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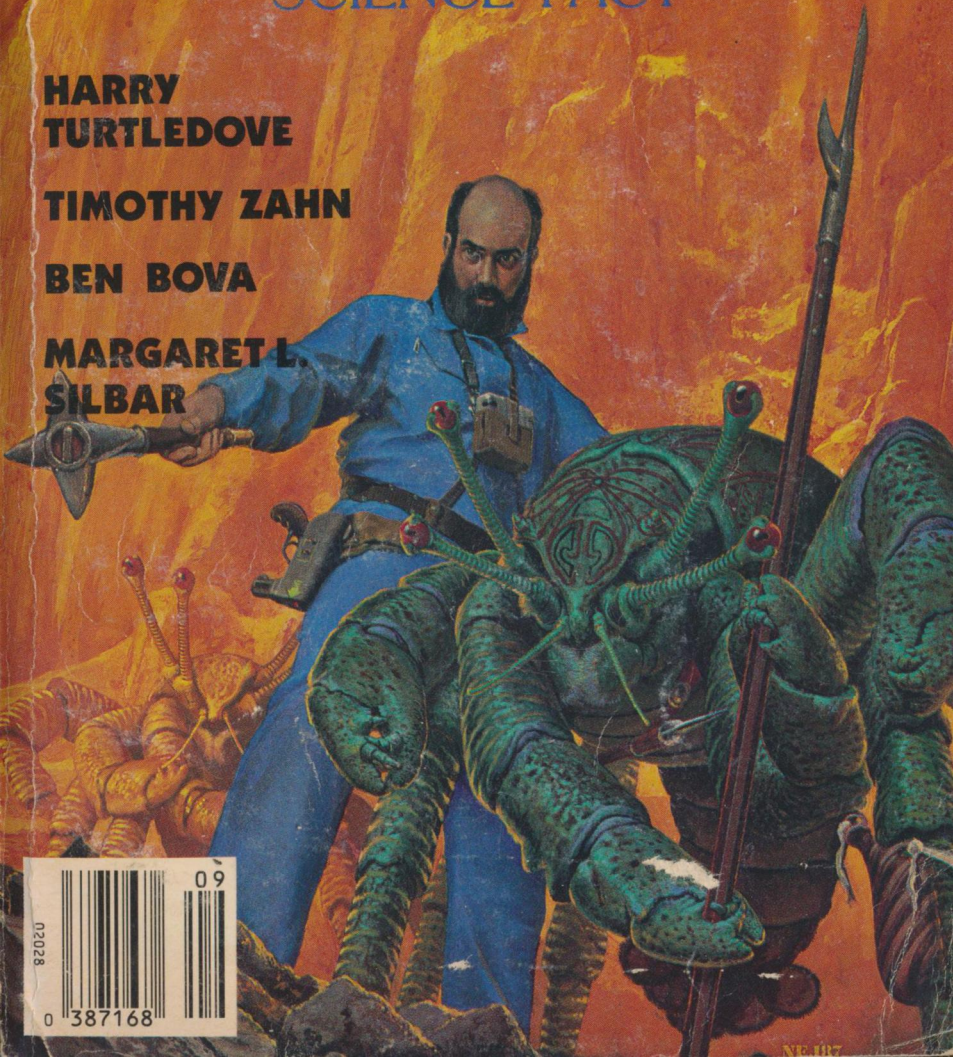
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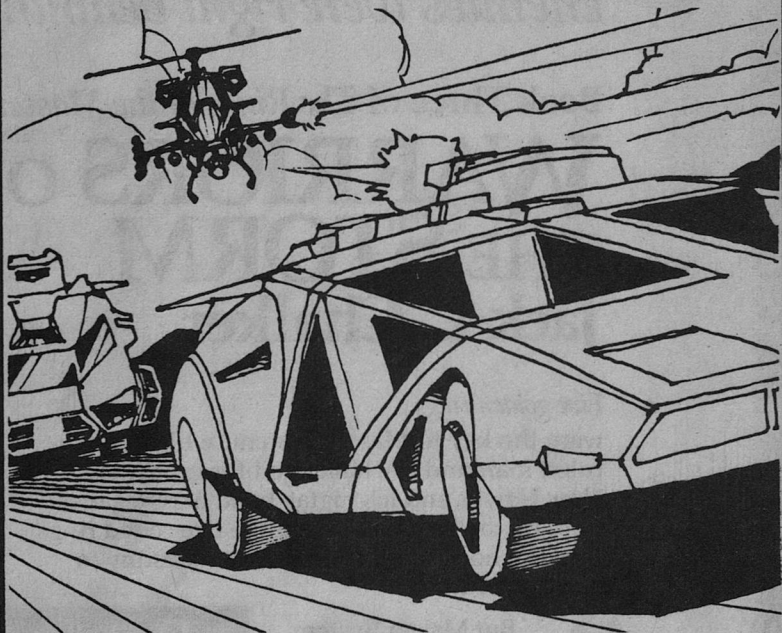
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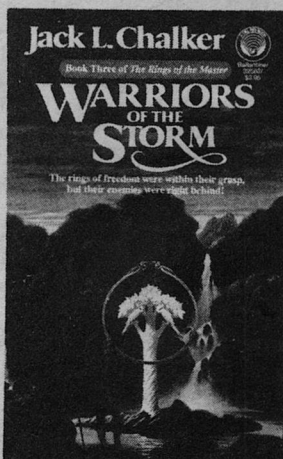
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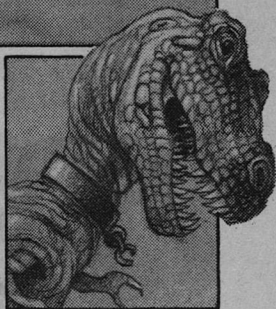
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Guest Editorial

FOR MARS, VOTE NO

Ben Bova

Before you get your dander up, let me tell you that I want to see human explorers set foot on the planet Mars. I would like to be one of those lucky people myself.

But I think that pushing for a manned mission to Mars as the top priority of the U.S. space program is a bad mistake—a disaster in the making.

No matter how much I want to see us reach Mars, it is poor tactics to make the Red Planet our number one goal. In fact, if space zealots keep beating their drums for Mars and Mars above all else, they are going to have an effect opposite to their dearest desire: they are going to set back the U.S. space program so badly that no Americans will reach Mars in the lifetime of those drumbeaters.

I am fully aware that one of those drumbeaters is the principal book reviewer for this august journal. Another is my old friend Carl Sagan. As I said, I share the dream and admire the goal. But sometimes we have to postpone our gratifications and nurse our dreams carefully until the time is ripe for them.

It's all well and good for us to talk up the Mars idea among ourselves. We all agree that we should be aiming for Mars. Hell, we all agree that we should never have killed the Apollo program, that we should have gone right ahead and built space stations in orbit around both the Earth and Moon, and established permanent bases on the lunar surface.

But that isn't what happened in the real world. And if we want to see

Americans on Mars during our lifetime, then we'd better stop behaving like spoiled children and start understanding what it takes—in *the real world*—to make it to Mars.

Let's start by examining what has motivated the American space program. No, I don't mean all the exciting ideas that have filled the pages of this magazine and our own imaginations for so many decades. I mean: what made the American space program happen, in the real world, that big, cold, bustling world out there where people who don't read science fiction magazines make most of the important decisions. Let's capitalize the concept and call it, from now on, the Real World.

(Let me make it very clear that I regard the fact that most of the decisions in the Real World are made by non-SF readers is one of the reasons that the Real World is in the sorry state it's in. It would be a better universe if the people in power knew and understood the realities that science fiction has examined for the past six decades and more. But that isn't the way the Real World works, more's the pity.)

At the end of World War II, a handful of Americans and an even smaller group of expatriated Germans wanted to put men on the Moon. Most of them were readers of science fiction. In fact, most of them read this very magazine, which in those days was titled *Astounding Science Fiction*.

Nobody in power listened to them. Big-name scientists from MIT and other institutions of learning (about the past) pooh-poohed even the idea of rockets

big enough to carry atomic bombs across the intercontinental distances.

In 1947 the U.S. government was told by its top-rank scientists that rockets capable of three-thousand mile ranges were "impossible for many years." Dr. Vannevar Bush of MIT concluded, "I think we can leave that out of our thinking."

Almost in the same month that Bush was writing that turgid statement, the Soviet government formed a State Commission to examine the feasibility of long-range ballistic missiles. Josef Stalin told his Kremlin aides, "We must go ahead with it, comrades! The transcontinental rocket . . . could be an effective straitjacket for that noisy shopkeeper Truman."

By the mid-1950s American intelligence sources were shocked to find the Russians flight-testing rockets of five-thousand mile ranges. A vast crash program was started in the U.S. to catch up to the Soviets.

In 1956, Khrushchev used the threat of Russian rockets to intimidate the nations of Western Europe while his tanks and troops crushed the Hungarian rebellion. In 1957, to prove to the world that Soviet rocketry was real, the Russians launched the first artificial satellite, Sputnik I.

Western public opinion went berserk. The Russians, who had always been portrayed as a nation of long-suffering peasants groaning under the yoke of a brutal totalitarian government, suddenly showed that they led the world in the newest and most exciting technology of all: space technology. When America

rushed to launch a satellite of its own, the rocket blew up precisely four feet above the launch pad.

I was a member of the Vanguard project. I witnessed that disastrous day from the inside. Two years before the creation of NASA, I had entered the fledgling American space program. I've been part of it ever since, one way or another. I'm not bragging; I'm just trying to show

that I speak from experience. Real World experience.

The human race went into space not for reasons of nobility or scientific advance or even of adventure. We were thrust into space for political purposes. For power. That's the way the Real World works.

The Space Race of the 1960s was the almost inevitable outcome of the polit-

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ical use of rocketry. Not only were the U.S. and USSR competing in the deadly military game of ICBMs and hydrogen bombs, they competed in a more open, almost sporting kind of contest: a race for the Moon.

The United States won that race. NASA's Apollo program worked so well that, to this day, many Americans think it was easy. And that the Russians never intended to put men on the Moon.

While President Nixon was congratulating Armstrong, Aldrin, and Collins for their epic journey, his underlings in the White House were killing the Apollo program. After seven missions (one of them aborted due to an in-flight accident) we stopped going to the Moon. Within a few years we even turned off the scientific instruments left on the lunar surface that were automatically relaying data back to Earth: there wasn't enough money in the NASA budget to keep them going.

We abandoned the Moon. And we had nothing to show for the \$23 billion we spent getting there.

Because of the political urgency to beat the Russians, we went to the Moon in the fastest manner possible. It was not the best. Instead of building a space station in orbit around the Earth, where lunar craft could be assembled and checked out before going on their way, we opted for the more expedient route of flying directly to lunar orbit and detaching a landing vehicle to carry two astronauts to the surface.

After Apollo was killed, there was no space station in orbit around the Earth to serve as a focal point for further space projects. There was no station in orbit

around the Moon, either: just a lot of abandoned hardware circling the Moon and scattered around the six landing sites.

All we had to show for the effort was 850.2 pounds of Moon rocks brought to Earth, miles of old videotapes and tons of scientific data.

The American space program nearly died in the early 1970s. The public felt that the Space Race was over, and we had won it. The average American turned his or her attention to Vietnam, inflation, recession, Watergate, and other earthly matters.

Leftover Apollo hardware was used in three ways: the Skylab space station effort of 1973-74; the Apollo-Soyuz mission of 1975; and as museum pieces.

Meanwhile, NASA proposed a logical program that consisted of a permanent space station in low Earth orbit, a reusable spacecraft to shuttle back and forth from Earth to the station, and an orbital tug to move satellites from one orbit to another. The Nixon White House and the Democratic-Party-controlled Congress opted for only one-third the funding NASA requested to tackle this program.

NASA decided to build the shuttle first. It was the key to everything else and the toughest technological challenge. The politicians refused to vote the funds needed to build the shuttle that NASA wanted. The engineers had to go back to their drawing boards and design a cheaper version.

What NASA originally wanted was a totally reusable craft, possibly one able to take off and land like an airplane. What the politicians dictated was the



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hybrid craft that takes off like a rocket—with the aid of two solid-propellant strap-on boosters—and then glides to an unpowered landing like a 99-ton brick.

Even at that, the space shuttle is the most advanced spacecraft in the world, and had put in 24 successful flights before the *Challenger* explosion.

But it could have been, should have been much better. The final twist of the knife is that the shuttle that Washington insisted upon has ended up costing the taxpayers much more than the one NASA originally wanted to develop, because its operating costs are so high.

So here we are, with the shuttle program struggling to get back on its feet. NASA is designing a permanent space station, at last. President Reagan gave the go-ahead on the space station in 1983, more than ten years after NASA originally suggested it.

And we have a growing chorus of space enthusiasts shouting, "On to Mars!"

Why Mars? Here are six reasons given by the "Martians":

1. A manned Mars mission will provide "an over-arching goal" for the American space program, a focus and a sense of purpose for NASA.

2. It is an adventure that can capture the public's imagination and support.

3. It is a potential bonanza of scientific information.

4. It can lead to cooperation between the U.S. and USSR.

5. It will enhance national prestige and technological development.

6. It will give "a crisp and unambiguous purpose to the American space station."

I won't try to refute those reasons, because I agree with them to a considerable extent. There are some contradictions among them, of course, but that's not what really bothers me.

What bothers me is the narrowness of vision among the "Martians," and their inability (or unwillingness) to look at the way things work in the Real World.

Narrowness of vision? Going to Mars is a *narrow* vision?

Hell yes, it is. There's a lot more to do in space than sending people to Mars. A manned Mars mission is part of what we should be trying to accomplish—but only a part of it. If we make Mars our only goal, we run the almost certain danger of destroying the American space program altogether.

Consider two scenarios.

Scenario One: Washington decides, thanks to pressure from the "Martian" enthusiasts, to make Mars the major goal of our national space program. One important aspect of the program is to work cooperatively with as many other nations as possible. The Soviet Union agrees to a joint Mars mission, together with several other nations.

Wonderful. The Russians work harmoniously with us. They point out that they can save us \$8 to \$12 billion right off the bat: instead of building a space station as a jumping-off place for the mission, we can use their existing space station, Mir.

We do that. Americans, Russians, and men and women from other nations work together and put a team on the red soil of Mars. The public is thrilled. Scientists are delirious. Science fiction fans

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rejoice.

But there is no American space station in orbit. There is no nucleus for the development of space industries and lunar resources. There is no Western industrial base in space. The American space program has become predominantly a scientific effort in planetary exploration.

The same disenchantment that followed Apollo sets in after we reach Mars. The taxpayers wonder why we spent all that money. What good has it done for the U.S. economy? How many jobs has it created? Those are Real World questions that cannot be answered by scientific reports or grand statements about adventure and Mt. Everest.

