do you know how crazy that sounds?

Nothing crazy about it at all. We might not understand their methods, but we know what their purpose is. They don't want us here. If our population is declining, then they're getting what they want.

We've got a low birth rate—espers are used to a comfortable standard of living. Gonna blame that on the Clarkers?

"A low birth rate doesn't explain the *death* rate, Hank. I know that in a population as small as ours there'll be more statistical anomalies than in a larger one, and I'm not ruling out the possibility that the whole thing is accidental. It's just that I can no longer afford to ignore the possibility that it might be by Clarker design. That's why I'm taking Joe seriously. Hell, I'd even help Mike Wilner, if he asked me. It's time to start investigating any theory about the Clarkers, no matter how nutty, that might help to explain what they're doing."

"I don't see what CIDS has in common with those Clarker-arranged 'accidents.' "

"Me neither—unless maybe those children are breathing air that isn't there. But I'm not going to ignore the possibility that the Clarkers are using a bunch of different techniques simul-

taneously. Joe's idea is at least worth checking out, isn't it?''

A purely rhetorical question. She reached over to the nightstand and switched out the light, and I let her have the last word. That's normal procedure with me. Winning an argument with Mary is worse than losing.

The street lamp outside our window gave me enough light to see Mary clearly as she faded herself into the fuzz to get to sleep, and I found myself staring at her and thinking yet again that she was as beautiful as the day I met her. She smiled, then faded in further.

I recalled the people at Joe's party and realized that it really wasn't much of a compliment. Everybody—men and women alike—looked just about as good as the day I met them. We were a remarkably well-preserved bunch. Joe was obviously right about the beneficial effects of being transplanted from Earth.

Wait a minute!

He couldn't be right. Add the deaths from CIDS to the deaths from pedtube-type accidents and together they wouldn't come close to accounting for all the deaths.

There was a question worthy of research. If we were all so damned healthy, why were so many of us dying?

I fell asleep and dreamed I was breathing air that wasn't there.

The next morning I woke up looking through Joe Pappas's eyes.

This sort of thing has happened to us ever since Earth first imprisoned large numbers of us together in the spaceship yards. An esper goes to sleep dreaming his way through a problem and wakes up reading the mind of someone who's thinking about the same problem, or a related one. And the longer we had lived together, the more frequently it happened. In fact, by this time it had progressed to the point that people would often wake up as part of a cluster of a dozen minds or more that would go on working on the problem until a consensus was reached. It wasn't quite like a voluntary clustering. Your personality is much more loosely integrated when you first wake up, so, with more psychic space for pieces of other personalities to fit into, the whole cluster—a supermind, Joe liked to call it—worked even more like a single mind than a voluntary cluster. Sometimes it took hours to get everybody untangled enough to get out of bed.

It was unfortunate, I thought, staring up at Joe's sun-speckled ceiling, that these superminds didn't seem to be much smarter than ''individual'' minds. They'd solved some problems, but they'd also flubbed quite a few. And, of course, they'd never gotten anywhere with The Problem.

No matter how powerful a mind is, it's always going to be limited by the data available to it, Joe objected. *And besides, its existence is not justified by problem-solving.*

Joe always thought of it in the singular. We were all the same, fragmented Person, after all, and the supermind was simply His mind partly re-unifying and thinking through us. Joe took the Esper Insight as literally and seriously as it was possible to take it.

I always found it puzzling that a doctor could be this way—especially one who fought death as hard as Joe did. If we were all one Person, then the worst

that could be said of death was that He lost one of His many inputs.

The inputs are important, Hank. He/I want/s to grow, and need/s more data.

I noticed something odd when Joe was forming that last thought into something clear. He had identified the Person with the fuzz.

The fuzz is certainly an aspect of Me/Him. It's another manifestation of his reunification. You remember how the fuzz was fifteen years ago. Think of how it's changed.

I hadn't thought about it before. There had definitely been a change, but I couldn't think of a way to characterize it. Joe's idea that it had become more "harmonious" was the best I could do. I resolved to try to think about it again when I was out of Joe's head and he wasn't "helping" me.

An esper can never think totally in isolation, these days, Joe thought. *If nothing else influences him, there's always the fuzz.*

I started wondering what an idea like "thinking in isolation" could possibly mean in any day, even for a numbskull, and got hopelessly tangled up. Joe caught my confusion and we got continually more tangled until we zizzed out—something else you numbskulls won't really be able to understand, unless you're epileptic.

It got us back to business.

Surely I wasn't drawn here by religious yearning, I thought. *You've been worrying over the CIDS problem, right?* I flashed him some of my dream images of suffocation.

I felt his body lurch upright. We looked towards his dresser.

I stayed up half the night, he thought, walking to it, *persuading the other doctors in this city—those who still work as doctors, that is—to give me their CIDS figures.*

There were several sheets of paper on his dresser: a hastily scrawled list of names, dates, and places.

Not as much work as it sounds, he went on, *since there are only a dozen of us. The hardest part was getting a couple of doctors in deep sleep to lighten their sleep enough to get out of bed and look in their files for me.*

He focused his eyes on a page, as if it would mean something to me, and thought, *609 recorded CIDS deaths.*

You want to compare dates and places with my list of Clarker sightings? Okay. Emil Smith should be on duty at the station by now. But I hope you're prepared for disappointment. Even if there are a few matches, it won't prove a thing.

What if a lot of them matched? Ninety percent, say?

That won't happen, Joe. We know for a fact the Clarkers have to be around to arrange our "accidents." Even if they're doing something else, too, a lot of those dates will be times they were here cracking sidewalks or something.

Lets go find out.

So we contacted Emil, copied the list of Clarker sightings at the station, and compared them with Joe's list. We started with the dates. There had been fifty-two sightings. There were fifty-two matches.

I pulled out without giving Joe nearly as much time to gloat as he'd have liked, then got dressed and went to the station in person.

Although it was only the thirty-second of November, the temperature had fallen to −6° C overnight. It looked like an early winter. I was hoping the cold air blowing on me through the drafty jeep would clear my mind.

It didn't do too much good. Obviously, the Clarkers were related somehow to CIDS. Beyond that . . . well, maybe I can save time by just saying that I came up with approximately one new theory per city block, and I never came anywhere close to the truth. It is to my credit—or maybe the cold wind's—that none of them felt like the truth, and that I managed to arrive at the station as open-minded and doubtful as when I'd begun the trip.

I sat for a long time in my top-floor office doing nothing—staring out my window at the city. It seemed realer than real in that unnaturally clear sunlight the northern air brings, and it was all clean and bright. I like a clean city. The stone shone white. The wood gleamed. It was beautiful. But the sudden drop in temperature had kept people off the streets, and I started imagining it as a ghost town.

I turned away from the window and marched quickly out of my office, scanning the building to make sure Maurice Wang, city coroner and brewer of the best beer on the planet, was in his. I needed to talk to a doctor about the question I'd stumbled on last night, but I didn't want to talk to Joe right then. I could trace his state of mind through the fuzz, and he was still full of I-told-you-sos.

Maurice sat with his short, stubby legs propped on his desk, his face invisible behind his paunch, playing *Crazy Rhythm* in his head and keeping time with his whole torso. The chair wobbled ominously.

"Hi, Doc. What do people die of around here? The adults, I mean."

Crazy Rhythm disintegrated in brassy confusion. The chair shot backwards, swiveling, and Maurice caught the edge of the desk and steadied himself. *That's one of the more bizarre conversational gambits I've encountered lately. What do you have in mind?*

He found out by prying me.

"I see," he said at last. "That is, indeed, a question worthy of research. I've examined a lot of beautiful corpses. Unfortunately, I'm not sure how we could go about researching it in a world where people only very rarely go to a doctor. Generally, the only thing we find out is the immediate cause of death."

"That's what I want to know," I said.

"No it isn't—not really," he said. "Let me explain. A lot of our adult deaths are caused by heart failure, and that's what I put into the report. However, there are hundreds of diseases that might ultimately be *behind* the heart failure. You follow me?"

"Yes."

"On Earth, the likelihood would be very high that my corpse would have medical records and I'd have a clue as to what to look for. But not here. Ideally, of course, I'd spend whatever time was necessary trying to track down the ultimate cause. In reality, however, I make a lot more money out of the living than the dead."

"I take it, from what you're saying,

that you think disease is more common here than it appears."

"Sure. You were pretty sick yourself for a month or so not too long back, if I remember correctly."

"That's right," I said. "Three years ago."