Or consider the alternative of Scenario Two: The political forces in Washington shrewdly watch the "Martians" build strength in the space community. When it becomes clear that Mars has become the major focus of the space enthusiasts, the politicians point out that the "space nuts" are never satisfied, no matter how much money they get.

The anti-space lobby (and there is one, never doubt it) loudly proclaim that they can feed the poor, educate the ignorant, rebuild our cities, and provide health insurance for the aged—all at half the cost of a Mars mission.

The end result is that the *entire* space program is gutted. NASA becomes a civilian adjunct to the growing military space effort. And the poor get poorer.

Those are merely two of the more likely results of a fixation on Mars.

The problem among the "Martians" is that they are putting the cart before

the horse. That's a sure recipe for a disaster in the Real World.

There is a plan for getting to Mars. It is a solid, workable plan, produced by the National Commission on Space and available at any bookstore under the title "Pioneering the Space Frontier" (Bantam Books, 1986; \$14.95).

The difference between the National Commission's approach to Mars and the approach of the dedicated "Martians" is this:

The National Commission calls for a new attitude toward our space endeavors. Instead of focusing on individual projects—the Moon, a space station, Mars, whatever—we must enlarge our vision. Instead of thinking about "sorties" into space, we must begin to think of the infrastructure needed to make us truly a spacefaring people. (Yes, I loathe the word *infrastructure*, too. But there it is.)

Mars is only part of this grand vision. Our real goal should be to expand human habitation throughout the solar system. The National Commission restricts its sights to the *inner* solar system, because it was ordered to stick to the next fifty years. You and I can look farther ahead.

To become truly spacefaring, to expand our species throughout this solar system, we must do many, many things.

First, we must show that our activities in space provide real economic payback to Earth. That is vital if we are to succeed in the Real World. One of the biggest problems in the Real World's perception of our space program is that the average taxpayer sees our space efforts as primarily a scientific adventure.

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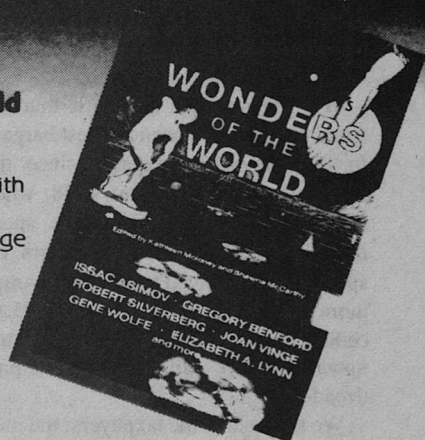
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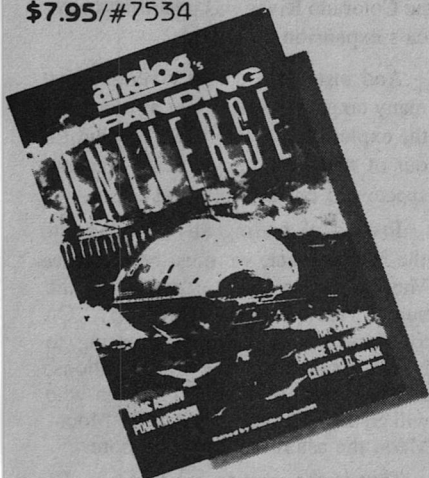
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That's why the NASA budget is always in trouble on Capitol Hill. The space budget is small, but highly visible. Congress members can slash it and tell their constituents back home that they're guarding the tax dollar.

What few people realize is that the space program has been the best bargain for the American taxpayer since the Louisiana Purchase. Since 1958, when NASA was created, we have spent roughly \$100 billion tax dollars on space. Space-derived technology pumps more than \$500 billion into the U.S. economy *every year*, and has generated upwards of five million jobs in the past decade.

We must show the taxpayers, the men and women who foot the bills, that the space program is an economic benefit to them.

We must develop efficient and reliable transportation systems for space. This includes craft for going from Earth's surface to orbit, craft for inter-orbital and deep space missions, and craft for landing on other planetary surfaces.

We must begin to utilize the resources of the Moon and, later, the asteroids. Industrial development of space is already beginning, but it will quickly reach a bottleneck unless and until space industries can draw their raw materials from low-gravity worlds.

While these efforts are going on, we

must also be pursuing the scientific exploration of the solar system, both for the pursuit of new knowledge and for the search for new sources of raw materials and energy.

Part of this effort will include, very naturally, the exploration of Mars. But instead of a "spectacular" mission designed primarily for prestige and adventure, the exploration of Mars will be as natural a part of our expansion into the solar system as the exploration of the Colorado River was a part of America's expansion westward.

And instead of a costly venture that many taxpayers will resent as a burden, the exploration of Mars will be paid for out of the economic bonanza that our spaceward expansion brings about.

Instead of putting all our eggs into the Mars basket, we must begin to see Mars as part of a vast expansion of the human race. Instead of shouting, "On to Mars!" we should be working to build the spacecraft, the orbital stations, and the teams of men and women who will go out and literally get us the Moon, Mars, the asteroids, and lots more.

That is the way to get to Mars. By making Mars a part of our expansion throughout this solar system.

Notice, I said *this* solar system. If all goes well, we may live long enough to begin considering others, too. ■

● Science is nothing but trained and organized common sense.

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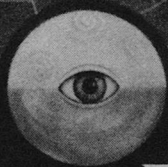
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The trouble with some people is that they are too wrapped up in hopelessly impractical things—which is sometimes very fortunate!

The prince of T'Kai let the air out of his booklungs in a hiss of despair. "Of course we will fight," K'Sed told the four Terran traders who sat in front of his throne, "but I fear we are done for." His mandibles clattered sadly.

The humans looked at one another. No one was eager to speak first. K'Sed watched all of them, one eyestalk aimed at each. At last Bernard Greenberg said, "Your highness"—the literal translation of the title was *one with all ten legs off the ground*—"we will do what we may for you, but that cannot be much. We are no soldiers, and there are only the four of us." The translator on his belt turned his words into the clicking T'Kai speech.

K'Sed slumped on the throne, a brass pillar topped by a large round cushion on which his cephalothorax and abdomen rested. His walking legs—the last three pairs—came within centimeters of brushing the carpet and giving the lie to his honorific. His two consorts and chief minister, who perched on lower toadstool seats behind and to either side of him, clacked angrily. He waved for silence.

Once he finally had it, he turned all his eyes on Greenberg. Even after most of a year on L'Rau, the master merchant found that disconcerting; he felt as if he were being measured by a stereoptanograph. "Can you truly be as weak as you claim?" K'Sed asked plaintively. "After all, you have crossed the sea of stars to trade with us, while we cannot go to you. Are your other powers not in proportion?"

Greenberg hesitated, running a hand over his bald pate. Just as he sometimes had trouble telling the crablike G'Bur

apart, they only recognized him because he wore a full beard but had no hair on his crown.

"Highness, you have exposed the Soft One's cowardice!" exclaimed K'Ret, one of K'Sed's consorts. Her carapace darkened toward the green of anger.

"Highness, do not mistake thought for fear." That was Marya Vassilis. She was the best linguist on the *Flying Festoon's* crew, and followed the T'Kai language well enough to start answering before the translator was done: "We do not want to see the M'Sak barbarians triumph any more than you do. Where is our profit if your cities are overthrown?" She tossed her head in a thoroughly Greek gesture of indignation.

"But by the same token, highness, where is the Soft Ones' profit if they die fighting for T'Kai?" put in B'Rom, K'Sed's vizier. He was the most cynical arthropod Greenberg had ever known. "For them, fleeing is the more expedient choice."

"Manipulative, isn't he?" Pavel Koniev murmured. Greenberg glanced at him sharply, but he had turned off his translator. "Get us to feel guilty enough to do or die for T'Kai."

One of K'Sed's eyestalks also peered Koniev's way; Greenberg wondered if the prince had picked up any Spanglish. K'Sed made no comment, though, turning all his attention back to the master merchant. "You have not yet answered my question," he pointed out.

"That, highness, is because the answer is neither yes nor no," Greenberg said carefully. K'Ret gave a derisive clack. The trader ignored it. He went on, "Of course, my people know more

of the mechanic arts than yours. But as you have seen on all our visits, our only personal weapons are stun guns that hardly outrange your bows and slings.”

“That might serve,” K’Sed said. “If a thousand of the savages suddenly fell, stunned, as they charged—”

Greenberg spread his hands in regret. “A hundred, perhaps, highness, but not a thousand. The guns have only so much strength in them. When it is gone, they are useless, except as clubs.”

Without flesh surrounding them, it was hard for K’Sed’s eyes to show expression, but Greenberg knew a baleful stare when he saw one. “And your ship?” the prince said. “What excuse will you give me there?”

“It is armed,” Pavel Koniev admitted. K’Sed hissed again, this time with a now-we’re-getting-somewhere kind of eagerness. Koniev, who was weapons officer when the *Flying Festoon* was offplanet, went on, “The weapons, unfortunately, function only out in space, where there is no air.”

“No air? There is air everywhere,” K’Sed said. T’Kai astronomy was about at the Ptolemaic level. The locals believed the humans when they said they came from another world; they and their goods were too unlike anything familiar. All the implications, though, had not yet sunk in.

“I think we are all looking at this problem in the wrong way,” Jennifer Logan said. Greenberg blinked. Jennifer’s silence through all this uproarious meeting so far was very much in character. With some people, Greenberg would have blamed that on her being twenty-two and an apprentice. He suspected Jennifer would remain much the

same as a fifty-year-old master— assuming she wanted to become one, which wasn’t likely.

He sometimes wondered if she was so quiet because she didn’t operate in the same world as everyone else. Maybe, though, that made it more likely she saw something everybody else had missed. “Tell us,” he urged.

She flushed and did not answer. Greenberg gave a mental sigh. At her age, he had been a hard charger, always sure of himself—wrong a lot of the time, but always sure. She was different. Maybe being beautiful had something to do with it. Nobody, heaven knows, would have accused him of being beautiful, or even handsome, at twenty-two, and he was gruffly aware he had not improved with age.

But at the moment, clear fair skin, sculpted chin and cheekbones, wide blue eyes, straight blonde hair that fell past her shoulders, a shape whose glory not even merchant coveralls could conceal—none of that mattered. To the T’Kai, Jennifer was as hideous and alien as the rest of the Soft Ones. “Come on,” Greenberg growled. “Don’t keep his highness waiting.”

“I’m sorry, master merchant,” Jennifer said. Her voice was small and breathy, barely enough to activate the translator. Then she hesitated again, until Greenberg’s glare forced more words from her: “We know, don’t we, that there isn’t much we can actually do against the M’Sak—”

“We don’t know that,” B’Rom said, not deigning to turn even one eyestalk Jennifer’s way. “You Soft Ones keep saying it, but we do not know it.”

The interruption flustered Jennifer.

She took a while to get going again. At last she said, "Maybe the M'Sak also doubt we are as harmless as we really are—"

Sixteen eyestalks suddenly rose to their full length; sixteen eyes bored into Jennifer's two. She stopped, glanced toward Greenberg for support. He nodded encouragingly. "I think," he said, cultivating his taste for understatement, "you have their attention."

"But what do I tell them now?"

"I haven't the slightest idea. How do you think we'd look tricked out with a paint job and enough false legs and teeth to impersonate four *f noi*?" Imagine a tiger crossed with a lobster: the *f noi* was the worst predator this continent knew.

"You're baiting me!" From some people, that could have been an invitation to fight. From Jennifer, it only conveyed disappointment. Against his best intentions, Greenberg felt guilty.

Marya Vassilis stepped into the breach. "We don't yet know your barbarous foes well," she reminded the prince and his companions. "You will have to advise us on how we can best appear terrifying to them."

"Maybe even the sight of your ship will be enough," K'Sed said hopefully. "I do not think any Soft Ones have traded directly with the M'Sak."

"Why should they?" observed D'Kar, K'Sed's other consort, with what the translator rendered as a sniff of contempt. She wore gold bands round all her walking legs, and had two rows of yellow garnets glued to her carapace. "The M'Sak are such low wretches, they surely have nothing worth trading for."

"'Let them eat cake,'" Koniev quoted. No matter how well the computer translated, it could not provide social context. A good thing, too, Greenberg thought, buckling down at last for some serious talk.


"Thanks for the notion that got us going there," Greenberg told Jennifer that evening, back at the suite the humans had been modifying to their comfort for the past several months. Air mattresses, a washtub, and a chemical toilet were great improvements over the local equivalents. T'Kai sleeping gear, for instance, resembled nothing so much as a set of parallel bars.

The master merchant frowned. Jennifer had a reader on her nose again, and hadn't heard him. He stretched a point and repeated the compliment, louder. She looked up. Her eyes took several seconds to focus on the real world.

"Oh. Thank you very much. I wasn't sure what would come of it, but—" She hesitated. As often happened, the hesitation became a full stop.

"—But anything was better than staying stuck where we were," Greenberg finished. "Yes." He was used to finishing sentences for her.

She had already given her attention back to the reader. He watched her for a moment. She was lovely to look at. He wondered why both he and Koniev found Marya more attractive, though she was fifteen years older and lovely by the canon of no human world he knew. He had been wondering that for months. He just thanked heaven no one on the *Flying Festoon* had a jealous nature. The computer had predicted they



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would be compatible, but the computer wasn't always right. Trips were ghastly when it was wrong.

He tried again to make contact with Jennifer. "What are you reading?" he asked. Again, he had to try twice before she noticed him.

"Heinlein—one of the early Future History books." She showed more enthusiasm for her reading than for the real world around her, and asked eagerly, "Would you like to borrow the fiche when I'm through with it?"

"More, ah, science fiction?" he asked. Jennifer nodded. "No, thank you," he said, as gently as he could. Jennifer's face fell. Greenberg felt as if he'd stepped on a puppy's tail.

But that wasn't right either, he thought, angry now at himself. Confound it, the real world counted for more than somebody else's imagination, especially if it was just an ancient picture of a future that hadn't happened.

He suddenly raised an eyebrow and pursed his lips. Maybe that was why he and Pavel both wanted Marya more than Jennifer. No one would ever have denied Marya was firmly rooted in the real world. No one ever had to ask her anything twice, either. When she was with someone, she was *with* him. Greenberg was no youngster any more. To him, that counted for a lot more than beauty.

Unfortunately, thinking of real things led him back to the M'Sak. They were real too, and he had the bad feeling no illusory threat would drive them away. He hoped he was wrong.

He did not think he was. As the meeting with the prince and his court was breaking up, a messenger had come in with bad news: C'Lar, one of the north-

ern towns of the T'Kai confederacy, had fallen to the M'Sak. The T'Kai and their neighbors had been peaceful for several generations now. As K'Sed himself was uneasily aware, they were no match for the vigorous barbarians emerging from the northern jungles.