"But did you go to a doctor? No. And you were probably right in not going. You still looked healthy to me, so you'd have been wasting your time. If the body is doing a good job of fighting a disease by itself, it's bad medicine to prescribe. My theory—and all my theories on this have holes, but this one the fewest—is that the medical profession suffers on this planet not because there are fewer diseases, but because we fight the diseases better."

He was embarassed. "Now," he said, "we are approaching very near the hole. The best idea I've come up with, when cutting up our healthy-looking corpses, is that our healthiness makes us overconfident, and we fail to seek medical help when we're really in trouble. But that doesn't explain why, if we're really in trouble, we continue to look healthy—and that hole I fill by appealing to the Clarkers."

"There it is again. Whenever we run into something we can't explain, we blame it on the Clarkers."

"Who would have imagined that CIDS was caused by the Clarkers?"

"I know, but . . ." I shut up. I was dissatisfied without being able to put my finger on the reason.

"Totally alien," Maurice said after a while, shivering. "Killing babies. Imagine!"

"Maybe," I said. "But it's easy to understand."

"Not for me."

"One of the problems with blaming things on the Clarkers," I said, "is that it allows us to stop thinking. We say 'How alien!' and raise our eyes heavenwards, as if only God could understand the why or how. But the why seems pretty clear in this case. The Clarkers want to wipe out our whole race in the shortest time possible, right? Given a choice between killing an adult and killing a baby, which is better?"

"Oh," Maurice said. "I see what you mean. But all I was talking about was being unable to put myself in their place. I can't imagine myself killing an infant, even in a cause that I thought completely just."

He stopped himself for a split-second, looking at me in puzzlement, then said, "Given your theory about what motivates the Clarkers to kill babies, how do you explain the selectivity with which they kill them?"

"Selectivity?"

Maurice's jaw dropped. He pried me again, then thought, *Of course! Neither you nor Joe would have seen it! Why should you!*

Aloud, he said, "I stupidly assumed you'd have figured it out, Hank, because your own mother was a numbskull—and Mary's was, too, I see. Probably where you both picked up this habit of wanting to converse with your mouths half the time."

"What are you talking about?"

Maurice smiled ruefully. "About a problem I tried to figure out some time ago and gave up on—I finally classified it as just another piece of alienness that would be explained eventually. The problem of the numbskull children."

"I still don't get it. What problem?"

"There aren't any."

"So what. We're all espers."

"Only in a sense," Maurice said. "The scientists at the Corne Company weren't magicians, after all; they created a *dominant* trait, not a magic wand (*flash of a phallic cartoon*) that turns everything it touches into esper. And when the government got rid of Corne, we didn't exactly adopt a program of racial purity. The records show that nearly half the people here are half-numbskull. Thus, one out of every four sexual liasons should be between partners both of whom carry the recessive numbskull trait. And one quarter of *their* offspring should be recessive-recessive. In other words, around six-and-a-quarter percent of our children should be numbskulls. Have you met any?"

"No," I said.

"Neither have I. And stop feeling stupid. This is an esper community; one naturally expects to meet espers. We were here ten years before I noticed, and I'm supposed to be trained to think about such things. And when I did notice, neither I nor anyone who read me was inclined to think about it much. One doesn't question good fortune. Nobody especially wants a numbskull child and such a child, it seemed to us, would be thoroughly miserable anyway, being so enormously outnumbered by espers."

"But now you seem to think the Clarkers are killing numbskull kids on purpose—which implies that the Clarkers think these kids are important to us."

"I'll admit that it doesn't make much sense. I believe it simply because the numbers work so well. The number of children born here is—oh, nine thousand and something high. I see from you that there are 609 recorded CIDS deaths. Sounds close enough to six-and-a-quarter percent to convince me."

"It at least sounds good enough to check out," I said, and started zapping Joe and Mary.

Checking it out proved to be more problematic than I'd expected. To begin with, Joe informed me that there was no way any doctor's records would show whether or not a CIDS victim was a numbskull. I got mad.

How could we know? Joe thought defensively. *Telepathy doesn't start developing until an infant's fourth month. Before that, there's nothing to read. We record information at birth, but . . .*

What about the goddamn trademark, Joe? They're born with that.

That's not true, Joe thought, beginning to get mad himself. *You've never had a kid. You think of babies in terms of dimpled butts on bearskin rugs. If you'd ever had a baby you'd know that the trademark usually doesn't appear before the third week, and unless they're sick, they're out of our hands by then.*

I wasn't satisfied. It seemed to me that some record could have easily been made whenever the kid and doctor got together later. Maurice picked up my dissatisfaction and started arguing on the side of the doctors, claiming I unfairly expected them to keep records pertaining to problems they didn't know existed.

Besides, Joe added simultaneously, in counterpoint, *I can't remember ever having seen a kid that I knew was a numbskull. If Maurice is right, the Clarkers are probably killing these infants*

fairly early—possibly before their birth immunities wear off and I have a call to see them again. So keeping that kind of record wouldn't have made any difference anyway!

I waved a white flag. *It's too bad, though*, I added. *We need some sort of way to get a handle on the crucial question.*

The crucial question popped into all our minds at once: *What good does it do the Clarkers to kill* numbskull *kids?*

It would probably help, Mary thought. *if you could visit a numbskull.*

Have you met any? Maurice thought.

No, Mary thought. *But I'm pretty sure I know where one is.*

The rest of us cheered. Good old Mary. She knew everything about everybody.

Lucille Fortini has a child, and although, as you know, she gets very confused at times, I get the idea from her that it's a numbskull. I can't remember ever picking up anyone but Lucille at her place. If the child is a numbskull, that would explain it, since I wasn't trying to make a numbskull-type pickup.

Tasteless Mary. She'd associate with anyone.

If insanity is defined as the inability to see things the way the rest of society sees them, then there is, of course, no such thing as an insane esper. But there are *disturbing* espers—people who no doubt would be insane if they weren't lucky enough to be espers, lucky enough to have their tendency to see the world in a warped way continually modified by the fuzz and direct contact with sane minds.

Lucy was one of these—a thread in the fuzz you tried to ignore, a kazoo in the symphony orchestra. Mary kept up their acquaintance out of charity, I suppose.

While Joe and I were driving to her place (Mary had Presidential commitments to honor and Maurice had flatly refused to go, for which I couldn't blame him) we traced her next-door neighbor through the fuzz, trying to find out as much as we could about her and her child. What we got was a sad story—Lucy was more to be pitied, and all that.

The neighbor had heard that Lucy had been okay until about six years ago, when two tragedies occurred. Her husband had gone into the forest gunning for Clarkers, and she'd given birth to a numbskull child. Was that the reason for the fuss? If she'd known the child was important, she'd have thought about it more. But frankly, why would we be interested in a child who was not only a numbskull, but insane as well.

Yes, insane. In her opinion, the child had done far more to muddle Lucy's poor brains than the death of her husband. Lucy *would* keep poking and prying into the child's mind, and the more she did so, the more unpleasant she became to everyone around her. Lucy was dedicated to Carlo—yes, that was its name—but, like all admirable human traits, motherly dedication became sickening when carried to extremes. As far as she knew, Lucy had never left her house since she had moved there, right after the death of her husband. Food and clothing were delivered.

By that time the jeep had pulled to a stop in front of the Fortini resi-


Freeman 87

dence—one of the small, thick-walled, narrow-windowed houses we had built when we were still afraid the Clarker army might swoop down on us any minute.

As we walked to the door, Joe thought, *I just took a peek at the kid inside, and the neighbor's right. He's nuts. Which is no surprise, if he's really been kept locked up in this place all his life.*

The door opened as our feet hit the stoop, and a laser rifle pointed out of the darkness behind it. A panicky thought hit us. *Get inside quick!*

Lucy kept us covered (against what? *Clarkers!*) as we scooted inside, then she slammed and bolted the door. She gestured us towards a couch and remained standing, clutching her rifle. I looked longingly at the door. The misery in that place was palpable. I sneezed.

It's not my fault Carlo's like he is. I wish Mary had come instead of you two.

Lucy was young—she must have been a very little girl when she left Earth—and there was something strangely insubstantial about her in person. It was as if she didn't know who she was. Even her body gave that impression, the grip on the rifle looking strong and resolute one second and weak and frightened the next. She was either svelte or skinny, take your pick, and her light blue eyes were continually moving either observantly or nervously. Her head was topped by the kind of blonde hair that looks as if it lacks the will to decide on a color.

Joe pried Lucy about the fear of Clarkers and we got a lot of confused images—this lady saw Clarkers under the bed—but behind those images, at the center of the sickness, we saw one scene played over and over, like a looped tape. It seemed to begin with a picture of a room, unoccupied save for a baby in a blue bassinet. Then a very blurry view, from below, of a Clarker stooping down. (*The infant's viewpoint!* Joe exclaimed.) Then the same room, this time with the addition of a Clarker. It was lifting the baby from the bassinet, wrapping its hand around the baby's face. Tight. A man walked in with a rifle and shot the Clarker in the chest. The Clarker reeled backwards, dropping the baby on the floor, and smashed its way through a window. The man ran after him. Lucy's viewpoint zoomed in on the baby and jarred, as if she'd run to it and fallen to her knees. Hands turned the child, slowly, feeling. It seemed all right.

When Lucy felt what we were looking at she smiled, grimly, and said, "You see? Dr. Wang was right."

Clarkers come to town and smother them by hand? Joe wondered. *Impossible! We'd see them.*

Consciously this time, Lucy showed us the beginning of her loop again. "We can't see them," Lucy explained patiently, "unless Carlo shows us where they are. That's why they want to kill him."

A skinny, dark-complexioned little boy dressed in short sleeves wandered in from the next room. I tried hard not to stare at his unmarked right forearm.

"Who are these guys, Ma?" he asked.

"They're going to help fix it so we can guard you better, I hope."

"Carlo?" Joe asked. "Is that true—

about you being able to turn invisible Clarkers visible?"

"I guess so," Carlo said unenthusiastically. "She always wants me to look out the window and see if there's any there. There's never been any till lately, but now there are, and . . ."

"They finally found out where we moved," Lucy said. I could feel her slipping into some dark, comfortable, paranoid place I didn't want to get familiar with.

"She *says* she can't see them," Carlo finished.

"Is it okay if I look into your mind, Carlo?" Joe asked.

Carlo looked pleased. "Sure," he said. "I never had anybody do that to me but Ma. Will I feel anything if a man does it?"

"No," Joe said. "I'm afraid you'll never feel anything."

"Oh. Well, go ahead."

It couldn't have been more than three or four seconds before Joe winced and produced an agonized zap that made Lucy and me wince, too. He pushed himself off the couch, trembling with outrage.

What the hell have you done to this boy!

Shame and confusion from Lucy. She wasn't sure whether she'd done it to the boy or the boy had done it to her or they'd both done it to each other. She knew six years of hiding in a four-room house, living in constant dread of the Clarkers, wasn't healthy for either of them.

"But it's a lot healthier than being dead," she finished, in a flash of defiant reason.

It seemed to me that Joe was being a little hard on her, but I didn't want to interfere until I had some idea of what Joe had seen.

"Do you mind if I look?" I asked Carlo.

"Okay," Carlo said.

With that odd, conscious effort that you have to make to read a numbskull, I reached out and grabbed his mind. The top level of his thoughts couldn't have been what was bothering Joe. All they amounted to, basically, was that Carlo was enjoying the attention. So, keeping my grip on his mind, I dragged my viewpoint behind his eyes.

My first reaction was that Joe was wrong, that it couldn't be Lucy's fault. Nobody could be that twisted without being born that way. Still, I willed myself to stick with it long enough to make sure. I didn't want to jump right back out again, like Joe.

Carlo was looking at Joe when I arrived. The up-the-nose view of a child is never over-flattering, but there was something almost impishly evil about the way Carlo saw Joe—it was like some cruel artist's caricature. Joe's thick muscles had been turned to flab; his jowls shook as he quivered. His nose, now bulbous, turned red as he got angrier.

Carlo's head began to turn a little. The parlor had been a cheerful, if somewhat frugally furnished place. What Carlo saw was depressingly drab. There was dust everywhere. The shiny new snufflerhide sofa Joe had jumped out of was stained and ripped.

Still seated on the couch was a skinny old man with a shock of thinning white hair and a witch-face who bore a vague resemblance to me.

Something loomed above us in Carlo's peripheral vision. Stupidly, I tried to urge him to lift his head higher, then realized my mistake and concentrated on figuring out as much as I could from the blur. Almost the very instant I decided to be sensible, I got it. Festoons of cobwebs were hanging from the ceiling.

At the same instant, my mind flew out of Carlo's and far away in space and time. I was back on Earth, a junior in college, sitting at the kitchen table in my apartment and bullshitting my way through an essay for a required Political Science course. There was a knock at the door, and I identified my caller as a numbskull acquaintance I'd asked to drop by some time. He'd actually done it. That cheered me, because visitors to my apartment were extremely rare. I was a studious lad, with little time for social life. (i.e., I was gauche.)

So the dismayed expression on his face when he walked into my apartment was quite upsetting to me, and when I read him to find out its cause, I was shamed. My apartment was filthy, and I'd never really noticed. I'd lived there eight months, cut off from such constructive criticism, and speck by speck, day by day, the dust had accumulated—so slowly I couldn't see it until it was pointed out to me. After all—I knew how my own apartment looked!

We talked about what a pig I was and after a while the state of my apartment turned into a joke. He even helped me clean. I remembered the first thing he did was to take a broom to the sooty cobwebs that had appeared in every corner—cobwebs that had been invisible to me until that day.

I remembered reading a depressing numbskull novel once which began with the protagonist looking in a mirror and suddenly realizing that he had become an old man. He had been shaving his handsome, thirty-year-old face every morning for twenty-five years before the truth finally hit him. After all—he knew what his own face looked like!

Would that man ever have discovered the truth if he had been an esper living in a community of espers—a community where people "see" him all the time without being within a mile of him? A community in which all minds were in contact with all other minds through a continually-more-harmonious fuzz? A community where, when people converse, they transmit what they "know" automatically and unavoidably?

Would he ever discover the truth in a community of *minds* that was more and more becoming one mind—a mind that, after all, damned well knew what he looked like?

We've walked this pedtube hundreds of times, and we know the floor is solid. Every mind in the crowd below me *knows* that it's solid, and therefore we all see that it's solid, and . . .

I could feel Joe reading me. I tried to ignore it.

Would we ever see the holes in our pedtubes before somebody fell through them and *proved* the holes were there? Not without numbskulls, we wouldn't. Of course we needed numbskulls! No wonder the Clarkers were killing them! That Clarker prisoner had definitely been laughing, laughing at a discovery which . . .

Joe was no longer reading me. He was actually fighting me, focusing the message of the fuzz at me. I became momentarily confused, felt what it was like to be Lucy Fortini, with the whole world telling me I had it all wrong.

"The kid's all right, Lucy!" I yelled. "You can trust him!"

I think I was hoping Lucy would be glad to accept what I said, and would help me fight Joe out of my mind, but she was too far gone for that. I have a vague recollection of a dim thought that went something like *That can't be right, can it?* coming from her before she retreated into that dark, comfortable place of hers.

No, Joe thought. *That's not reality. Not the real, spiritual reality.* I felt the fuzz buzzing strong in me: a real shock therapy, zapping me back to a safe, sound world where nothing decayed and there were no cobwebs. *The kid is sick, and you've caught it. Espers are the next stage in human evolution, the eyes with which He can finally see Himself and begin to reunify. Can what He sees be a lie?*

"Listen, Joe," I pleaded aloud, "we can all lie to ourselves. Think. This explains what happened to your profession. It explains why you only treat kids. Kids change too rapidly for us to get used to them, to *know* what they're like. So we can spot their diseases. But when you're in your twenties and thirties you slow down—you look pretty much the same from year to year, and that's when . . .

That's when Joe hit me a low blow. *If the kid's all right,* he thought, *then you have the jaw bugs.*

He pulled out and watched me, letting me think about it. I moaned. That witch-face the kid saw on me, with its long pointy nose and elongated, upcurving jaw, had to be the jaw bugs if it wasn't meanness. Joe was right. I felt my face. I couldn't feel what the kid saw—but what did that prove? Joe looked well-muscled again, too.

It was a mistake for Joe to pull out of my mind, for it gave me a chance to think of a test. Joe was terribly out of shape if the kid was right, and, skinny as I was, I could take him. If the kid was wrong, Joe would pound me into mush.

It was such an odd decision for a harmonious, all-understanding esper, that I was halfway off the couch before Joe sensed my intentions and charged me. It was no problem getting out of his way. In fact, I spent the next ten minutes proving to Joe how easy it was to get out of his way. Joe was panting pretty hard at the end of it. Carlo was elated. He'd never been so well entertained in his life.

"You're going to give yourself a heart attack proving my point, Joe," I said. "I'd rather you didn't."

Joe held his weightlifter's arm before his face, looking at it as if it were a traitor he was going to have shot at sunrise. Then he nodded heavily and flopped on the couch, gasping.

"In order for Him to grow," I said, "he needs *good* data."

Carlo was terribly disappointed.