But K'Sed intended to try, and nobody on the *Flying Festoon* even thought of backing the other side. For one thing, T'Kai *objets d'art* brought the crew a tidy profit, trip after trip—that would vanish with a M'Sak conquest. For another, the M'Sak were not nice people, even for crabs. Their leader V'Zek seemed to have taken Chingis Khan lessons, being both ruthless and extremely able.

That led Greenberg back to worrying. He shrugged and did his best to push it aside. Sometimes a hand only got dealt low cards. He would play them as best he could. If he failed, the *Flying Festoon* could at least flee.

K'Sed would not be so lucky.

V'Zek came down from his shelter, stepped away from it to watch the full moon rise. Many of his warriors felt anxious away from the trees they were used to, but he took the southlands' open spaces as a challenge, and he had never met a challenge any way but claws-first.

Thus he did not pull in his eyestalks when he was away from the posts that held up his shelter and the web of ropes that imitated the closely twined branches of the jungle. And, indeed, there was a certain grandeur in seeing the great yellow shield unobscured by twigs and leaves.

He stretched his eyestalks as far as

they would go, a grasping-claw's length from his cephalothorax. He drew his knife, brandished it at the moon. "Soon everything you shine on will be mine."

"The Soft Ones may perhaps have something to say about that, my master," a dry voice beside him observed. He hissed in surprise. He had not heard Z'Yon come up. The shaman could be eerily quiet when he chose.

"Soft Ones," V'Zek said, clicking in scorn. "They did not save C'Lar, nor will they save T'Kai when we reach it. I almost wonder if they exist at all. So much open space makes people imagine strange things."

"They exist," Z'Yon said. "They are one of the reasons I sought you out tonight, or rather what you plan to do about them."

The chieftain clacked discontentedly. Since C'Lar fell, he had known the Soft Ones were real, but had tried to avoid thinking of them. Z'Yon was useful, because the shaman made him look at hard questions. "I will deal with them, if they care to deal with me," V'Zek said at last. "Some of their trinkets are amusing."

He thought of the mirror some grandee had owned in captured C'Lar. It was his now, of course. He admired the perfect reflection it gave. It was ever so much clearer than the polished bronze that was the best even T'Kai made. He had not known what a handsome fellow he was.

But Z'Yon would not leave off. "And if they do not?"

"Then I will kill them." V'Zek was very straightforward. That made him a deadly dangerous war leader—he saw an objective and went right after it. It

also suited him to lead the M'Sak, whose characters were mostly similar to his own, if less intense. Z'Yon, though, did not think that way: another reason he was valuable to his chieftain.

The shaman let V'Zek's words hang in the air. V'Zek suspected his carapace was turning blue with embarrassment. Who knew what powers the Soft Ones had? "No rumor has ever spoken of them as killers," he said, the best defense of his belligerence he could come up with.

"No rumor has ever spoken of anyone attacking them, either," Z'Yon pointed out.

V'Zek knew that as well as the shaman. He changed the subject, a chiefly prerogative. "Why else did you want to see me?"

"To warn you, my master." When Z'Yon said that, V'Zek grew very alert. The shaman had smelled out plots before. But Z'Yon went on in a way his master had not looked for: "When the moon comes round to fullness again, unless I have misreckoned, the great *f noi* that lives in the sky will seek to devour it." The M'Sak were not as sophisticated intellectually as the T'Kai, but their seekers after wisdom had watched the heavens through the trees for many, many years.

The chieftain cared nothing for such concerns. A superstitious chill ran through him; he felt his eyestalks contract themselves. "It will fail?"

"It always has," Z'Yon reassured him. "Still, you might spend some time warning the warriors this will take place, so they are not taken by surprise and perhaps panic-stricken."

"Ah. That is sensible. Claim yourself

any one piece of loot from my share of the booty of C'Lar." V'Zek was open-clawed with his gifts; who would stay loyal to a chieftain with a name for meanness?

Z'Yon lowered and raised his eyes, a thank-you gesture. "I wish I could have told you sooner, my master, but the campaign has disrupted my observations, and I did not become certain enough to speak until now."

"It is of no great moment." V'Zek settled back on his walking legs. "Fifty-one days should be adequate time to prepare the fighters. By then, if all goes well, we will be attacking the city of T'Kai itself."

"Yes, and that is why you will need to harden the warriors' shells against fear. Think on it, my master: when the *fnoi* in the sky wounds the moon with its claws, what color does the moon turn as its blood spreads over it?"

V'Zek thought. He had seen such sky-fights a few times, watching as Z'Yon and the other shamans beat drums to frighten away the sky-*fnoi*. "The color of bronze, more or less . . ." The chieftain paused. All his eyestalks came to bear on Z'Yon. "You are subtle."

"You see it too, then: when the heavenly *fnoi* attacks the moon, it will become the color of the T'Kai banners. That is an omen which, without careful preparation, common warriors might well see as disturbing."

"So they might." V'Zek opened and closed his upper grasping-claws while he thought, as if he wished to rend something. His left lower claw was never far from the shortspear strapped to his plastron. "Suppose the omen

means that T'Kai will fall to us? Suppose that, till the evil night, you put that meaning about."

"Shall I consult the moltings, to seek the significance of the phenomenon?"

"For your own amusement, if you like." That lower claw moved closer to the shortspear; Z'Yon felt his small, fanlike tail, of itself, fold under the rear of his abdomen. He did not need the reflex to know he was afraid; he felt the fear in wits as well as body. His chieftain went on, "Of course, you will present it to our warriors as I have given it to you now."

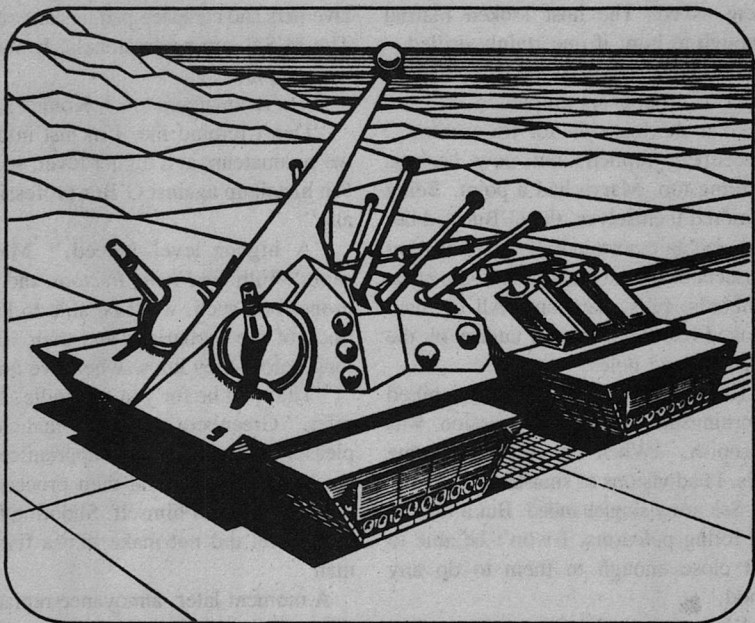
"Of course, my master." Z'Yon backed out of V'Zek's presence. When—actually, just before—he had gone a seemly distance, he turned and hurried away.

V'Zek let the slight breach of etiquette pass. He glowered up at the moon. Nothing would interfere with his plans for conquest: not the Soft Ones, whatever they might be, and not the moon either. *Nothing*.

Having made that vow to himself, he returned at last to his shelter. The ropes and poles were a poor substitute for the fragrant, leafy branches he was used to. He let out a resigned hiss, and wondered again how the southrons bore living away from the forests. Maybe, he thought, they were such skillful artificers exactly because they were trying to make up for what they lacked.

The why of it did not matter, though. They had been making their trinkets and trading them back and forth for so long that they forgot claws had any other uses. C'Lar had fallen even more easily than V'Zek had expected.

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He composed himself for sleep. C' Lar was only the beginning.

On the battlements, Marya giggled as she watched T' Kai's army march out of the city. "What's funny?" Greenberg asked. The host looked martial enough to him, if uncertainly drilled.

"It's just that I've never seen such a lot of tin-openers on parade."

"On the big side for tin-openers," Greenberg replied, but now he was smiling too. Marya had a point. Being armored themselves, the G' Bur had developed an assortment of weapons reminiscent of those of Earth's middle ages: halberds, bills, partisans. All of them looked like big pieces of cutlery on the ends of long poles.

Koniev swung a wickedly spiked morningstar, but his expression was sheepish. "When the locals gave me this, I had visions of smashing down the M' Sak army singlehanded. But if they're all toting polearms, I won't be able to get close enough to them to do any good."

"It's a personal defense weapon, like the shortspears they carry," Greenberg said. "If you're close enough to have to use it, odds are we'll be in a lot of trouble." He switched off his translator, in case one of the natives milling about was eavesdropping—as seemed likely. "We probably will be."

The other humans (all but Jennifer, who was paying more attention to her reader than to either the army of T' Kai or the conversation) followed the master merchant's example. Marya, though, protested, "They seem willing enough to fight—which is more than I can say for their prince."

"I'm afraid he knows more than they do." Greenberg watched a couple of K' Sed's warriors get the heads of their weapons tangled, stop to work things out, and thus hold up their whole section. "They're amateurs—smiths and taverners and carapace-painters and such. The M' Sak are professionals. It makes a difference."

"We're amateurs too," Koniev said.

"Don't remind me. I'm just hoping we're amateurs at a higher level, so we can match up against G' Bur professionals."

"A higher level indeed," Marya said. "With the *Flying Festoon* and our drones and such, we'll be able to keep track of the barbarians and their route long before they know where we are."

"That will be for you to handle, Jennifer." Greenberg took some malicious pleasure in recalling his apprentice to the here-and-now, and then proceeded to be ashamed of himself. Shooting fish in a barrel did not make him a fisherman.

A moment later, annoyance replaced shame as he realized he had not really brought Jennifer back from her book. She did put down the reader, but only to say, "I'm so sorry. What was that?" She blinked; the reader had shielded her eyes from the glare of the sun.

"The drones," Greenberg said, more patiently than he expected. Jennifer always seemed so eager, so open, so ready to do whatever he asked, that somehow she kept mollifying him. One day he would have to think about that. This was not the day, though.

"Oh, yes, the drones, of course," Jennifer said, but Greenberg was too old a hand to know she hadn't the faintest

idea what he wanted her to do with them.

Koniev saw that too. "I'll handle them, Bernard. I've had experience with them."

"I know you have. That's why I'm giving them to Jen. She has to get some herself." That made enough sense to shut Koniev up. The other thing Greenberg had in mind, the one he was glad he did not have to mention, was that keeping Jennifer aboard the *Flying Fes-ton* might keep her out of trouble. He made a point of not specifying, even to himself, whether he meant trouble from the M'Sak or trouble from her.

Irony sparkled in Marya's dark eyes. Greenberg felt his cheeks go hot with a warmth that had nothing to do with the sun. Marya had done too many tours with him, and saw through him too well.

He was saved from his embarrassment when K'Sed came over to the four humans. The prince of T'Kai had gone martial to the extent of carrying a ceremonial shortspear that did not look sharp enough to menace anything much more armored than a balloon. "Let us see what we can do," he said. He did not sound martial. The translator made him sound like a man in a blue funk.

Greenberg said, "Your highness, we admire your courage in going forth to confront your enemies. Many princes might stay within the walls and try to withstand a siege."

"If I thought I could, Soft One, I would. But V'Zek, may his clasper's prongs fall out, would swallow my cities one by one, saving T'Kai for the last. Maybe the town can hold against him, maybe not. But the confederacy would

surely die. Sometimes a bad gamble is all there is."

"Yes," Greenberg said, having had the same thought a few minutes before.

"I thank you for making it better than it might be. Now I join my troops." K'Sed gestured jerkily with the shortspear and headed for the way down. That was neither stairs nor ramp, merely a double row of posts driven into the wall. With ten limbs, the G'Bur needed nothing more complex. Humans could use the posts too, though less confidently.

"More to him than I thought," Koniev said as he watched the prince descend.

"He's brave enough, and bright enough to see what needs doing," Greenberg agreed. "Whether he has the skill and the wherewithal to do it is something else again. Maybe we can help a little there."

"Maybe." Marya sounded about as convinced as K'Sed, but like the prince of T'Kai was ready to get on with it. "Shall we go down? Otherwise they'll leave without us, which won't make them like us any better." She lowered herself off the edge of the wall, grunted when her feet found purchase, and then climbed down rapidly.

Greenberg's palms were always sweaty by the time he made it to the ground. He did not have a good head for heights, which struck him as ironic for a spacer but was there—and a nuisance—all the same. Jennifer, by contrast, was altogether unruffled as her boots kicked up gravel in the courtyard. Nothing seemed to get to her, Greenberg thought with reluctant admiration.

His orders certainly had not. She was

starting to walk with the rest of the humans toward the T’Kai army. The warriors milled about under their standards: bronze-colored pennons bearing the emblem of the confederacy K’Sed ruled—a golden grasping-claw, its two pincers open.

“You won’t be marching with us,” Greenberg reminded her. “You’re going back aboard the *Flying Festoon*, remember?”

“Oh, that’s right,” she said; yes, she had forgotten all about it. The ship sat a few hundred meters away, its smooth silver curves contrasting oddly with the vertical dark stone curtain of the walls of T’Kai. Jennifer turned and walked toward the *Flying Festoon* willingly enough. Her curves, Greenberg thought, also made an odd contrast with the jointed, armored G’Bur all around her. He sighed. In spite of everything, he would miss her.

K’Sed harangued his army with a blessedly brief address. He was less optimistic than most human leaders would have been in the same predicament. Even his peroration sounded downbeat: “Warriors of T’Kai, we are fighting for our freedom and our lives. Fighting is our best chance to keep them; if we do not fight, we will surely lose them. So when the time comes, let us fight with all our strength.”

He got no cheers, but the soldiers began tramping north. Heavy wagons drawn by *t’dit*—large, squat, enormously strong quasi-crustaceans—rumbled in a long column between troops of warriors. Choking clouds of dust rose into the sky.

The humans marched near the rear of the army the first day. “I wish I had a

set of nose-filters,” Koniev said, coughing.

“Get used to it.” Greenberg waved his hand at the ground over which they were walking—bare dirt, sparsely sprinkled with small bushes here and there. Most of them, now, were sadly bedraggled. “No grasses, or anything like them,” the master merchant went on.

“So?” Koniev said indifferently.

Greenberg stared at him. “So?” he echoed. “Next trip in, we’ll have a load of grain genetically engineered to take advantage of the gap in the ecosystem—all grain is, after all, is grass with big seeds. I’ve had people working on that for a long time, but always on a shoestring, so it’s taken a while. T’Kai would pay plenty for a new food crop like that . . . if there’s any T’Kai left to sell it to in a couple of years, that is. The M’Sak won’t give a damn about it—what forest nomads would?”