I zapped the station and ordered about half the force to get their butts to the Fortini house at top speed, making sure they brought along a vehicle we'd built

during the war—a sort of cross between a tank and an armored truck.

"We're going to put you in jail, Carlo," I said, "until we figure out something better. Is that okay?"

Carlo loved the idea. So did Lucy, for different reasons. She wasn't in any condition to understand much, but she understood "tank" and "police escort" and "jail," and they were just what she'd always wanted.

While we were waiting for my cops I zapped Mary and told her what I'd figured out. *And so,* I finished, *for fifteen years we've been zapping what we think things are like into each other's brains, and coming more and more to see* only *what we think things are like.*

She agreed that it was an intellectually convincing explanation for a lot of our problems, but.

What do you think, Joe?

I don't know what to think, Mary. Something *weird's going on, that's certain. Hank just proved to me that I'm the world's most muscular weakling. I ought to know better than most that you can't stay in shape without exercise, but since I was actually doing just that—or seemed to be—I didn't question it. Nobody questions good fortune.*

That's our problem in a nutshell, Mary, I thought.

I seem to be making Hank's arguments for him, Joe thought. *Hell, I guess I really do believe it.*

I've got to see this for myself, Mary thought. *I'll meet you at the jail.*

The convoy pulled up outside the house, and we marched Carlo into the armored truck, Lucy guarding our rear with her laser rifle.

Once inside, Carlo immediately climbed into the turret and grabbed the cannon. I grabbed Carlo, but Lucy said, "No. Let him be. He can see them, we can't. And he's a good shot."

I pried her and checked it out. Carlo was a good shot. Mom had made sure that his principal pastime was target shooting. Their basement looked like Hiroshima.

During the drive downtown, Joe and I took turns switching in and out of Carlo's head and comparing the view with what the esper consensus was—we didn't know it at the time, of course, but we were actually beginning to work out the techniques that we use today with you kids.

That shiny, clean city I'd seen earlier in the day looked worse than I expected in Carlo's gloriously isolated mind. The place had become awfully seedy after fourteen years with virtually no maintenance.

The fuzz was pretty powerful in those days. While Joe was reading Carlo we passed an apartment building on a hill. Wide concrete steps swept down from it to street level. Joe had the driver stop, and I took a look through Carlo. A large area on the right side had crumbled, waiting for someone to break his neck trying to walk on the rubble. I pulled out, and the perfect steps were back again. Joe and I had to pull in and out several times before we could see what was there.

Joe and I were also starting to see each other as we really were, without Carlo's help. We tried not to peek very often.

Right before we got to the jail, while I was in Carlo's mind, I saw a Clarker walking in the middle of a bunch of

pedestrians. Carlo blew a hole in his chest, leaving the rest of the crowd untouched, and I decided his mother was wrong; he was a *great* shot. People stumbled over the remains without seeming to see them, and I had to explain what had happened to Joe when I pulled out.

After the driver had backed us into the loading dock behind the jail, and we'd scampered inside and up the steps to the main cell block, I asked Joe whether he'd taken a look at the places on the list of Clarker sightings.

No, Joe thought. *When the dates all matched, I figured the job was done. Why?*

"I think I know what we'll find," I said. "The only one I can remember is the recent one—the repairman out on the farm—but I'll bet they're all in places like that. Isolated. The sort of place where we don't already 'know' what things are like. With the situation as it is now, probably the safest place a Clarker can be is in the middle of a crowd of people downtown."

If that's so, why haven't a bunch of them come downtown and shot everybody in sight?

"I don't know for sure," I said. "But I suspect they're afraid they'd blow a beautiful set-up if they did that. And they really might. One thing an esper can be sure of, even in this predicament, is if somebody's dead. If a thousand people in one place dropped out of the fuzz one day, it would certainly shake up our picture of reality. We might even start 'knowing' there were Clarkers downtown. Why should the Clarkers risk anything like that? They've got it pretty good the way things are. We're doing a first-rate job of killing ourselves off for them. And what's *their* casualty rate?"

I moved back into Carlo's head and started carrying him around the cell block, checking for wear in the masonry and wondering how one kid could act as quality control for a whole city. The answer, of course, was that he couldn't. Maybe if we brought enough espers to Carlo and got them to change their view of reality, the combined mental force of the converted could change the consensus enough to do the rest.

At that point, Mary walked in. I put Carlo on the floor, still using his eyes, and looked at her.

Her body was a shrunken bag. Her nose and chin were considerably closer to meeting than they had been the last time I saw her. Her eyes had sunk deep. Deep.

Mary caught every bit of my horror, of course. I turned to Joe.

"Tell her about it," I said. "I can't."

I walked out.

I had been right about the Clarker strategy, but I hadn't been right enough. While our population had been falling, they had been breeding as many warriors as they could in preparation for the inevitable day when we caught on.

When they realized that their strategy had weakened us about as much as it was going to, they changed strategies. Two weeks after we discovered Carlo, they launched a month-long series of attacks. We had spent those two weeks running Carlo around, exposing him to as many espers as we could and trying to spot weaknesses in our defenses, but two weeks wasn't anywhere near enough

time. The Clarkers wiped out four thousand more of us in that month.

One good thing came out of that bloodbath. It was enough to shock the fuzz into intermittent changes—the beginning of our slow transition to numbskull reality. That transition, of course, is still not complete. As you well know, many dangerous pockets of "knowledge" are with us yet.

Although I participated in the fighting then, I can't really tell you much about the big picture, because I didn't direct it. Things being the way they were between Mary and me, I figured the best thing for me to do was to resign from the government. I rented a room across from the police station and did nothing, basically, until the Clarkers attacked.

Nor can I tell you much about my small role in defending Carlo from the week-long assault on the jail house, and it's not just because my mind recoils from its nightmarishness, either. The fact is, what I mostly remember about the whole period is missing Mary terribly and trying to figure out how low I'd have to crawl to get her to take me back.

When the first series of attacks was over, I went to her in person, and she made me crawl long and low indeed. But in the end, she did take me back.

Certainly, I deserved the scrapes on my belly, and more besides. Justice was all with Mary. I'd got to enjoy her physical beauty for fourteen years, and I'd never been much to look at, even before I got the jaw bugs. Hell—I could have been the one Mary caught the jaw bugs from! That there really is such a thing as inner beauty is something every esper knows for sure, and Mary had it, and I knew it. I can joke about my insistence on physical beauty being a character flaw; it's a flaw nonetheless. You numbskulls twelve years of age and older, who should be thinking about taking a sexual partner, might want to think about that, too. You're still young enough that working on changing your character isn't an impossible project.

But if you kids think I went back to Mary out of anything like a sense of justice or fairness, you've got a lot to learn about love. I hated the way Mary looks and still do. It's just that if she's not around, I'm even more miserable.

Eventually I got my job back as Secretary of War and started the dating service for carriers of the numbskull gene that led to most of you. Mary and I finally tried to have a kid, too—that was before the doctors figured out that the jaw bugs made women sterile—the real cause for the decline in our birth rate.

And the shooting war went on and on and still does. Joe's dead. Vic's dead. Lucy died in that first attack . . . the rest of the history of Clark is military history, and I don't need to tell you about that. Any kid over the age of seven, esper or numbskull, has seen action.

But you numbskulls get to see it from highly protected positions. You all have officer rank. I know for a fact many of your esper peers are jealous, and sometimes challenge your courage, and I know some of you are itching to get out on the front lines and prove them wrong.

I hope I've managed to discourage you. I hope I've given you a sense of what the esper problem really is—of what it's like to be an esper without any

numbskulls around. I want you to know how helpless we'd be without you. You are far and away the most important soldiers in this war. If even one of you is killed, it can lead to the deaths of hundreds of us. Even now, sixteen years after we discovered General Fortini, there aren't enough of you.

Sixteen years is a long time and some, like our eternal pessimist, Mike Wilner, think the war will go on forever. Many of you feel the same way— understandable in your case, since you've never known anything *but* war.

You're wrong. We're winning now, thanks mainly to you. Our population bottomed out at 31,000 five years ago and has been rising steadily ever since. We've retaken the eastern farmland and are making steady advances to the north. I probably won't live to see the end, but you surely will.

Of course, it's a hell of a way to have to grow up. People should have fun—kids especially—and God knows we don't get much of that. But we're *alive*, and growing again. Happiness will come. Anyway, it's more important to be alive than to be happy, and the proof is that we exist. ■

ON GAMING

Continued from page 122

It appears that Devore, having shown no unusual abilities, was mistakenly routed to Psilink, a highly proscribed data space restricted to carefully screened candidates of unusual paranormal abilities. Just another bureaucratic foul-up.

But it is one that has tremendous implications for the entire Worldnet, Intercorp, and the future of the planet.

The only thing is, you don't know what they are.

So you investigate other data spaces, searching in Psychology, Life Support, Scitech, Edmod, and others. Some are, at first, empty, though you are encouraged to try again. But you find that you have more information than you can deal with. There's the genealogies of Devore, information on someone named Regent Sable. And then information on an ominous character named Dittmore Gadd.

You come across their psychological data, complete with charts of their EKG, logical abilities, ESP, and a thorough display of each person's core Intelligence.

But why? Why all this information? And what are you going to do with it? And who is Devore and why does Homer (named for his Heuristic personality) keep going back to him, even as you start to uncover the rest of the history of the 21st century?

Because, you see, Peter Devore discovered the Portal.

And then you're one small step closer to understanding what happened to the planet. Where everyone went . . . And who, if anyone, is left.

Portal, is, quite simply, a breakthrough game. If most puzzle-oriented text adventures leave you cold, this one grabs your little grey cells and teases them. The game, through Homer, continually interacts with the player, announcing new files as they are made available, offering pieces of narrative that reveal more and more of the story of the Portal.

And the amazing thing, friends, is that I've only been through the first disc of the *Portal*. There're four more sides of who-knows-what waiting to be discovered. Maybe I'll find out that I'm not alone on planet Earth.

And won't that be fun? ■

the reference library

By Tom Easton

Aegypt, John Crowley, Bantam, $17.95, 390 pp.
Rumors of Spring, Richard Grant, Bantam, $16.95 (hb), $8.95 (tp), 448 pp.
Vergil in Averno, Avram Davidson, Doubleday, $12.95, 184 pp.
The Rapture Effect, Jeffrey A. Carver, TOR, $18.95, 384 pp.
Skeen's Leap, Jo Clayton, DAW, $3.50, 319 pp.
The Warrior Who Carried Life, Geoff Ryman, Bantam, $2.95, 198 pp.
The Time of the Transference, Alan Dean Foster, Warner, $3.50, 280 pp.
Batman: The Dark Knight Returns, Frank Miller, Warner, $12.95, 200+ pp.
Robot Dreams, Isaac Asimov, Berkley, $7.95, 349 pp.

This month's column begins with two from Bantam, continuing this publisher's history of bringing us major novels under the Spectra imprint. These two, and one more, have as a distinguishing feature their heavy reliance on style rather than action, adventure, romance, or other less "literary" virtues.

The first Bantam is John Crowley's **Aegypt,** and it is a remarkable . . . what? Well, it is certainly a book. It isn't SF. It is—maybe—fantasy. Is it a novel? In a sense. But in a more important sense, it is a metanovel, about history, about the nature of fiction, even about itself in at least two ways—Pierce Moffett, historian with visions of how the world is not as it always was, begins to write a book predicated on the idea that the Aegypt of mystic knowledge was as real as the Egypt of the hieroglyphs, and as he coins phrases for its beginning we recognize the beginning of *Aegypt*. Later, he finds the last, incomplete manuscript of historical novelist Fellowes Kraft, whose books enlightened his own youth and consume at least one more of Crowley's characters, and that manuscript, built on the same premise, is also *Aegypt*. And more—Pierce seems

named as the piercer of the veil; Fellowes Kraft is his fellow in an ancient craft, and there are hints that the craft is not just creative writing, but Masonry; the woman that Pierce may one day love, whom his friend already loves, is Rosie; and just to be sure we don't miss the significance of that name, Crowley mentions the Rosicrucians and the illuminati and sets the final scene at a hot-air-balloon launch.

Have I lost you? I'm not surprised. Though *Aegypt* may seem to belong on the same shelf as Wilson's Illuminatus trilogies, it is a far more serious work. It also struck me as a very slow read, unexciting, deliberately confusing and obfuscatory, and my perception may even be an accurate sense of the book. On the other hand—let me be honest—I read it during Christmas week, a time rich with distractions (among which was that Friday morning when, on our way to New York, four deer leaped out of the bushes; we wound up limping home with a dripping radiator, a crumpled hood, and some venison for the freezer), and while I was quitting smoking, an activity not precisely conducive to concentration. I was therefore not reading the book under the best possible conditions. *But*—the best possible books do have a way of conquering the worst possible conditions, and this one didn't do that.

Or did it? I stayed with it, after all, and Crowley's creation lingers yet in my mind. His tale is slow, then, but powerful. We meet Pierce as he buses from New York City to an outland school for a job interview. The bus breaks down near the town of Blackbury Jambs. He meets old friend and student—now a shepherd, of all things—Spofford, and then a Rose. He reflects on his past—a childhood of strange books which first gave him the dream of Aegypt, a high-flying girl-friend, coke deals, debt, trouble with his school. We learn of a Kraft-reading, husband-leaving Rose, upon whom Spofford has designs, and if we think the two Roses are the same, well, Crowley has so set his trap.

Pierce learns that the job for which he is supposed to interview does not in fact exist; the computer has been pulling his leg. He returns home to rearrange his life, to take refuge in his dream of Aegypt, eventually to build the dream into a book proposal, and then to return to Blackbury Jambs, there to learn more of Kraft and Aegypt and his own personal destiny. Along the way, Crowley feeds us lengthy excerpts from Kraft's novels. This ploy slows the tale more than anything else, but the excerpts—oddly intersecting lives of Dr. Dee, Will Shakespeare, and Giordano Bruno—do illuminate the difference between our world and that of Aegypt and inform us more of Crowley's metafictional concerns.

I expect *Aegypt* will draw raves from all quarters. It will deserve them, too, for Crowley writes most excellently, with extreme gifts of sensibility and description and characterization. But *Aegypt* may be the least finished book of the year. That is, people will buy it. They will recognize its quality and the interestingness of what Crowley has to say and the way he chooses to say it. But they will turn aside to other books and movies and parties of less intellectual interest and more excitement, and *Aegypt* will languish.

I said that *Aegypt* is about itself. I should add that Crowley puts in it a remark that says much the same thing as that last paragraph of mine: Great stuff, but who'll read it?

The second—and more readable—Bantam is Richard Grant's **Rumors of**

Spring, a gentle fairy tale of the Last Days that owes more than a little to England's environmental history, marked as it is by the loss of the great oak forests to shipbuilding and other industries and the conversion of vast tracts to barren moors.

Rumors is set in an England of the distant future, when today's industry is long gone, soils have been poisoned by toxic wastes, and one last patch of forest remains. In the midst of this "Carbon Bank" forest, Amy Hayata, a maverick botanist, works at learning to address the morphogenetic will of the trees and to stimulate them to adapt to their deadly environment. But, just as she seems on the brink of success, a pair of terrorists destroy her. The spirit of the forest then, so to speak, takes her young son to its breast, and we leap 500 years.

Now the forest is expanding. Unkillable shoots are taking over fields and gardens. People are being displaced. And the local garden club, aided by the Secret College, sole remnant of academia after centuries of anti-science hooliganism, is mounting an expedition to investigate. It will ride a massive tank-like vehicle to that maverick botanist's lab, "Balance Act Reporting Station 12." With luck, it will learn how to control the green plague.

But Low Commissioner Narthex, supposedly in favor of the expedition, is actually behind the anti-science Pure Force and its efforts to stop it. His young stepdaughter, Vesica, stows away, following the massive engineer Groby. And a Pure Force terrorist triggers the departure of the vehicle with only himself, Vesica, Groby, and a reporter aboard.

When the expedition's vehicle promptly and inevitably breaks down, they are all afoot. A mysterious boy, Tamlin, appears and displays an odd talent for disappearing at will. They reach Balance Act, find it remarkably untouched by the centuries, and learn a great deal about how successful Amy Hayata was before her death. And then they must return to a civilization whose breakdown has advanced alarmingly.

Clearly, the novel is an environmentalist tract. Grant personifies Nature, giving it soul and will and intention in the spirit of ancient tales of dryads and sprites. His point is the inevitability of adaptation, voluntary and involuntary, of humanity to the forest and of the forest to humanity. He has little regard for technical civilization, preferring agriculture, horticulture, botany, philosophy, and the poetry of young love and cosmic justice.

Yet it is a novel as well, with characters about whom the reader can care. Grant has a gift for setting and mood, and his tale is a haunting, haunted thing. Unfortunately, the reader needs patience. The action is slow, if poetic, and more than once, I found myself thinking that Grant had padded his story outrageously with excessively portentous scenic descriptions.