Marya knew about the grain project. “We’re not just trying to save T’Kai out of altruism, Pavel,” she said.

“Well, I was hoping not. Where’s the profit in that?”

Quiet and smooth, the *Flying Festoon* rose into the air. The ground screen showed G’Bur with eyestalks that seemed more than fully extended, G’Bur pointing grasping-claws at the tradeship, a few G’Bur running like hell even though starships had been visiting L’Rau every few years for a couple of generations now.

Jennifer noticed the excited locals only peripherally. The novel she was reading interested her much more than they did. Only when the *Flying Festoon* reached the 5,000 meters she had preset

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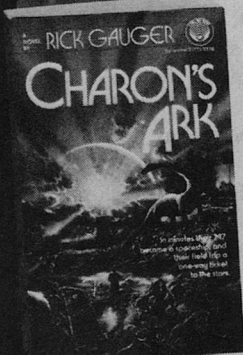
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did she reluctantly lower the reader and get around to the job she had been assigned.

Three drones dropped away from the ship and slowly flew off: northeast, due north, northwest. One of them, Jennifer thought, ought to pick up the advancing M'Sak army. When it did, she would have more to handle. Until then, she could take it easy. She got out the reader, put it back on. The novel engrossed her again.

Pre-starflight writers, she reflected, had one thing wrong about trading runs. Nobody she'd ever read of complained about how boring they were. But then, she supposed, nobody would set out to write a deliberately boring book.

Her being here on L'Rau, she decided, was all her father's fault. Better to blame him than something blind like fate or something too close to home like herself. Her father was a professor of pre-starflight English, and had taught her the old speech so young she read it as fluently as she did Spanglish.

A whole little academic community specialized in comparing imagined worlds with reality as it had unfolded. Jennifer always intended to join that community, and at the end of her sophomore year had had an idea original enough to guarantee her tenure before she turned thirty—no mean trick, if she could bring it off.

She'd reasoned that her competition—ivory-tower types, one and all—hardly knew more about how things really happened outside the universities than the old sf writers had. If she spent a couple of years on real fieldwork and coupled that unique perspective with a

high-powered degree, what doors would not open for her?

And so she'd taken a lot of xenanth courses her last two years. Some of them, to her surprise, were even interesting. When the crew of the *Flying Festoon* decided to carry an apprentice, there she was, ready and eager.

Here she was still, bored.

She read for a while, took a shower she did not really need, programmed the autochef for a meal whose aftermath, she realized with remorse, she would have to exercise off. She did, until sweat stuck her singlet and shorts to her. Then she took another shower. This one, at least, she had earned.

After all that, she decided she might as well check the drones' reporting screens. Night had fallen while she was killing time. She did not really expect to find anything exciting, the more so as the drones would be barely halfway to the jungle home of the M'Sak.

For a moment, the regular array of lights twinkling in the blackness did not mean much to her. A town, she thought, and checked on the map grid to find out which one it was. COORDINATES UNMATCHED, the screen flashed.

"Oh, dear," she said, and then, finding that inadequate, followed it with something ripe enough to have made Bernard Greenberg blink, were he there to hear it.

She sent the drone in for a closer look. Then she called Greenberg. He sounded as if he were underwater—not from a bad signal, but plainly because she had woke him up. "I hope this is important," he said through an enormous yawn.

Jennifer knew him well enough to

translate that: *it had better be* sounded in her mind. "I think so," she said. "You do want to know where the M'Sak are camped, don't you?" The silence on the comm circuit lasted so long she wondered if he had fallen asleep again. "Bernard?"

"I'm here." Greenberg paused again, sighed. "Yes, you'd better tell me."

V'Zek peered into the night. The tympanic membrane behind his eye-stalks was picking up a low-pitched buzz that would not go away. Scratching the membrane with a grasping-claw did not help. The chieftain summoned Z'Yon, and felt his temper rise when the shaman clicked laughter. Laughing around V'Zek was dangerous, laughing at him insanely foolhardy.

"Well?" V'Zek growled. He reared back so the other M'Sak could see his shortspear.

Z'Yon opened the joint between his carapace and plastron to let the chieftain drive the spear home if he wanted. V'Zek thought the gesture of ritual submission insolently performed, but his anger gave way to surprise when the shaman said, "I hear it too, my master. The whole army hears it."

"But what *is* it?" V'Zek demanded. "No sky-glider makes that sort of noise."

Z'Yon opened the edges of his shell again, this time, V'Zek judged, in all sincerity. "My master, I cannot say. I do not know."

"Is it a thing of the T'Kai?" V'Zek was worried. He expressed it as anger; no chieftain could show anything that looked like fear. "Can they smite us with it? Have you heard of their possessing such?" He looked as if he

wanted to tear the answer from Z'Yon, with iron pincers if his own were not strong enough.

"Never, my master." Now the shaman truly was afraid, which made his overlord a trifle happier. Z'Yon spoke more firmly a moment later: "My master, truly I doubt it is a T'Kai thing. How could they conceal it?"

"And more to the point, why? Yes." V'Zek thought, came up with no alternatives that satisfied him. "What then?"

"The Soft Ones," Z'Yon said quietly. "Traveling through the air, after all, is said to be their art, is it not?"

The suggestion made sense to V'Zek. He wished it had not. When the other choice was thinking them creatures of near—(or maybe not just near)—supernatural powers, he had preferred to doubt such things as Soft Ones even existed. After C'Lar, he could not do that any more. So he had thought of them as skilled artificers—their mirrors and such certainly justified that. But then, the T'Kai confederacy was full of skilled artificers. The difference between those of his own race and the strangers seemed one of degree, not of kind.

The T'Kai, though, he knew perfectly well, could not make anything that buzzed through the air. If the Soft Ones could . . . It had never occurred to V'Zek that the line between skilled artificers and creatures of near-supernatural powers might be a fine one.

Someone cried out in the camp, a shout of fear and alarm that tore the chieftain away from his uncharacteristically philosophical musings: "There it is! The sky-monster!" Other yells echoed the first. Warriors who should

have been sleeping came tumbling out of their tents to see what the trouble was. Panic ran through the camp.

"By the First Tree, I see it myself," Z'Yon murmured. V'Zek aimed his eyestalks where the shaman's grasping-claws were pointing. At first he saw nothing. Then he spied the little silvery box his army's campfires were illuminating. The buzzing came from there, too. No, no T'Kai had made the thing, whatever it was. Every line, every angle screamed its alienness. V'Zek wanted to run, to hide himself under the leaves and branches of the forests of M'Sak, to imagine himself undisputed lord of all creation.

He did not run. He filled his book-lungs with air till they pressed painfully against his carapace. "Warriors!" he bellowed, so loud and fierce that eyestalks whipped toward him all through the camp. "Will you flee like hatchlings from something that does you no harm?"

"How much you take for granted," Z'Yon said, but only V'Zek heard him.

He knew the shaman was right. He ignored him anyhow—he knew he had only this one chance to rally the army to him before it fell apart. He cried out again: "Let us try to make it run off, not the other way around!" He snatched up a fair-sized stone, flung it with all his might at the thing in the sky, and wondered if he would be struck dead the next moment.

So, evidently, did his followers. The stone flew wide, but the thing floating in the air above the camp took no notice of it and did not retaliate. "Knock it down!" V'Zek shouted, even louder than before. "Drive it away!" He threw another stone. Again the buzzing de-

vice—creature?—paid no attention, though this time the missile came close to it.

Crazy confidence, fueled mostly by relief, tingled through V'Zek. "You see? It cannot hurt us. Use arrows, not just stones, and it will be ours!" He had led the M'Sak many years now, almost always in victory. As they had so often before, they caught fire from him. Suddenly the sky was full of rocks and arrows, as if the fear the northerners had felt were transmuted all at once to rage.

"My master, you have magics of your own," Z'Yon said, watching the frenzied attack on the sky-thing. V'Zek knew the shaman had no higher praise to give.

Praise, however sincere, won no battles. The M'Sak roared as one when a stone crashed against the side of the sky-thing. It staggered in the air. V'Zek ached to see it fall, but it did not. An arrow hit the thing and bounced off. Another, perhaps shot by a stronger warrior, pierced its shiny skin. It lurched again.

Despite that, its buzzing never changed. And after a little while, it began to drift higher, so that not even the mightiest male could hope to hit it.

"A victory," V'Zek shouted. "We've taught it respect."

His warriors cheered. The thing was still there; they could see it faintly and still catch its sound, though that was muted now. But they had made it retreat. Maybe it had not been slain or broken or whatever the right word was, but they must have hurt it or it would not have moved away at all. The panic was gone.

But if V'Zek had managed to hold his

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army together, he still felt fury at the buzz which remained, to his way of thinking, all too audible. The sky-thing showed no signs of departing for good. It hung over the camp like, like—on a world where nothing flew and only a few creatures could glide, he failed to find a simile. That only made him angrier.

“What’s it doing up there?” he growled. At first it was a rhetorical question. Then the chieftain rounded on Z’Yon. “Shaman, you lay claim to all sorts of wisdom. What *is* it doing up there?”

Z’Yon was glad he had been working through that question in his own mind. “My master, I do not think it came here merely to terrify us. Had that been the aim, it would be more offensive than it is. But for its, ah, strangeness, in fact, it does not seem to seek to disturb us.”

V’Zek made an irregular clicking noise. The sky-thing was disturbing enough to suit him as it was. Yet Z’Yon had seen a truth: it could have been worse. “Go on,” the chieftain urged.

“From the way it hangs over us—and keeps on hanging here—my guess is that somehow it passes word of us to the Soft Ones, and I suppose to the T’Kai as well. I say again, though, my master, that is only a guess.”

“A good one,” V’Zek said with a sinking feeling. Hanging there in the sky, that buzzing thing could watch everything he did. At a stroke, two of his main advantages over T’Kai disappeared. His army was more mobile than any the city-dwellers could patch together, and he knew with no false modesty that he surpassed any southron general. But how would that matter, if

T’Kai learned of every move as he made it?

He clicked again, and hissed afterwards. Maybe things could not have been worse after all.

B’Rom peered into the screen Greenberg was holding. “So that is the barbarians’ army, is it?” the vizier said. “Does their leader camp always in the same place within the host?”

“I’d have to check our tapes to be sure, but I think so,” Greenberg answered cautiously: B’Rom never asked anything without an ulterior motive. “Why?”

The chief minister’s eyestalks extended in surprise. “So I can give proper briefing to the assassins I send out, of course. What good would it do me to have them kill some worthless double-pay trooper, thinking all the while they were slaying the fierce V’Zek?”

“None, I suppose,” Greenberg muttered. He had to remind himself that the M’Sak had not invaded the T’Kai confederacy for a picnic. Drone shots of what was left of C’Lar told that louder than any words.

B’Rom said, “Do you think our agents would be able to poison the barbarian’s food, or will we have to use weapons to kill him? We would find fewer willing to try that, as the chances for escape seem poor.”

“So they do.” The master merchant thought for a moment, went on carefully, “Excellency, you know your people better than ever I could. I have to leave such matters of judgment in your hands.” He knew the computer would give the appropriate idiom, probably

something like *in the grasp of your claws*.

The minister went click-click-hiss, sounding rather—Greenberg thought unkindly—like an irritated pressure cooker. “Do not liken me to the savages infesting our land.” He glared at Greenberg from four directions at once, then suddenly made the rusty-hinge noise that corresponded to a wry chuckle. “Although I suppose from your perspective such confusion is only natural. Very well, you may think of yourself as forgiven.” He creaked again and scurried away.

No doubt he’s plotting more mischief, Greenberg thought. That was one of the things the vizier was for. The old devil was also a lot better than most G’Bur—most humans too, come to that—at seeing the other fellow’s point of view, likely because he believed in nothing himself and found shifting position easy on account of it.

The T’Kai army moved out. Greenberg, Marya, and Koniev tramped along with the G’Bur. Even the locals’ humblest tools would have fetched a good price on any human world. The waterpots they carried strapped to their left front walking legs, for instance, were thrown with a breathtaking clarity of line the Amasis potter would have envied. And when they worked at their art, the results were worth traveling light-years for.

The T’Kai treated their land the same way. The orchards where they grew their tree-tubers and nuts were arranged like Japanese gardens, and with a good deal of the same spare elegance. The road north curved to give the best pos-

sible view of a granite boulder off to one side.

Greenberg sighed. The M’Sak cared little for esthetics. They were, though, only too good at one art: destruction. The master merchant wished he had a warship here instead of his merchant vessel. He wished for an in-atmosphere fighter. Wishing failed to produce them.

“I didn’t expect it would,” he said, and sighed again.

“Didn’t expect what would?” Marya asked. He explained. She said, “How do the M’Sak know the *Flying Festoon* isn’t a warship?”

“Because it won’t blast them into crabcakes, for one thing.”

“Will it have to? They’ve never seen it before. They’ve never seen anything like it before. If a starship drops out of the sky with an enormous sonic boom and lands in front of them, what do you think they’ll do?”

Greenberg considered. As far as he knew, no offworlders had ever visited the M’Sak. He laughed out loud, and kissed Marya on the mouth. She kissed him back, at least until a couple of G’Bur pulled them apart. “Why are you fighting?” the locals demanded.

“We weren’t,” Greenberg said. “It’s a—”

“Mating ritual,” Marya supplied helpfully.

The G’Bur clacked among themselves. The translator, doing its duty, laughed in Greenberg’s ear. He didn’t care. He thought what the G’Bur did to make more G’Bur was pretty funny too.

Jennifer put down the reader. Naturally, Greenberg’s orders had come just when she was getting to the interesting

part of the book. She wished this Anderson fellow, who seemed to have a feel for what the trader's life was like, were on the *Flying Festoon* instead of her. As he was several hundred years dead, though, she seemed stuck with the job.

She had all three drones over the M'Sak army now, flying in triangular formation. They stayed several hundred meters off the ground. That first night had not been the only time the invaders attacked them, and they thought of ploys Jennifer certainly never had. One had climbed a tree to pump arrows into a drone she'd thought safely out of range. Greenberg would not have thought well of her had it gone down.

She made a sour face. She did not think Greenberg thought well of her anyway. Well, too bad. No one had held a gun to his head to make him take her on. Just as she had to make the best of boredom, he had to make the best of her.

The M'Sak were approaching a wide, relatively open space with low bushes growing sparsely here and there. When L'Rau got around to evolving grasses, that kind of area would be a meadow. It would, Jennifer thought with a faint sniff, certainly be more attractive as a broad expanse of green than as bare dirt and rocks punctuated by plants.