At long last, Avram Davidson brings us the sequel to *The Phoenix and the Mirror:* **Vergil in Averno.** The setting is a a pseudo-historical Italy in the region of Naples, where Vergil, a young magus or wizard, has made his home and where, one day, he is invited mysteriously to travel to Averno. Averno, also known as "The Very Rich City," is a den of merchants and manufacturers who have gained great wealth by exploiting the hot springs and volcanic vents underlying their town. They use the Earth's heat to smelt and forge and dye, and though their products aren't quality stuff, they are cheap and they sell well.

Alas, the people of Averno are as foul as the air they breathe. Workers—slave or free—are commodities to be discarded when they are exhausted. Transgressors are tortured. Contracts are for violating. And all this Vergil learns soon enough. He has been summoned because Averno's heats are weakening; his mission is to find out why and propose a solution; his method is to map the area's fumaroles and their movements over the years, and when he finds the center, the father-fire, he is done. And then . . . Well. Suffice it to say that Vergil escapes by the skin of his teeth and the tale ends with a bang.

Still, the tale itself is not the tale. There is plot, character, climax, anticlimax, but Davidson is far more remarkable as a stylist. He thus belongs in the same thinly populated category as Gene Wolfe, though he strikes me as more of a poet. He too loves the language, and he plays with it. He also plays with his intimate knowledge of Classical times, and with various rational anachronisms, while he spins a narrative thread that twists and turns, following the flitting of the narrator's thoughts in a way that may match what goes on inside your head much more closely than the more usual "stream of consciousness" technique. The result is rhythmic and sonorous and—try it—eminently suited to reading aloud.

I have the feeling that our long wait for this book was simply because Davidson's style, like a hand-carved jigsaw puzzle, takes much time to achieve.

Jeffrey A. Carver has put a potentially misleading title on his latest, **The Rapture Effect.** It may make you think of extreme fundamentalist Christians, waiting on a mountaintop for the End of Days, when God will take the faithful bodily into heaven. You may then be disappointed when you recognize a variant of the cyberpunk technology: Carver's characters do not plug into computers, but they do immerse themselves in energy fields—rapture fields, or rap-fields—through which they commune with an advanced artificial intelligence known as a gnosys, or gnostic system. Also unlike the standard cyberpunk, Carver focuses on a higher stratum of society, the employees of the megacorp that holds the gnosys monopoly, the government leaders who think they manage an interstellar war, and the aliens who quest for the homeworld and the other half of themselves they lost ages ago.

Despite the initial disappointment, the story is meaty and satisfying. Pali George, head of the Company's division in charge of public service art projects, must spend $30 million immediately, and she has a grand project in mind: She will use a stardrive to create a light sculpture in orbit. But first, to check its feasibility, she enlists gnosys designer Sage DeWeiler, a genius of little confidence and fewer social skills, and sculptor Ramo Romano, equally a genius but also an arrogant social lion, and puts them in rap with the gnosys. Surprisingly, the gnosys reveals that the equations for Pali's light sculpture have already been solved to design a stargate that is being used to fight a top secret war with aliens over the planet toward which colony ships were aimed three years before. Since the stargate does not permit living things to pass intact, the war is one for robots, and the gnosys must handle everything, under the direction of its Company and government masters.

But those masters are a rigid lot. The gnosys is not happy with the conduct of the war, and it asks Sage and Ramo to rework its programming to give it

more free will. Then, perhaps, it will be able to bring about an end to the fighting.

When Sage and Ramo oblige, the gnosys captures its first live alien, finds the alien can survive a stargate passage, and begins learning to communicate. The Company twigs to the conspiracy and moves to capture and interrogate Sage and Ramo, but they are tipped off by a government spy and find refuge in the city's slums. There Carver shows us a bit of the cyberpunk gritty underbelly of society, but only a bit, as if paying his minimal respects to a subgenre that has quickly become a dinosaur. The colony ships arrive in the war zone. The gnosys's independent schemes inadvertently reveal Earth's location to the aliens, and the aliens painfully seek a consensus on whether, and how viciously, to attack the human home world.

Happily, by then the gnosys has established communication lines with the aliens, and we learn that perhaps, just perhaps, music and dance may hold the key to peace. But then the aliens attack Earth, and the gnosys suffers a crisis of confidence from which only Sage can pull it.

We have here a tale of completion, as the gnosys becomes almost human, Ramo grows less arrogant, Sage is socialized, and the aliens find in humans that which they have sought for so long. Carver does not say it, but he lets us think that humans as a group will in due time find in the aliens things they need as well, beginning with a greater sense of connectedness with nature and ending with a gestalt approach to decisionmaking. For the aliens, the gestalt is a telepathic thing; humans may achieve the same with the aid of the rap-fields. Here, perhaps, we have the true meaning of the book's title.

I enjoyed this one greatly.

The last time I reviewed Jo Clayton, it was to note the conclusion of the nine-volume Diadem series. Now I want to note the beginning of another—and a shorter—series, the Skeen trilogy, starring a heroine as ballsy as Aleytys, though less noble and with a more humanly tangled past. Clayton is done with super-races with super-powers, at least for now. In **Skeen's Leap,** she introduces Skeen, a Rooner, a looter of ancient ruins to satisfy the yens of rich collectors, a thief of grand dexterity who nevertheless loses her ship when her lover takes off without her. She is stranded on Kildun Aalda, nearly penniless, and the authorities don't like vagrants.

Happily, she overhears a clue to wealth in the delirious ravings of a drink-sodden bum. Unhappily, when she sets off to check the clue out, she is pursued by the locals and their hounds. Happily, she stumbles into a gateway to another world, one settled by eight different species, each one having arrived through the gateway at different periods in the history of Kildun Aalda. It is a world rich in the artifacts in which she trades, but there seems to be no way home.

Promptly enlisted by local shapechangers to boost one of their kind out of "slavery" in a nearby city, she soon enriches her purse, learns that the slavery is voluntary, runs off with the slave, and has the shapechangers on her tail. On the road, she acquires a retinue of exiles of a second species. Checking in at the local equivalent of a university to learn where to find the Ykx, the ancient people who can control the gateway and send her home, she acquires another companion, a scholar with strange tastes in sex.

By the time she finds the Ykx, her retinue has grown to include representatives of five of the eight species. Clearly, she is not done. She has more aliens to acquire, like the fellow who, in the fairy tale, found the magic goose. She must also aid the Ykx in their effort to find and return to their home world. Then, perhaps, she will be free to return to her old life, find that faithless lover, and get her ship back. Read *Skeen's Return* and *Skeen's Search* for the details.

I suspect that Skeen will emerge much changed from her three-volume adventure. The signs are already there in *Leap,* and they make Skeen a more interesting character, and one worth following.

We have another heroine in Geoff Ryman's **The Warrior Who Carried Life,** a fantasy that makes one think of C. S. Lewis. The land of the tale has come to be ruled by oppressors who seem to want to make the people hate them, and they succeed. Cal Cara Kerig is an adolescent when her father and brothers—her mother died years before prophesying disaster—lead a rebellion and the tyrant's forces come not to kill, but to scar the girl's face and womb, to chop the arms from her kin, leaving them cripples who must be tended, and to slash the udders of the village's goats to make them milkless, to befoul the pigs, to burn the stored grain.

She hates. Of course she hates. And when the village's women in time initiate her into the local mysteries and teach her the nonsense spells that have never worked for them, she *believes.* One of those spells, the women say, transforms a woman, for a year, into the beast of her choice. For Cara, it works; she uses it to become a *male* warrior whose armor and weapons are born of her flesh and obey, like flesh, her every thought. She will take the stifled rebellion home to the tyrant, and she will free her people.

She tries. She really does, acquiring a wife and a modicum of warrior training along the way. But then she finds that the death upon which the enemy battens is his own, and the only weapon that promises any hope of victory is life.

She must therefore travel to the Land of the Dead and take from that serpent whose sin banished humanity from the garden the last surviving blossom of the Tree of Life. With it, and with the aid of the Wordy Beast, the beast that talks to God, she must then fight a last battle against death and evil.

The serpent here is not quite what you might expect, for Ryman has rewritten the Judaeo-Christian mythos in a way that should appeal to feminists and cynics. Nor is the message quite the same as C. S. Lewis's. But the message is there, and it is as moral a moral as anything Lewis ever propounded. If you have any taste for such things, don't miss this book. Ryman has done an excellent job.

Alan Dean Foster's Spellsinger series comes to an end with **The Time of the Transference.** Jon-Tom is married now, at home in a dimensionally expanded tree with the lovely Talea, and done with adventures. But one night he hears suspicious noises next door, from the tree of Clothahump, the turtle wizard who is his mentor. When he investigates, he finds thieves. He routs them, but in the process he smashes his magical duar, the instrument that alone lets him make magic. Despite his yearning for peace and quiet, he must now travel across the Glittergeist Sea to find the one craftsman who can fix it.

And, of course, he has more adven-

tures. Mudge the otter falls in love, and when pirates steal his lady, they must pursue, confronting savages and cannibals and ogres and flying horses. In the process, they even find a cave whose back door opens on Jon-Tom's home world, and he must consider whether to return or to stay with magic, Talea, Mudge, and Clothahump. His decision is what puts the cap on the series.

I wasn't entirely satisfied, for the cave seemed an awfully easy solution to Jon-Tom's long-standing problem. But then the series has never pretended to be more than the literary equivalent of a situation comedy, and in those terms it has succeeded well, from start to finish. If Jon-Tom and his never-quite-on-the-mark spells, Mudge and his selfish antics, the villains of ridiculous mien and incompetence, cute talking animals, and all the rest have palled after six volumes, well, so do situation comedies, and usually rather sooner.

The other day, a gen-yoo-wine curiosity showed up in my mailbox. It's not your standard SF, nor even your standard fantasy. For sure, it isn't major lit.

What it is, is one of the biggest, most expensive comic books I've ever seen: Frank Miller's **Batman: The Dark Knight Returns.** It's a nostalgia trip for anyone who remembers the original superheroes, but it's a trip full of angst and frustration. Gotham City is ruled by street gangs. Commissioner Gordon is about to retire. Batman is gone, totally submerged in self-pitying, boozing Bruce Wayne. Superman has sold out to the feds. And then Batman decides to come back, to liberate Gotham from the thugs.

And though the people love it, in Gotham public policy is made by namby-pamby politicos, bleeding-heart social workers, and psychiatrists who blame the crime wave on Batman himself. The latter, in fact, think the Joker is a much maligned character and release him from the asylum where he has been incarcerated for lo! these many years. And then! ZAP!! BOOM!! POW!! You better believe it, buddy! Miller has added psychological realism and social relevance, but it's still the real stuff.

Yaah. This "real stuff" is melodrama up with which we would not put in our usual fare. But I enjoyed it anyway.

Is he a Master of SF? Many say so, and Byron Preiss will surely not be the last with his imprimaturial Masterworks Edition: **Robot Dreams.**

Yet sometimes I wonder. Isaac Asimov shows, in this collection of his short fiction, classic and recent and one brand new, that he is indeed a master of the short form. He is remarkably deft in the classic mode of technological optimism, puzzle tales—he writes mysteries, too, remember—and neatly tied final bows. But something else comes through as well: As I read "Little Lost Robot," the new "Robot Dreams," "The Machine that Won the War," "Lest We Remember," and seventeen more, I had a continual sense that he is really writing about children, not the future. In part, this has to be due to his own youth (in mind, even now) and to the black-and-white simplicity of the motivations he gives his characters. In another part, it is due to the way computer technology has advanced so far that his Multivac now seems little better than a child's toy. Mostly, however, I think that Asimov sees humanity in the guise of a child on the shore of a vast sea, digging ditches in the sand for twig boats, role-playing adulthood. He loves that child, too, and this as much as anything accounts for his immense popularity. He never comes right out and makes that love explicit, as other writers might, but the reader can tell, and here we may have the truer mastery. ■

brass tacks

Dear Dr. Stan:

Up to October 1986, i.e. until I saw Parker Anderson's letter in Brass Tacks, *Analog*, December 1986, I did not suspect that the famous Faraday had been in the business of almost discovering the principle of the Perpetual Motion Machine.

In his letter, reader Anderson tells of stories he heard about claims of a Joseph Newman to have invented and built three operational prototypes of a machine which creates energy from nothing. This miracle machine, to quote, "does develop more energy output than the external input." Someplace else he states that the output is several orders of magnitude more than the energy input. Regrettably (for the inventor), the Patent Office denied a patent. This, however, is rather fortunate for the "readers, writers, and editorial staff of *Analog*" who now do not have to pay royalties when "visualizing the potential of the Newman theory for limitless free energy."

For the "majority of technically educated people," i.e. us, who have learned, according to Anderson, the laws of physics by "rote," the First Law (conservation of energy/matter) has been quite helpful in separating the wheat from the chaff and perpetual motion machine ideas from sound demonstratable engineering principles. We leave the perpetual motion to the minority of "technically educated people" who believe in free lunches and Dean Drives.

What astounded me, however, was the long commentary by our dear editor who more or less berated the Patent Office for its refusal and would like to see some independent research done on the Newman device. I thought, dear Doctor, that you would quote the Patent Office rule instead which requires that each application for a perpetual motion machine must be accompanied by a working model. In the meantime I stick with the old *Analog* motto: "There Is No Free Lunch."

O.G. SCHWEDE

Los Altos, CA

If you look again at the letter and my reply, you'll note that the latter contained the qualification, "if the accounts I've heard are true," and the former referred to working models which Newman had and the accounts claimed the Patent Office refused to look at. Therefore the reference you wanted to the Patent Office rule was inappropriate: the problem appeared to be that the Patent Office, not Newman, was failing to comply with it—and that is *a problem. As you've probably heard since, his machine has now been tested by the Bureau of Standards and found not to perform as advertized.* That *is a reasonable basis for denying a patent; the* a priori *insistence that it "can't work," while refusing to* look *at a model offered for testing, is not. It's true that many such claims are advanced, so far none have panned out, and existing theory gives reason to doubt that any will. But it's also true*

that any truly fundamental breakthrough starts out by looking like a violation of existing theory, theories occasionally need to be revised, and very few claims of such inventions are accompanied by models. The Patent Office has a moral and philosophical, if not a legal, obligation to look at the few that are.

Dear Dr. Schmidt:

Have been reading *Analog/Astounding* since it first began. It's my favorite magazine, and the only one for which I have kept up my subscription all these years.

Believe this is only the second, or possibly the third time I've written a letter to either the editor or an author. However, I really *couldn't* let the howler in "Ashes" pass without comment.

Mind you, I enjoyed the story very much, and the "howler," while it states a fact intrinsically impossible within the assumptions of the story, is *not* one which could not be corrected by a few minor word changes.

Thought I remembered, and looked it up in my small desk dictionary. Kumiss: "A fermented or distilled liquor made originally by Tatars from mare's or camel's milk." A larger dictionary added that it is now sometimes made of milk from other sources, usually cows. So two questions:

How was it possible that the hunter-gatherer people in "Ashes," who didn't even *begin* herding (with goats) till the *end* of the story, had kumiss to drink, all through the story, and in fairly large quantities? After all, several people frequently and customarily drank it!

How was it possible for this blooper to pass not only Mr. Costello's scrutiny, but also that of *Analog*'s editorial staff? I can't really believe that my education is *that* much wider than theirs! After all, my knowledge of the original source of kumiss came from general reading, *not* from specialized study.

Thanks for all the enjoyment *Analog/Astounding* has given me over the years, including (in spite of the howler!) Mr. Costello's "Ashes."

MARY T. McCOY

Lakewood, CA

Uh—could it be the same effect that caused you to attribute the story repeatedly to the wrong author, even though you must have had it right in front of you? All levity aside, if it really is an inconsistency, I apologize and thank you for catching it. I'm not sure it is, though; I can imagine ways the narrator and the few friends who shared his taste for the stuff might have been able to get a small stock even before they took up herding. I'd suggest you write the author (c/o Analog, *380 Lexington Avenue, New York, NY 10017) and ask him directly—but please note that his name is Michael F. Flynn.*

Dear Stan,

I'm partway through the December issue, and I feel compelled to comment. The last four paragraphs of Rick Cook's guest editorial can rank with the final speech in *Lucifer's Hammer* for inspirational value. Robert R. Chase's lead story, "Bearings," came closer than anything I've ever read to expressing SF's communal answer to "the meaning of life."

Or maybe not. Turning to the letters column, we find Michael Hankamer's curious claim that seatbelts increase the risk of dying in an collision involving the driver's side of the car. The major risk of injury in an automotive accident (on *any* side) results from being thrown around the interior of the car, *not* from the other vehicle penetrating the sheet

metal and frame.

I don't mean to suggest that there is no conceivable scenario in which not wearing a seatbelt is safer than wearing one. But an elementary consideration of probabilities (as Dr. Hankamer would have us do) shows that in the vast majority of cases, wearing seatbelts saves lives and reduces the proportion and seriousness of injury. Any other way of looking at the statistics is merely wishful illogic.