But even as it was, it would serve her purpose. She did not want the M'Sak distracted from her arrival by anything.

She punched instructions into the computer. She was smiling as she picked up the reader again. She doubted they would have a lot of trouble paying attention to her.

* * *

V'Zek and his army hardly paid attention any more to the drones that hung over them. Their buzzing still reached the chieftain's tympanic membrane, but he no longer heard it unless he made a deliberate effort. If the things were spying on him for the Soft Ones, then they were. He could do nothing about it, now that the drones kept out of missile range.

The M'Sak marched in a hollow square, with booty and prisoners inside. The army was smaller than it had been when it entered T'Kai territory, not so much from casualties as because V'Zek had left garrisons in the towns he had taken. He intended to rule this land, not just raid it. When the T'Kai finally came out to fight, he would still have enough warriors to deal with them.

"For that matter, they may just yield tamely," the chieftain said to Z'Yon, who was ambling along beside him. The shaman was not a large male, and not physically impressive, but had no trouble keeping up with the big hulking youths who made up the bulk of V'Zek's army.

Z'Yon did not answer for a moment; he was chewing a *fleg* fruit he had snipped from a bush as he walked past. When he was done, he said, "I have to doubt that. The confederation is stronger to the south. I think they will try to meet us somewhere there."

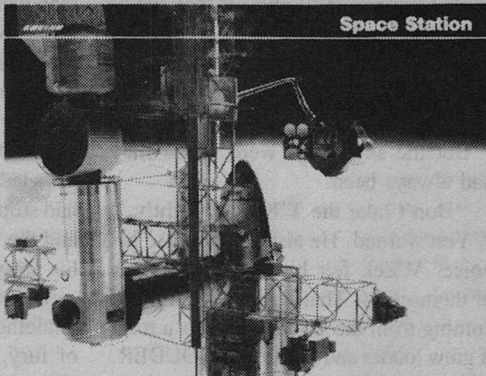
"I begin to wonder. The southrons are such cowards," V'Zek said derisively.

"Such what?"

"Cowards," V'Zek said, a little louder. The noise from the sky was louder, too. The chieftain turned his eyestalks that way, wondering if the

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drones were dropping lower again for some reason of their own. If they were, he would have his troopers drive them up again—they should not be allowed to think they could get gay with the bold M'Sak.

But the sky-things were where they had always been.

"Don't take the T'Kai too lightly," Z'Yon warned. He also had to raise his voice. V'Zek felt his eyestalks shrink of themselves. That was not a thin buzz coming from the sky now; it was a roar. It grew louder and *louder* and LOUDER. V'Zek's walking legs bent under it, as if he had some great weight tied to his carapace.

Z'Yon pointed with a grasping-claw. V'Zek made an eyestalk follow it. Something else was in the sky that did not belong there. At first he thought it just a bright silver point, as if a star were to appear in daylight. But it got bigger with terrifying speed—it became a shining fruit, a ball, and then, suddenly, the chieftain realized it was a metal building falling toward him. No wonder his legs were buckling!

He no longer heard the noise of its approach, but felt it as a vibration that seemed to be trying to tear his shell from his flesh. He looked up again, willing one eye to follow the sky-building as it descended. Would it crush him? No, not quite, he saw.

The roar continued to build, even after the thing was down on the ground in front of the M'Sak host. Then all at once it ended, and silence seemed to ache as much as clamor had a moment before.

"—the Soft Ones!" Z'Yon was shrieking.

V'Zek wondered how long the shaman had been talking, or rather screaming. "What about them?" he said. His own voice echoed brassily on his tympanic membrane.

"It's their ship," Z'Yon said.

"Well, who cares?" the chieftain growled. Now that that accursed noise had stopped, he was able to think again, and the first thing he thought about was his army.

When he looked back over his cephalothorax and tail, he let out a whistle of fury. His army, his precious invincible army, was in full flight, dashing in all directions.

"Come back!" he bellowed. He chose the one line that had even a tiny chance of turning the warriors, and shouted, "The prisoners are escaping with our loot!"

That made eyestalks whip around where nothing else would have. He saw he had not even been lying: captives from C'Lar and other towns were scuttling this way and that, with baskets on their carapaces and in their grasping-claws. He sprang after one, swung down his axe. It bit through the poor fellow's shell, which was softened by recent privation. Body fluids spurted. The prisoner fell. V'Zek slew one of his own soldiers, one who was running.

The chieftain reared back on his hindmost pair of legs, waved the dripping axe on high. "Rally!" he cried. "Rally!" A few officers took up the call. V'Zek fought and killed another would-be fugitive. The warriors began to regroup. They had feared their master for years, the unknown from out of the sky only for moments.

Then an even louder voice came from

the sky-thing, roaring in the T'Kai dialect, "Go away! Leave this land! Go away!"

V'Zek understood it perfectly well. Most of his soldiers could follow it after a fashion; the M'Sak language and that of the southrons were cousins. The chieftain thought the sky-thing made a mistake by speaking. Had it remained silent and menacing, he could not have fought it, for it would have given him nothing to oppose. This way, though—

"It's a trick!" he shouted. "It's the accursed T'Kai, trying to run us off without fighting us!"

"Doing a good job, too," cried one of his fleeing soldiers.

The fellow was too far away for him to catch and kill. V'Zek had to rely on persuasion instead, a technique with which he was much less familiar. Still with the full power of his booklungs, he said, "It hasn't harmed us. Will you run from noise alone? Do you run from thunder and lightning?"

"Not bad," Z'Yon said beside him. Then he too raised his voice: "If this is the best the T'Kai can do, you warriors should be ashamed. Our master has the right of it: a good thunderstorm back home is more frightening than this big hunk of ironmongery ever could be. If it smites us, that is the time for worry. Till then, it's only so much wind."

As an aside to V'Zek, he added, "If it smites us, I suspect we'll be too dead to worry about anything afterwards." But only the chieftain heard him; Z'Yon knew what he was doing.

Long-ingrained discipline, the fear of losing plunder, and the sky-thing's failure to do anything more than make threatening noises slowly won the day

for V'Zek. The M'Sak reclaimed most of their captives, most of their loot. They reformed their ranks and, giving the building that had fallen from the sky a wide berth, resumed their march south.

V'Zek wanted more than that. He wanted revenge for the sky-building's nearly having put paid to his whole campaign. He sent a squad of halberdiers against it. Their weapons were good for cracking shells; he wanted to see what they would do against that gleaming metal skin.

He never found out. The sky-thing emitted such a piercing screech that he, no short distance away, drew in his eyestalks in a wince of pain. His warriors dropped their halberds and fled. Most returned to their troop, but two dashed straight for Z'Yon: the shaman was the army's chief healer.

Z'Yon examined them, gave them a salve, and sent them back to their comrades. When he turned back to V'Zek, his hesitancy showed the chieftain he was troubled. "The salve will soothe a bit. It will do no more. Their tympanic membranes are ruptured."

"Deafened, are they?" V'Zek glowered at the flying building. He only glowered, though. If the thing really could be dangerous when provoked, he would not provoke it. He had more important things to do than pausing for vengeance in the middle of his attack on T'Kai.

Once he had broken the confederacy, though, he told himself, the Soft Ones—or whatever was in charge of the sky-thing—would pay for trying to thwart him. Anticipating that was almost as sweet as wondering how many

days he could keep prince K'Sed alive before he finally let him die.

Browns and greens chased each other across K'Sed's carapace as he looked at the M'Sak army in the vision screen. His eyestalks pulled in a little. He noticed and lengthened them again, but Greenberg caught the involuntary admission of fear. "They are still advancing," the prince observed. The translator's flat tones did not sound accusing, but the master merchant knew what he would have been feeling in K'Sed's shoes.

Not, he thought, that the prince wore any. He shoved the irrelevance aside. "So they are, highness," he said. If K'Sed felt like restating the obvious, he could match him.

"You said your ship would frighten them away," K'Sed said. "Were I not used to it, the sight and sound of a ship falling from the sky would be plenty to frighten me away."

"Yes, highness," Greenberg agreed. "I thought that would be true of the M'Sak as well. Evidently it was not." Out loud, he did not draw the obvious conclusion: that the invaders, or at least their leader, were braver than K'Sed. He hoped the prince would not reach that conclusion at all. K'Sed was demoralized enough already.

His next words showed that again, but at least he was thinking in terms of the nation he led rather than personally: "I wish we could fortify a strongpoint and force the M'Sak to attack us on ground of our own choosing. But I fear they would only go around us and keep on ravaging the countryside." Refugees from the north had spread lurid tales of

the destructiveness of the M'Sak, tales that did not shrink in the telling. Sadly, recon photos confirmed them.

"Your highness, I fear you are right." Anything that kept K'Sed focused on dealing with his problems seemed a good sign to Greenberg.

"And after all," the prince said, mostly to himself, "the savages are still some days' journey from us."

"So they are." Greenberg chose his words with care, not wanting to let K'Sed delude himself that he need do nothing and not wanting to alarm him further either. "And remember, your highness, that we still shadow their every move. When our forces close with theirs"—not, Greenberg made sure, *when they attack us*—"we will know their every move. They cannot take us by surprise."

"That is true." K'Sed brightened. His eyestalks lengthened, his shell went from green to bluish. "We will be able to ready ourselves to meet them."

Greenberg tried to tell himself that reading a plaintive note into the translation of the prince's words was sheer anthropomorphizing. He had trouble making himself believe it.

"We draw closer, my master," Z'Yon said. As the M'Sak moved further from their home, the land grew strange. These cool uplands, with the only trees in the neat orchards that yielded nuts and tubers, were daunting. Even the shaman felt under his shell how far away the horizon was.

V'Zek rarely showed worry. This was no exception. He made his eyestalks long as he peered south. The smellpores around his eyes opened wider; he seemed

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to be trying to smell out the T'Kai. "It will be soon," he agreed at last.

Two of his eyes stayed where they were. The other two broke from their southward stare to glance up at the three drones that still circled his army, and at the flying building as well. The latter was just a silver dot in the sky now, but V'Zeke knew its true size. He wondered absently how far up it was, to look so small. However far that was, it was not far enough.

Without his willing it, his grasping-claws clattered angrily. "They watch us," he said. His voice reminded Z'Yon of the hunting call of a *f noi*.

"They are not very brave, my master," the shaman said, trying to ease him from his gloom.

But V'Zek burst out, "How brave need they be? Knowing how we come, they can meet us at a spot of their own choosing. And when at last we fight them, they will see every move we make, as we make it. They will be able to respond at once, and in the best possible way. How can we gain surprise in a fight like that?"

"Warrior for warrior, we are better than they," Z'Yon said. He knew, though, as did V'Zek, that that meant only so much. Fighting defensively, the T'Kai might hold their casualties close to even with those of the invaders. A few engagements like that, and the M'Sak were ruined. Unlike their foes, the T'Kai could levy fresh troops from towns and countryside. The M'Sak had to win with what they had.

The shaman turned one cautious eye toward his chieftain. He was in luck: V'Zek was paying him no attention. The chieftain's eyestalks were all at full

length, his eyes intently staring at one another—a sure sign of furious concentration.

Then V'Zek let out a roar like a *f noi* that has just killed. "Let them see whatever they want!" he cried, so loud that half the army trained at least one eyestalk on him. He took Z'Yon's upper grasping-claws in his, squeezed till the shaman clattered in pain and feared for his integument.

V'Zek finally let go. He capered about like a hatchling, then, as if whispering some secret bit of magical lore, bent to murmur into the shaman's tympanum, "They cannot see into my mind."

Pavel Koniev leaped aside. The halberd's head buried itself in the ground where he had stood. The G'Bur hissed with effort, used all four grasping arms to tug the weapon free. It lifted.

Too slow, too slow—before the local could swing the long, unwieldy polearm again, Koniev sprang close. The G'Bur hissed again, dropped the halberd, and grabbed for his shortspear. By then Koniev had jumped onto the local's back. He swung his mace up over his head.

The circle of spectators struck spearshafts against carapaces in noisy tributes to his prowess. The claps and whoops that Greenberg and Marya added were drowned in the din. Koniev scrambled down from the G'Bur, gave him a friendly whack where a grasping-leg joined his shell. "You almost split me in two there, N'Kor, even though that halberd just has a wooden head."

"I meant to," N'Kor said. Luckily, the soldier did not seem angry at having

lost. "I thought it would be easy—I flattered you often enough when we started our little games. But you're learning, and you Soft Ones dodge better than I dreamed anything could. Comes of just having the two legs, I suppose." With their wide, armored bodies and three walking-legs splayed off to either side, the G'Bur were less than agile.

Of course, Greenberg thought as Koniev repeated his moves slowly so the locals could watch, the G'Bur weren't very fragile, either. A practice halberd would bounce off a carapace with the equivalent of no more than a nasty bruise, but it really might have done in Pavel.

"A good practice," Koniev was saying to N'Kor. "With the M'Sak so close, we need all the work we can get."

N'Kor made a puzzled noise that sounded like brushes working a snare drum. "But you have your little belt-weapons that bring sleep from far away. You will not need to fight at close quarters."

"Not if everything goes exactly as it should," Koniev agreed. "How often, in a battle, does everything go exactly as it should?"

This time, N'Kor's clattering was a G'Bur chuckle. "Next time will be the first. As I said, for a trader you are learning."

"Hmm," was all Koniev said to that. He wiped sweat from his face with a yellow-haired forearm as he walked over to the other two humans. "What are they doing?" he asked Greenberg; the master merchant always kept the vision screen with him.

"Making camp, same as we are," he answered after a brief look at it.

"How far away are they?" Marya asked.

She and Koniev waited a moment while Greenberg keyed new instructions into the vision screen. The M'Sak camp vanished, to be replaced by a map of the territory hereabouts. Two points glowed on the map, one gold, the other menacing scarlet. "Fifteen kilometers, more or less," Greenberg said, checking the scale along one side of the screen.

"Tomorrow," Marya said thoughtfully. Her dark eyes were hooded, far away. Greenberg suspected he bore a similarly abstracted expression. He had been in plenty of fights and skirmishes, but all of them came out of the blue, leaving him no time for anything but reacting. Deliberately waiting for combat was, in a way, harder than taking part.

Because humans needed less room than G'Bur, the tents they set up were dwarfed by the locals' shelters. But their three stood out all the same, the orange nylon fiery bright when compared to the undyed canvas fabric that was the standard tent-cloth on L'Rau.

Marya opened her tentflap. She hesitated before going in, and looked from Greenberg to Koniev. Daylight was fading fast now, and campfires were not enough to let the master merchant be sure she flushed, not with her dark skin. "Come in with me," she said quietly.

Now the two men looked at each other. "Which one?" they asked together. They laughed, but without much mirth. Till now, they had never had any trouble sharing her affection . . . but there might not be another night after this one.