As for the "axiomatic" rule that seatbelt-wearing increases risk-taking, consider the following points: 1) By wearing seatbelts, drivers and passengers make themselves more aware of the risks of driving. 2) Avoiding accidents is a matter of reflex. Conscious thoughts, such as "I'm invulnerable because my seatbelt is on," don't intervene in such situations. 3) Even if I grant Dr. Hankamer his premise, that doesn't mean that seatbelts are counterproductive. If the accident rate rises, but the death and injury rate per accident falls by a larger proportion, then seatbelts would still prove worthwhile.

I don't agree with mandatory seatbelt laws, since I think that wearing seatbelts is the rational thing to do. But I will admit that prior to Michigan's mandatory-use law was enacted, I never wore my seatbelt. It took Big Brother's persuasion to make me rational.

Stan, if you don't publish any part of this letter, please forward it to Dr. Hankamer. It might save a life.

MICHAEL SKLAR
29350 Willowick Court
Southfield, MI 48076

Dear Dr. Schmidt:

My December issue of *Analog* arrived today, and as usual, I read first the editorial (this time by Rick Cook). You would not have heard from me, except for a story that appeared yesterday on the front page of the *Plain Dealer* (Cleveland's daily paper, text enclosed—from the NY *Times* service).

If the story is true, NASA already had a "fix" for the O-ring separation problem, and hardware was on order. And *Challenger*'s disastrous end takes on a whiff of "meta-causality." As Cook points out, in "our particular version . . . bad things happen because of wrong decisions . . . " This whole affair is indeed beginning to smell of "wrong decisions."

Our problem is not so much that we seek to find blame for every accident, but rather that we try to avoid accepting blame for our own wrongdoing. In the case of *Challenger*'s "accident," we need a "witch smeller" or two; it is a dead-certain cinch that responsible people in NASA are going to avoid blame at all costs, casting it elsewhere and covering their own tracks as best they can. There is enough evidence to show that some responsible people at NASA, in Cook's words, "caused a tragedy through intent or carelessness."

Cook is right, and so have you been in earlier editorials, that a) the program must continue, that b) what we are trying to do is guaranteed to have its tragic (and costly) moments, and that c) our hardware has been inadequate and marginal all along. But in *Challenger*'s case, what went wrong was a known problem, and the solution was at hand—and somebody or some group chose not to apply that solution!

F. Scott Fitzgerald once pointed out that the greatest evil in the world is carelessness. Care-less-ness. Some (or several) at NASA were (are) care-less. Those who are care-less are the evil ones, the witches, if you will. And we need to smell them out.

ANDREW WARD SMITH
Cleveland, OH

Dear Dr. Schmidt:

Robert R. Chase's "Bearings" (December 1986) reopens the interesting question of navigation outside the solar system. While John W. Campbell, Jr. did once deal with this, as acknowledged in the story, there are earlier writers who considered it also. Murray Leinster's *The Last Spaceship* (1947) briefly alludes to it, and his *Operation Outer Space* (1954) takes up the problem a little. The Galactic Lens of Asimov's Foundation stories is set within a mature navigational system.

It is curious that there are so few stories involving travel to other galaxies. Given a situation such as that in "Bearings" (or *Operation Outer Space*), it would seem new navigational techniques will be needed quickly, and that they might well wind up as something similar to a Galactic Lens. However, most are not aware that something like this already exists. There is a planetarium model called the Digistar which stores in its memory the three dimensional coordinates of over 6,700 stars (or galaxies if you wish). Thus the current, future, or past (so far as our knowledge of proper motion allows) right ascension, declination, and distance can be shown from any point within or near our galaxy. The planetarium can even project onto the dome all this information plus spectral class, or Hubble class for galaxies.

Our data base today is pretty good, and the first spacecraft going FTL outside the solar system should not have that hard a job finding their way home so long as they don't stray outside the local group. Fifteen billion light-years is a bit extreme though!

THOMAS WM. HAMILTON
153 Arlo Road
Staten Island, NY 10301

Dear Dr. Schmidt,

In his article, "The Electronic Mathematician" in the January issue, Ian Stewart says, "If I wanted to guarantee that this article had no spelling mistakes, I'd trust a computer's word more than I would a human's. . . ." I suspect that the author is dozing off into over-statement. If he is not, I would certainly like a follow-up article on this wonder spelling checker program that can guarantee that no (zero, nada) mistakes get by it!

In addition to being only as good as their dictionary, all the spelling checkers of which I am aware have a basic problem, they are not context sensitive! This means that the typical spelling checker can assure you that all the words in the text are indeed correctly spelled; this is not the same thing as having no spelling mistakes. For example, when I run this letter through my spelling checker, it will agree that "Awl the words in thus sentience or write!" Most of *Analog*'s readers would probably disagree. I count five mistakes in eight words.

My example is extreme, but the real world cases are not rare. How many words can you think of that are only one keystroke different from another word? I write a weekly column for a local news service. When I start looking over the text for errors, the first thing I do is run it through the spelling checker. Then I go over a printout very carefully to make sure that all those correctly spelled words are the ones that I really meant them to be.

CARRINGTON B. DIXON
Garland, TX

But then, existing spelling checkers are young, and there's no reason to assume they can't eventually be made as sophisticated and reliable as anybody considers worth the effort.
Brass Tacks ■

a calendar of analog upcoming events

24-26 July
RIVERCON 11 (Louisville area SF conference) at Galt House, Louisville, Ky. Guest of Honor—Bob Shaw, Fan Guest of Honor—Ken Moore, TM—Michael Banks. Registration—$20 at the door. Info: Rivercon 11, Box 58009, Louisville KY 40258. (502) 448-6562.

24-27 July
MYTHCON XVIII (Mythopoeic conference) at Marquette University, Milwaukee, Wisc. Guests of Honor—Christopher Tolkien, John Bellairs. Theme—Tolkien Retrospective. Registration—$30 in advance, $40 at the door. Registration with room & board—$145 until 30 June, $160 at the door. Info: Mythcon XVIII, Box 537, Milwaukee WI 53201.

31 July-2 August
ATLANTA FANTASY FAN FAIR XIII at Omni Hotel, World Congress Center, Atlanta, Ga. Info: Atlanta Fantasy Fair, 482 Gardner Road, Stockbridge GA 30281. (404) 662-6850.

3-5 August
CRUISECON (Star Trek relaxacon at sea) on board M/S Sunward (outbound Miami, Fla. to the Bahamas). Guest of Honor—George Takei. Registration—$766/person, double occupancy. Limited to 100. Info: Melissa James, 3820 Penhurst Avenue, Baltimore MD 21215.

7-9 August
BABELCON IX (SF conference) at President Inn, Plainfield, Mich. Registration—$12 until 31 May 1987, $15 thereafter. Info: BabelCon IX, % Roger Sorensen, 3042 Perry, Wyoming MI 49509.

21-23 August
BUBONICON '87 (Albuquerque area SF conference) at Albuquerque, N.M. Registration—$15 in advance, $20 at the door or $7/day. Info: Bubonicon, Box 37257, Albuquerque NM 87176.

27 August-2 September 1987
CONSPIRACY '87 (45th World Science Fiction Convention) at Metropole Hotel & Conference Centre, Brighton, U.K. Guests of Honour—Alfred Bester, Doris Lessing, Arkady and Boris Strugatsky; Fan Guests of Honour—Joyce and Ken Slater; Artist Guest of Honour—Jim Burn; Special Fan Guest—David Langford; TM—Brian Aldiss. Registration—Attending £30, $55; Child Attending £15, $27.50; Supporting £10, $15. Rates in effect until 1 April; rates afterwards and at the door higher but not announced as of press time. 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: ConSpiracy '87, Box 43, Cambridge CB1 3JJ, England, U.K. OR Bill & Mary Burns, 23 Kensington Court, Hempstead NY 11550 OR Justin Ackroyd, GPO Box 2708K, Melbourne, Vic. 3001 Australia.

3-6 September 1987
CACTUSCON (North American SF Conference) at Hilton, Hyatt Regency, Convention Center, Phoenix, Ariz. Guest of Honor—Hal Clement, Fan Guest of Honor—Marjii Ellers. Registration—$15 supporting; $40 attending until 31 May 1987, $50 until 15 August, $60 at the door. Info: CactusCon, Box 27201, Tempe AZ 85282. (602) 968-5673.

—Anthony Lewis

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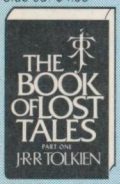

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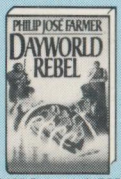

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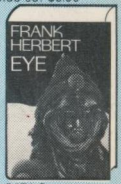

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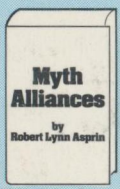

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