Marya knew that too. "Both of you."

Greenberg and Koniev looked at each other again. They had never done that before. Koniev shrugged. Greenberg smiled. "Come on, dammit," Marya said impatiently. As the closing tentflap brushed him, Greenberg reflected that he had already decided it was no ordinary night.

In the *Flying Festoon*, Jennifer read fantasy and wished she were with the three traders. She had heard them all together when she called to ask if they had come up with any new notions on how to use the starship in the upcoming battle. They hadn't; flying low and creating as much confusion as possible was the best thought they'd had. Jennifer got the idea their minds were elsewhere.

They could have invited her down, she thought. There would have been nothing to landing the *Flying Festoon* outside the T'Kai camp and then finding the brilliant tents the humans used. Except for prince K'Sed's huge pavilion, they were the most conspicuous objects in camp.

But they had not asked her to come down, and she would not go anywhere she was not asked. She felt the hurt of that implied rejection, and the sadness. The three of them had a world in which she was not welcome. Maybe that was just because she was younger than any of them, she told herself. She did not believe it. No matter what courses she had taken, she was not a trader. Greenberg must be sorry he had ever chosen her.

She gave herself back to her fantasy novel. It reminded her that she had a place of her own too, in an intellectual

world where she was up and coming, not all too junior and none too skilled. It also reminded her, unfortunately, that the nearest center of that world was some light-years away.

She began a fantasy of her own, one where she saved the *Flying Festoon* from hideous danger in space. The traders were ready to go into cold sleep and unfurl the light sail for a sublight trip back to civilization that would almost surely last centuries. Somehow, armed with no more than a screwdriver and determination, she saved the stardrive.

She managed to laugh at herself. Even before spaceflight, that would have made godawful science fiction. Here and now, it was simply ridiculous. If anything went wrong, the best she could do would be to scream for help; all other alternatives were worse.

She turned down the temperature in her quarters until they were just above chilly, then dug out blankets and wrapped them tight around her. She finally fell asleep, but it was not the sort of warm embrace she wanted to enjoy.

"They are not four times our size, are they?" Prince K'Sed spoke with a certain amount of wonder as he studied the drawn-up ranks of the enemy.

"You knew that, your highness," Greenberg observed, hoping to hearten the T'Kai leader. "You've received M'Sak ambassadors often enough at your court."

"Ambassadors are different from soldiers," K'Sed answered. Now he could see the M'Sak were G'Bur much like the ones he commanded, but it did not seem to encourage him.

Eyering the force waiting ahead,

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Greenberg began to understand why the prince remained apprehensive. The ranks of the M'Sak were grimly silent and motionless, while the T'Kai still milled about and chattered as if they were just on march or, better image yet, gabbing about this and that while they tried to outdo one another in the marketplace. For the most part, they *were* merchants, not soldiers by trade. The M'Sak, unfortunately, were.

The master merchant slowly realized that went deeper than the discipline the northern warriors showed. Everything about them was calculated to intimidate. Even their banners were the green of an angry G'Bur, not the unmartial bronze under which the T'Kai mustered. Greenberg wondered how many such clues he was missing that were playing on the psyches of K'Sed and his army.

And yet, the T'Kai owned an edge no soldiers on L'Rau had ever enjoyed. "They cannot hide from us," he reminded K'Sed. "We will know all their concealed schemes, and be able to counter them." Only when the words were out of his mouth did he stop to think the one might not be the same as the other.

Something of an odd color moved with a peculiar sinuous motion through the ranks of the T'Kai. V'Zek wondered if the southrons had lured ghosts to fight for them. Trying to suppress superstitious dread, he put the question to Z'Yon.

"Anything is possible, my master, but I have detected no signs of it," the shaman said. "I think you are seeing instead a Soft One."

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V'Zek gave a clattery shudder of disgust. The Soft One moved like—like—V'Zek looked for a simile and for a long time failed to find one. Finally he thought of water pouring from a jug. That did not make him feel much better. Live things had no business moving like water pouring from a jug.

He waved to his drummers. Their thunder signaled his warriors forward. He spent only moments worrying about being watched from the sky. Once it was spear against spear, things would happen too fast for that to matter. And he felt fairly sure the sky-things could not read his thoughts. If they could, reading his hatred would have burned them down long since.

“They’re advancing,” Jennifer reported.

Greenberg’s voice was dry. “I’ve noticed.” He paused for a moment to take a closer look at what the vision screen showed him. When he spoke again, he sounded resigned. “Two lines, no particular weighting anywhere along them that I can see. Whatever cards he’s holding, he doesn’t want to show them yet.”

“No,” Jennifer agreed. She said, “Perhaps we shouldn’t have let him get used to the idea of having the drones up there.”

Greenberg paused again. “Maybe we shouldn’t. Why didn’t you say something about that sooner?”

“I just thought of it now.”

“Oh.” Greenberg hadn’t thought of it at all, and so was in no position to criticize. “Well, we’re all amateur generals here. I just hope it doesn’t end up costing us. Do you suppose we shouldn’t

have shown the northerners the *Flying Festoon* either?”

“We’ll find out soon, don’t you think?”

“Yes, I expect we will. This is a little more empirical than I really planned on being, though. Wish us all luck.”

“I do; you three especially, because you’re on the ground.”

The master merchant did not answer. Jennifer sighed. She sent the *Flying Festoon* whizzing low over the battlefield. The roar of cloven air filled the cabin when she activated the outside mike pickup. Then she shut it off again, and turned on the ship’s siren. It reverberated through the hull even without amplification, and set her teeth on edge.

She studied the pictures the drones gave her. After reading about so many imaginary battles, she fancied herself a marshal. She soon discovered the job was, as with most things, easier to imagine than to do. She found no magic strategic key to V'Zek’s maneuvers. If anything, she thought him over-optimistic, advancing as he was against a strong defensive front: the T’Kai right was protected by a river, the left anchored by high ground and a stand of trees.

She wondered if he knew something she didn’t, and hoped finding out would not be too expensive.

B’Rom sidled up to Greenberg crabwise—an adverb the master merchant applied to few G’Bur but the vizier. “Soon now,” B’Rom declared. The translator should have given his clicks, hisses, and whistles a furtive quality, Greenberg thought, but that, sadly, was beyond it.

"Soon what?" Greenberg asked, a trifle absently. Most of his attention was on the forest of oversized cutlery bearing down on the T'Kai. The *Flying Fes-ton*'s histrionics left his ears stunned. He hoped the M'Sak were quaking in the boots they didn't wear.

Then his head whipped round, for B'Rom was saying, "Soon the assassination, of course. What better time than when the savages are in the midst of their attack?"

"None, I suppose," Greenberg mumbled. He felt his hand ease on his stunner. Maybe he wouldn't have to use it after all.

The racket overhead was appalling and confusing, but V'Zek was proud of the way his warriors pressed on toward the waiting enemy. The Soft Ones had

blundered in showing their powers too soon. That relieved V'Zek a good deal: ghosts or spirits would never have made such a foolish mistake. The Soft Ones were natural, then, no matter how weird they looked. V'Zek was confident he could handle anything natural.

A warrior whose carapace was painted with a messenger's red stripes came rushing up to the chieftain. V'Zek's eyestalks drew together in slight perplexity—what could be so urgent, when the two armies had not even joined? Then the fellow's left front grasping-claw pulled a war hammer from its concealed sheath under his plastron. He swung viciously at the M'Sak chieftain.

Only V'Zek's half-formed suspicion let him escape unpunctured. He sprang to one side. The hammerhead slammed painfully against his side between right front and rear grasping legs, but the

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chisel point did not penetrate. By the time the would-be assassin struck again, V'Zek had out his own shortspear. He turned the blow, gave back a counter-thrust his enemy beat aside.

Then half a ten M'Sak were battling the false messenger. Before their chieftain could shout for them to take him alive, he had fallen, innards spurting from a score of wounds. "Are you all right, my master?" one of the soldiers gasped.

V'Zek flexed both right-side grasping legs. He could use them. "Well enough," he answered. He looked closely at the still shape of his assailant. The curve of the shell was not quite right for a M'Sak. "Does anyone know him?"

None of the warriors spoke.

"I suppose he is of T'Kai," the chieftain said. The soldiers shouted angrily. So did V'Zek, but his fury was cold. He had wanted the southrons for what they could yield him and his people. Now he also had a personal reason for beating them. He reminded himself not to let that make him break away from his carefully devised plan. "Continue the advance, as before," he ordered.

"Some sort of confusion for a moment there around the chieftain." Jennifer's voice sounded in Greenberg's ear. With the M'Sak so near, he had put the vision screen away. He let out his breath in a regretful sigh when she reported, "It seems to be over now."

"Damn." Marya and Koniev said it together. All three humans were on the right wing of the T'Kai army, not far from the river. Since V'Zek led the in-

vaders from their right, he was most of a kilometer away, and out of their view.

Closer and closer came the M'Sak. They were shouting fiercely, but the din from the *Flying Festoon* outdid anything they could produce. "Shoot!" cried an underofficer.

All G'Bur held bows horizontally in front of themselves with their front pair of grasping-claws, using the rear pair to load arrows—sometimes one, sometimes a pair—and draw the weapons. The M'Sak archers were shooting back at the T'Kai, lofting arrows with chisel-headed points to descend on their foes' backs.

Every so often, warriors on one side or the other would collapse like marionettes whose puppeteers have suddenly dropped the strings. More commonly, though, the shafts would skitter away without piercing their targets. Exoskeletons had advantages, Greenberg thought.

An arrow buried itself in the ground less than a meter from his left boot. He shuffled sideways and bumped into Marya, who was unconsciously moving away from an arrow that had landed to her right. Their smiles held little humor. "Shall we give them something to think about?" she asked.

Greenberg and Koniev both nodded. The three humans leveled their stunners at the M'Sak. The master merchant felt the gun twitch slightly in his hand as it fed stun charges one after another into the firing chamber.

One after another, M'Sak began dropping; pikes and halberds fell from nerveless grasping-claws. The invaders' advance, though, took a long moment to falter. Greenberg realized the M'Sak,

intent on the enemies awaiting them, were not noticing that their comrades were going down without visible wounds.

Then they did notice, and drew up in confusion and fear: for all they knew, the felled warriors were dead, not stunned. Greenberg took careful aim and knocked down a M'Sak whose halberd had a fancy pennon tied on below its head—an officer, he hoped. "Good shot!" Koniev cried, and thumped him on the back.

"I only wish we had a couple of thousand charges instead of a hundred or so," Marya said, dropping another M'Sak. "That would be the end of that, and in a hurry too."

By no means normally an optimist, Greenberg answered, "We're doing pretty well as is." The M'Sak left was stalled; had they been humans, the master merchant would have thought of them as rocked back on their heels.

The officers who led the T'Kai right did not have that concept (or heels, for that matter), but they recognized disorder when they saw it. "Advance in line!" they ordered.

The T'Kai raised a rattling cheer and moved forward. They chopped and thrust at their foes, who gave ground. For a heady moment, Greenberg thought the M'Sak would break and run.

They did not. Faced by an assault of a sort with which they were familiar, the invaders rallied. Their polearms stabbed out at the T'Kai, probing for openings. The opposing lines came to close quarters. For a long time, motion either forward or backward could be measured in bare handfuls of meters.

The humans stopped shooting. They had to be careful with charges, and

friend and foe were so closely intermingled now that a shot was as likely to fell a T'Kai as a M'Sak. If the enemy broke through, stunners could be of value again. Without armor, they were useless in the front line.

Koniev gave a nervous laugh as he watched the struggle not far ahead. "I never thought there would be so much waiting *inside* a battle," he said.

"I notice you're still holding your stunner, not your mace," Marya said.

"So I am." Koniev looked down as if he had not been sure himself. The mace was still on his belt. He touched it with his left hand. "If I have to use this thing, odds are we'll be losing. I'd sooner win."

Greenberg's own personal defense weapon was a war hammer. He had almost forgotten it; now he noticed it brush against his thigh, felt its weight on his hip. He nodded to himself. He would just as soon go on pretending it wasn't there.

"The savages are mad, mad!" prince K'Sed clattered, watching the M'Sak swarm up the slope toward his waiting soldiers. "All the military manuals cry out against fighting uphill." Like a proper ruler, he could stand on any walking-leg. He had studied the arts of war even though they bored him, but never had expected the day to come when he put them to practical use.

B'Rom clicked in agreement. "No law prevents our taking advantage of such madness, however." He turned to the officer beside him. "Isn't that so, D'Ton?"

"Aye, it is." But the general sounded a little troubled. "I had looked for better

tactics from V'Zek. After all, he—"D'Ton had at least the virtue of knowing when to shut up. Reminding his prince and vizier that the enemy had won every battle thus far did not seem wise.

"Let us punish him for his rashness," B'Rom declared. D'Ton looked to K'Sed, who raised a grasping-claw to show assent.

The general scraped his plastron against the ground in obedience. He had no real reason not to agree with the prince and vizier. Knowing when and by what route the M'Sak were coming had let the army choose this strong position. Not taking advantage of it would be insanely foolish. He filled his book-lungs. "Advance in line!"

Lesser officers echoed the command. Cheering, the prince's force obeyed. They knew as well as their leaders the edge the high ground gave them. Iron clashed and belled off iron, crunched on carapaces, sheared away limbs and eyestalks.

With their greater momentum, the T'Kai stopped their enemies' uphill advance dead in its tracks. The two lines remained motionless and struggling for a long moment. Here, though, the stalemate did not last. The T'Kai began to force the M'Sak line backwards.

"Drive them! Drive them! Well done!" D'Ton shouted. V'Zek truly had made a mistake, he thought.

Prince K'Sed, gloomy since the day he learned of the M'Sak invasion, was practically capering with excitement. "Drive them back to M'Sak!" he cried.

"Driving them back to level ground would do nicely," B'Rom said, but as he spoke in normal tones no one heard him. The T'Kai warriors picked up the

prince's cry and threw it at the foe: "Back to M'Sak! Back to M'Sak!" It swelled into a savage chant. Even B'Rom found a grasping-claw opening and closing in time to it. Irritated at himself, he forced the claw closed.

"Hold steady! Don't break formation! Hold steady!" V'Zek heard the commands echoed by officers and underofficers as the M'Sak gave ground. He wished he could be in the thick of the fighting, but if he were, he could not direct the battle as a whole. That, he decided reluctantly, was more important, at least for the moment.

"Back to M'Sak! Back to M'Sak!" The cry reached him over the din of battle and the shouts of his own warriors.

"Amateurs," he snorted.

"They aren't fond of us, are they?" Z'Yon observed from beside him.

"They'll be even less fond of us if they keep advancing a while longer." And, V'Zek thought but did not say, if my own line holds together. He never would have dared to try this with the T'Kai semi-rabble. Even with good troops, a planned fighting retreat was dangerous to try. Planned retreat could turn unplanned in an instant.

But if it didn't . . . If it didn't, he would get in some fighting after all.

Being a trader was different from what Jennifer had expected. So was watching a battle. It was also a great deal worse. Those were real intelligent beings trying to kill one another down there. Those were real body fluids that spurted from wounds, real limbs that lay quivering on the ground after they were



hacked away from their owners, real eyestalks that halberds and bills sliced off, real G'Bur who would never walk or see again but who were in anguish now and might well live on, maimed, for years.

She tried to detach herself from what she was seeing, tried to imagine it as something that was not real, something that was only happening on the screen. Koniev or Marya, she thought, would have no trouble doing that; about Greenberg she was less sure. She knew she was having no luck. What she watched was real, and she could not make herself pretend it was only a screen drama. Too many of these actors would never get up after the taping was done.

So she watched, and tried not to be sick. The really frustrating thing was that, in spite of having a full view of the whole battlefield, she could not fathom what, if anything, V'Zek was up to. The T'Kai right wing was holding; the left, by now, had actually advanced several hundred meters.

This, she thought with something as close to contempt as her mild nature would allow, was the sort of fighting that had made V'Zek feared all through the T'Kai confederacy? It only went to show that on a world with poor communications, any savage could build up a name for himself that he didn't come close to deserving.

F'Rev had no idea what the battle as a whole looked like. The commander-of-fifty had his own, smaller, problems. His troop was in the T'Kai center. The line he was holding had been stretched thin when the army's left claw drove

back the barbarians: it had to stretch to accommodate its lengthened front.

Now it could not stretch any further. He sent a messenger over to the troop on his immediate right, asking for more warriors.

The messenger returned, eyestalks lowered in apprehension. "Well?" F'Rev growled. "Where are the reinforcements?"

"He has none to send, sir," the messenger said nervously. "He is as thin on the ground as we are."

"A pestilence!" F'Rev burst out. "What am I supposed to do now?"

V'Zek's guards almost killed the red-striped messenger before he reached the chieftain: after the one try on their master's life, they were not about to permit another. But when the fellow's bona fides were established, he proved to bring welcome news.

"There's a stretch in the center three or four troops wide, my master, where they're only a warrior or two thick," he told V'Zek.

Z'Yon, who heard the gasped-out message, bent before V'Zek so that his plastron scraped the ground. "Just as you foretold, my master," the shaman said, more respectful than V'Zek ever remembered hearing him.

The chieftain knew he had earned that respect. He felt like bards sometimes said they did when songs seemed to shape themselves as they were sung—as if even the sun rose and set in accordance with his will. It was better than mating, purer than the feeling he got from chewing the leaves of the *p'sta* tree.

Neither the moment nor the feeling

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was to be wasted. "Now we fight back harder here," he told the subchiefs who led his army's right claw. "We've drawn them away from their strong-point—now to make them pay for emerging."

"About time," said one of his underlings. "Going backwards against these soft-shells was making my eye-stalks itch."

"Scratch, then, but not too hard. I want you to hold their left in place, make it retreat a little if you like, but not too far."

"Why not?" the subchief demanded indignantly.

"Because that would only hurt them. I intend to kill them." V'Zek was already running full-tilt toward the center. Now he would have some fighting to do.

"The M'Sak aren't giving up any more ground on the left," Jennifer reported into Greenberg's ear. "I suppose the T'Kai charge has lost impetus now that they're down onto flat ground." A moment later she added, "The barbarians are shifting a little toward the center, or at least V'Zek is moving that way."

"Anything serious there, do you think?" the master merchant asked.

After a pause (sometimes Greenberg wondered if she ever answered without one), Jennifer said, "I doubt it. What can he do that he hasn't already failed with on the left. He—" She stopped again. When she resumed, all she said was, "My God."

This time Greenberg did not blame her for the hesitation. He could not yet see what had gone wrong, but he could

hear that something had. "What is it, Jennifer?" he snapped.

"They found a soft spot in the line somehow—the M'Sak in our line, I mean." This time the wait seemed to be for Jennifer to collect herself. "Hundreds of them are pouring through. They're turning in on our left wing and—rolling it up, is that the phrase?"

"That's the phrase," the master merchant said grimly.

Along with Koniev and Marya, he ran to try to stem the rout. Long before he reached the rupture point, he knew it was hopeless. No mere thumb could repair this dike. The few M'Sak the three humans dropped did not influence the battle in the slightest.

"I'm sorry I didn't notice anything going wrong," Jennifer said from the *Flying Festoon*.

"I don't think there was anything much *to* notice," Koniev told her. Greenberg found he had to agree with the younger man. Wise with hindsight, Koniev went on, "V'Zek didn't find that soft spot in our line—he made it. He lured the left out till the T'Kai got over-extended, and then—and now—"

"And now," Jennifer echoed ruefully. "A few minutes ago, I was thinking V'Zek a fool of a general for letting himself get driven down the slope. He must have done it on purpose. That makes me the fool, for not seeing it."

"It makes all of us fools," Greenberg said. The thought galled him. Humans had a lot more cultural sophistication than any G'Bur, let alone barbarians like the M'Sak. V'Zek should not have been able to spring this kind of hideous surprise, especially not with drones watching the M'Sak's every move.

He had, though. And that, considering his background, made him a very nasty foe indeed.

"Wonderful," Greenberg said out loud. Marya and Koniev looked at him curiously. He did not explain.

"We are undone!" K'Sed cried. It was not a shout of panic, but rather of disbelief. "They tricked us!" The M'Sak surged against his line now, and pushed it back. Maybe, he thought much too late, he should not have called for pursuit down off the slope the T'Kai had once held. Then, perhaps, he would not have had these screaming, clacking savages in his rear, rolling up his warriors like a molting folding a shed piece of grasping-claw.

"I did not know trickery was not in the rules," B'Rom pointed out. The vizier made as much a point of pride at being unimpressed with everything as V'Zek did with being unafraid. B'Rom went on, "After all, we tried to do the same to the M'Sak with what we learned from the Soft Ones."

"The Soft Ones!" K'Sed shouted. "They tricked us too! They said we would win if we fought here. This whole botch is their fault."

"Oh, nonsense, your highness."

K'Sed stared at B'Rom with all four eyes. Under other circumstances, that would have been *lese-majesté* enough to cost the vizier his shell, one painful bit at a time. But now—K'Sed mastered his anger, though he did not forget. "Nonsense, is it?"

"Certainly." Whatever his shortcomings in behavior, B'Rom was no coward. "They told us nothing of the sort that I recall. They said this was a

good place to fight, and it is. You can see that with three eyes closed, and so can I. But they are traders, not generals—unfortunately, that is not a problem from which V'Zek suffers."

"Unfortunately." K'Sed was no mean player at the game of understatement either. Staying detached was not easy anymore, though, not when the line was unraveling like a poorly woven basket and the guards were almost as busy behind the prince as in front of him. He did try. "All these unfortunate things being true, what do you recommend now?"

One of B'Rom's eyestalks pointed behind him and to the left. "Running for the forest over yonder seems appropriate at the moment, wouldn't you say? We'll save a remnant that way, rather than all staying caught in the trap."

"Our right—"

"Is on its own anyway, now."

K'Sed hissed in despair. B'Rom had a way of being not just right, but brutally right. With a more forceful prince on the throne, he would have been killed long since. K'Sed wished he were that sort of prince; the T'Kai confederacy could use such a leader, to oppose V'Zek if for no other reason. He was as he was, though; no help for it. "Very well. We will fall back on the forest." He hoped all the practice he had put in on the shortspear would stay with him.

Chaos also gripped the T'Kai right wing (claw, the locals would have said), if in a less crushing embrace. Still under assault from the M'Sak before them, the T'Kai warriors could do little to rescue their cut-off comrades. In fact, the northerners pouring through the gap

where the center had been tried to roll them up and treat them like the left.

“Here they come again!” Marya shouted. The humans expended more of their precious stun charges. M’Sak fell. Others advanced past them. Dying in battle, even strangely, held few terrors for them. They did not know the stun guns were not lethal, but they had seen enough to be sure the weapons were not all-powerful.

Pavel Koniev perturbed them more than the stun guns could when he sprang out at them and shrieked “Boo!” at the top of his lungs. The cry was as alien to their clicks, hisses, and pops as his fleshy body was to their hard integuments. Not even the ghosts in their stories were so strange as he.

But the M’Sak were soldiers, and they were winning. As with the *Flying Festoon*, the mere appearance of the unknown was not enough to daunt them. They rushed forward, weapons ready. The humans snapped shots at them. As with any hurried shooting, they missed more often than they wanted to. And they only had time to press trigger buttons once or twice before the M’Sak were on them.

Marya’s scream made the shout Koniev had let out sound like a whisper. The warrior in front of her was startled enough to make only a clumsy swipe with his halberd. She ducked under it, stunned him at close range, then dashed up to crush the brain-nodes under his suddenly flaccid eyestalks.

Koniev did not use his stunner. He killed his foe with exactly the same move he had practiced on the way north. Then, orange body liquids dripping from his mace, he stood on the fallen

M’Sak’s carapace and roared out a challenge to the local’s comrades. No one answered it.

Greenberg only found out later how his friends fared. At the time, he was too busy trying to keep from being killed to pay them much attention. He threw himself flat on the ground to avoid a halberd thrust, then leaped up and grabbed the polearm below the head to wrestle it away from the M’Sak who wielded it.

That was a mistake. G’Bur were no stronger than humans, but their four grasping limbs let them exert a lot more leverage. Greenberg found himself flung around till he felt like a fly on the end of a fisherman’s line. At last, he lost his grip and fell in a heap. The M’Sak swung up the halberd for the kill.

Before he could bring it down, he had to parry a blow from a T’Kai. The soldiers from the southern confederacy were frantically counterattacking. The master merchant scrambled to his feet. “Thanks!” he shouted to the warrior who had saved him. He doubted the T’Kai had done so out of any great love for humans. But if the right wing of the T’Kai army was to escape as a fighting force, it could not let itself be flanked like the luckless left. Greenberg did not care about the local’s motivation. He would accept any excuse for rescue.

The M’Sak retreated grudgingly, but they retreated. More and more of them went off to finish routing the left—and to plunder corpses. That was easier, more profitable work than fighting troops still ready to fight back. The T’Kai right broke free of its assailants, moving south and east along the line of the stream that protected its flank.

A finger of light stabbed out of the sky. The *Flying Festoon* descended, its siren wailing. Greenberg wished it were a rocket like the ones Jennifer read about—then it might incinerate thousands of M'Sak with its fiery blast. Wishing, as he had found too often on L'Rau, did no good.

By then, the M'Sak were taking the starship for granted. They ignored it as it came down until, landing, it crushed several of them into wet smears beneath it. The three worn and battered humans who had fought on the ground laughed in delighted wonder to find the *Flying Festoon* a weapon of sorts after all.

The M'Sak, coming to the same conclusion, scattered. Greenberg was tempted to set the starship smashing them by ones and twos, but reluctantly forbore: as well go smashing cockroaches by dropping an anvil on them. And the *Flying Festoon's* drastic arrival served its purpose—it convinced the northern invaders to break off from the T'Kai right, which managed to withdraw in good order.

"Open the hatch, Jennifer." Only after the fighting was done did Greenberg realize how exhausted he was. Talking loud enough for the apprentice to understand him took a distinct effort. He looked at Marya and Pavel. They both looked as bad as he felt. "I think we'll spend the next night or two in the ship."

Nobody tried to talk him out of it.

Peering out from the walls of D'Opt at the M'Sak who ringed the town, Greenberg wished they seemed further away. D'Opt was barely important enough to rate a wall; its four meters of

baked brick sufficed to keep out brigands. Keeping out V'Zek and his troopers was likely to be something else again.

Walking-claws clattered on the bricks, close by the master merchant. He turned his head. "Your highness," he said.

Prince K'Sed did not answer for some time. Like Greenberg, he was looking out at the encircling enemy. "I wish we were back in T'Kai city," he said at last.

"So do I, your highness." Greenberg meant it. T'Kai city's walls were twice as high and three times as thick as D'Opt's, and made of stone in the bargain.

"You Soft Ones could have done more to help us get there," K'Sed said—crabbily, the master merchant thought.

He took a firm grip on his patience. K'Sed had not had an easy time of it. Skulking through the woods and fleeing for one's life were not pastimes for which princes usually trained. Even so, Greenberg did not intend to let K'Sed's criticism stay unchallenged. "Your highness, were it not for us, you would have no army left at all, and the M'Sak would be running loose through the whole confederacy. As is, you are strong enough still to force them to concentrate against you here."

"But not strong enough to beat them," K'Sed retorted. "That only delays matters, does it not? Had we fought them somewhere else, we might have won."

The unfairness of that almost took Greenberg's breath away. He managed to stutter out, "But you might have lost everything, too!" Likely would have lost everything, he said to himself.

“We’ll never know now, will we?” K’Sed sounded as though he thought he had scored a point. “And after the fight, you did little to keep the barbarians off us.”

“I am sorry, your highness, that they did not oblige us by holding still to be smashed one at a time.”

Greenberg’s sarcasm reached the prince where more dignified protests had failed. K’Sed bent his left walking-legs, letting his plastron almost scrape the bricks, a G’Bur gesture of despondency. “I knew this campaign was ill-omened when we undertook it. Even the moon fights against us.”

It was late afternoon. Greenberg looked eastward. He rarely gave L’Rau’s moon a thought—why worry about a dead stone lump several hundred thousand kilometers away? It looked as uninteresting now as ever: a gibbous light in the sky, especially pale and washed out because the sun was still up.

“I do not follow you, your highness,” the master merchant said.

“When the moon grows full, three days hence, it will be eclipsed,” K’Sed told him, as if that explained everything.

“Well, what of it?” Greenberg was so surprised, he forgot to tack on K’Sed’s honorific. “Surely you know what causes an eclipse?”

“Of course—the passage of our world’s shadow over the face of the moon. Every enlightened citizen of the towns in the confederacy knows this.” The prince turned one eyestalk toward the soldiers swarming through D’Opt’s narrow streets. “Peasants, herders, and even artisans, though, still fear the malign powers they believe to stalk the night.”

“That is not good.” Greenberg thought about how big an understatement he was making. As low-technology worlds went, L’Rau, or at least the T’Kai confederacy, was relatively free of superstition. The key word, though, was relatively. And because the master merchant dealt mostly with nobles and wealthy traders, he did not have a good feel for just how credulous the vast majority of the locals were.

He had also missed something else. K’Sed pointed it out for him, literally, gesturing toward the bronze-hued T’Kai banners that still fluttered defiance at the M’Sak. “Perhaps our color is ill-chosen,” the prince said, “but when the swallowed moon appears in that shade, how will the ignorant doubt it implies their being devoured by M’Sak? Truly, I could almost wonder myself.” K’Sed *was* a sophisticate, Greenberg thought, but even sophisticates on primitive planets found long-buried fears rising when trouble came.

“Maybe we could teach your soldiers—” Greenberg began. Then he stopped, feeling foolish, and annoyed at himself for his foolishness. Three days of lessons would not overturn a lifetime’s belief. He asked, “Do your warriors know the eclipse is coming?”

“Sadly, they do. We tried to keep it from them, but even the M’Sak, savages though they be, have got wind of it. From time to time they amuse themselves by shouting it up to our sentries, and shouting they will destroy us all on that night. I fear”—K’Sed hesitated, went on, “I fear they may be right.”

“Are you sure it is prudent to warn our foes of what we intend?” Z’Yon

asked, listening to the northern warrior yelling threats at the southrons trapped in D'Opt.

"Why not?" V'Zek said grandly. "We spread fear through their ranks, and anticipation of disaster. Having them with their eyestalks going every which way at once can only help us. And besides, they cannot be sure we are not lying. Almost I find myself tempted to delay the assault until the darkening of the moon is past."

"That might be wise, my master," Z'Yon said.

"What? Why?" When V'Zek stretched his walking-legs very straight, as he did now, he towered over Z'Yon. His voice, ominously deep and slow, rumbled like distant thunder—not distant enough, the shaman thought. He sank down to scrape his plastron in the dirt. "Why?" V'Zek repeated. "Speak, if you value your claws."

"The moltings suggest, my master, that we may fare better under those circumstances."

"So you consulted the moltings, did you?" The chieftain let the question hang in the air; Z'Yon felt its weight over him, as if it were the big metal sky-thing that had crushed a fair number of M'Sak to jelly.

"You said I might, my master," Z'Yon reminded the chieftain, "for my own amusement."

"For yours, perhaps. I, shaman, am not amused at your maunderings. On the given night we shall attack, and we shall win. If you put any other interpretation on what the moltings say, you will no longer be amused either, that I promise you. Do you grasp my meaning?"

"With all four claws, my master," Z'Yon assured him, and fled.

"The condemned man ate a hearty meal," Greenberg said, cutting another piece from the rare, juicy prime rib. He cocked an eyebrow at Jennifer. "Is that a quote from your ancient science fiction?"

She paused to swallow and to cut a fresh piece for herself; the *Flying Festoon's* autochef did right by beef and nearly everything else, though Koniev swore its vodka was only good for putting in thermometers. She answered, "No, I think it's even older than that."

"Probably," Marya agreed. "It sounds as though any society would find it handy."

"No doubt," Greenberg said. "The T'Kai would certainly think it was relevant tonight." He told the others what he had learned from K'Sed.

Koniev nodded slowly. "I've heard the barbarians shouting their threats. I didn't take much notice of them; the translator garbles them a lot of the time, anyway. But they're not bluffing, then?"

"Not even a little bit," Greenberg said. "That's why I want us to stay close by the ship. We may have to pull out in a hurry, and fighting my way back to the *Flying Festoon* through a mob of panicked or bloodthirsty G'Bur is something I'd rather not even have nightmares about."

"Sensible," Koniev said. Marya nodded a moment later.

"Pity the T'Kai won't be able to take ship with us," Jennifer observed.

"Yes; a good market will close down when the confederacy goes under,"

Marya said. "V'Zek won't be eager to deal with us, I'm afraid."

"That's not what I meant!" Jennifer sounded angry. Greenberg never remembered her sounding that way before; she had never been involved enough in what they were doing to get angry before. Now she burst out, "We're leaving a whole civilization to go down the drain. That counts for more than markets, if you ask me."

"Of course it does," Greenberg said. "Why do you think we've put so much effort into trying to save T'Kai? No matter how much money's involved, I wouldn't do footsoldier duty for a people I didn't like and respect. Or do the folks in your books care that much for profit?"

He hoped he hadn't been too harsh with her, and worried when he saw her bite her lip; now that she had shown a spark of interest, he did not want to blow it out. But her "No" held none of the indifference that annoyed him so much.

"All right," he said, relieved. "What we've been trying to do, then, is—"

"Wait," Jennifer told him. He did, from sheer startlement—she hardly ever interrupted. She got up from the table and dashed—again something new—for her cubicle. The three traders exchanged glances, as if to say she had never acted like this before.

She came back with the viewer (inevitably, Greenberg thought later; at the moment, he was just bemused). She held it out to him. "Here. Look at this, please. I think it's important."

He did not know she could be so urgent, in bed or out of it. Had she been this way in bed, he thought, he might have gone to her more and to Marya

less. Then he looked into the viewer, and puzzlement replaced vague regret. "Jennifer, I'm sorry, but I can barely make heads or tails of Middle English, or whatever the name for this is. What are you trying to show me?"

She made an exasperated noise, took back the viewer, peered into it. She returned it to him. "This story is called 'The Man Who Sold the Moon.' Do you see the circle, here and on this page"—she hit the FORWARD button—"and here"—she hit it again—"and here?"

"The one with '6+' printed inside it? Yes, I see it. What is it supposed to be, some sort of magic symbol?"

She told him what it was supposed to be. He and Marya and Koniev all looked at one another again. This Heinelein person did not think small; Greenberg had to give him that. "I still don't quite follow how you think it applies to our problem here."

This time her eyes said he had disappointed her. She did some more explaining. The master merchant felt a stab in his chest. He needed a moment to recognize it as hope, and took grim pleasure in fighting it down. "Where would we get enough soot, or for that matter rockets?"

"We don't need rockets, and soot wouldn't do us much good here either. Instead—"

Greenberg thought it over. By their expressions, Marya and Koniev were doing the same thing. Koniev spoke first: "It might even work, which puts it light-years ahead of anything else we've got going for us."

"Pulling the *Flying Festoon* out will be tricky, though," Marya said. She saw the only answer to that at the same

time Greenberg did. She sighed, not much caring for it. "I suppose some of us will have to stay behind, to show the T'Kai we aren't abandoning them."

"All of us but Jennifer, I think," Greenberg said. "After all, this is her hobbyhorse; let her ride it if she can."

"And let her—and us—hope she'll be able to rescue us if she can't," Marya said. No one argued with that, even for a moment. If Jennifer's scheme didn't work as advertised, the humans would need rescuing. So would the whole T'Kai confederacy. For it, unfortunately, none seemed likely.

V'Zek sent the T'Kai female scuttling out of his tent when the guard called that Z'Yon would have speech with him. "This is important, I take it?" the chieftain rumbled. It was not a question. It was more like a threat.

Z'Yon stooped low, but managed to keep the ironic edge in his voice: "It is, unless you would sooner not know that the great sky-thing has departed from D'Opt."

"Has it indeed?" V'Zek forgot about the female, though her shell was delicately fluted and the joints of her legs amazingly limber. "So the Soft Ones give up on their friends at last, do they?" He wished the weird creatures were long gone; without their meddling, he would have overwhelmed T'Kai without having to work nearly so hard.

Then Z'Yon brought his suddenly leaping spirits down once more: "My master, the Soft Ones themselves are still in D'Opt. They have been seen on the walls since the sky-thing left."

The chieftain cursed. "They are still plotting something. Well, let them plot.

The moon still grows dark and red tomorrow night, and the Soft Ones cannot alter that. And our warriors will fight well, for they know that darkened moon portends the fall of T'Kai. They know that because, of course, you have been diligent in instructing them, have you not, Z'Yon?"

"Of course, my master." The shaman suppressed a shudder. V'Zek was most dangerous when he sounded mild-est. As soon as Z'Yon could, he escaped from the chieftain's presence. He wondered how many eyestalks he would have been allowed to keep had he not followed V'Zek's orders in every particular. Surely no more than one, he thought, and shuddered again.

V'Zek watched the shaman go. He knew Z'Yon had doubts about the whole enterprise. He had them himself. The Soft Ones alarmed him; their powers, even brought to bear without much martial skill, were great enough to be daunting. He would much rather have had them on his side than as opponents. But he had beaten them and their chosen allies before, and after one more win they would have no allies left. For a moment, he even thought about dealing with them afterwards. He wondered what they would want for the weapon that shot sleep as if it were an arrow.

But even more, he wondered what they were up to.

The guard broke into his chain of thought. "My master, shall I fetch back the female?"

"Eh? No, don't bother. I've lost the mood. After we win tomorrow, we'll all enjoy plenty of these southron shes."

"Aye, that we will!" The guard

sounded properly eager. V'Zek wished he could match the fellow's enthusiasm.

Jennifer looked at L'Rau in the viewscreen. The world was small enough to cover with the palm of her hand. Away from the *Flying Festoon*, the ship's robots were busy getting everything into shape for tonight. She'd had to hit the computer's override to force it to make the gleaming metal spheroids do as she ordered.

At last everything was the way she wanted it. She still had a good many hours of waiting until she could do anything more. She got into bed and went to sleep.

Her last fuzzy thought was that Heinlein would have approved.

L'Rau's sun set. Across the sky, the moon rose. The shadow of the world had already begun to crawl across it. The M'Sak raised a clamor when they saw the eclipse. To Greenberg, their tumult sounded like thousands of percussion instruments coming to demented life all at once.

The translator could handle some of their dialect. Most of their threats were the same stupid sort soldiers shouted on any planet: warnings of death and maiming. Some M'Sak, though, showed imaginative flair, not least the barbarian who asked the defenders inside D'Opt for the names of their females, so he would know what to call them when he got to T'Kai city.

Then the hubbub outside the walls faded. An enormous G'Bur came out from among the soldiers. This, Greenberg thought, had to be the fearsome V'Zek. "Surrender!" he shouted up at

the T'Kai. He used the southern speech so well that the translator never hiccuped. "I give you this one last chance. Look to the sky—even the heavens declare your downfall is at hand."

Prince K'Sed waved a grasping-claw at Greenberg. The master merchant stepped to the edge of the wall; he hoped the sight of a human still had some power to unsettle the enemy. "You are wrong, V'Zek," he said. The translator, and amplifiers all along the wall, sent his reply booming forth, louder than any G'Bur could bellow.

"Roar as loud as you like, Soft One," V'Zek said. "Your trifling tricks grow boring, and we are no hatchlings, to be taken in by them. As the sky-*f noi* makes the moon bleed, so will we bleed you tonight, and all T'Kai thereafter," the M'Sak warriors shouted behind him.

"You are wrong, V'Zek," Greenberg said again. "Watch the sky if you doubt me, for it too shall show T'Kai's power."

"Lie as much as you like. It will not save you." V'Zek turned to his troops. "Attack!"

M'Sak dashed into archery range and began to shoot, trying to sweep defenders from the walls. The T'Kai shot back. Greenberg hastily ducked behind a parapet. He was more vulnerable to arrows than any local.

"What if you are wrong, Soft One, and your ploy fails?" Only B'Rom would have asked that question.

"Then we die," Greenberg said, a reply enough to the point to silence even the cynical vizier. B'Rom walked away; had he been a human, Greenberg thought, he would have been shaking his head.

Arrows ripped through the T’Kai banners flying above the master merchant’s head. He glanced up. The grasping-claw that stood for the confederacy had a hole in it. Not liking the symbolism of that, Greenberg looked away.

Shouts and alarmed clatterings came from the wall not far away. The translator gabbled in overload, then produced a word Greenberg could understand: “Ladders!”

Poles set into the wall could suffice for the G’Bur. When such aids were absent, though, the locals, because of the way they were built, needed wider and more cumbersome ladders than humans used. That did not stop M’Sak from slapping them against the walls of D’Opt and swarming up them. In fact, it made the defenders’ job harder than it would have been in medieval human siege warfare—being heavier than scaling ladders made for humans, these were harder to topple.

Without exposing more than his arm, Greenberg used a stun cartridge where the top of a ladder poked over the wall. The barbarian nearly at the level of the battlements fell on his comrades below. They all crashed to the ground. Cheering, the T’Kai used a forked pole to push down the suddenly empty ladder.

“Good idea!” Koniev shouted. The younger man imitated him. Another set of crashes, another overturned ladder.

“I’d like it better if I had more than”—Greenberg checked the charge gauge—“half a dozen shots left.”

“Eight here,” Koniev said. Marya was somewhere off around the wall’s circuit. Greenberg hoped she would not stop an arrow. For that matter, he hoped he would not stop one himself.

“Ladders!” The cry came from two directions at once. The master merchant looked at the moon. L’Rau’s shadow covered more than half of it, but totality was still close to an hour away. “Ladders!” This shout was further away. *Click-pop-hiss-click*: by now, Greenberg had heard the T’Kai word often enough to recognize it in the original, even if he needed electronics to reproduce it.

“Lad—” This time, the cry cut off abruptly after *click-pop*—an arrow must have found its mark. The M’Sak were throwing everything they had into this attack. Greenberg worried. Jennifer hadn’t counted on the possibility of D’Opt’s falling in a hurry. Neither had he. If that was a mistake, it was likely to be his last one.

“Forward!” V’Zek roared. “Forward!” He wished he could have gone up the first ladder and straight into D’Opt. Waiting behind the scenes for his warriors to do the job was the hardest part of being chieftain. He corrected himself: no, the hardest part was knowing he needed to hold back, and not giving in to the urge to go wild and slaughter.

If he suppressed that urge all the time, he wondered, would he be civilized? He found the idea ridiculous. He would only be bored.

He cast two critical eyes on the fighting, turned a third to Z’Yon, who was filing down a wounded M’Sak’s shell so no sharp edges would further injure the soft tissues inside. His fourth eye, as it had been most of the night, was on the moon. The fully lit portion grew ever smaller.

"You were right, shaman," he said, an enormous concession from him. But even a chieftain felt small and insignificant when the natural order of the world turned upside down.

Z'Yon did not answer until he had finished his task—had his prediction been wrong, he would have dared no such liberty. What would have happened to him had he been wrong was unpleasant to contemplate anyhow. He hoped he sounded casual rather than relieved when he said, "So it seems."

"The warriors truly know the meaning of the prodigy," V'Zek went on. "They fight bravely. I think they will force an entrance into the town not long after the whole moon goes into the jaws of the *f noi* in the sky. You did well in instructing the troops and insuring that they would be of stout spirit for the battle."

"I did as you commanded, my master." Z'Yon's eyestalks tingled in remembered fright. A ladder went over, directly in front of the shaman and his chieftain. Injured M'Sak flailed their legs in pain. One lay unmoving. "They fight well inside D'Opt, too."

"Doubtless their leaders and the Soft Ones have filled them with nonsense so they will not despair at our might," V'Zek said scornfully. "And see over there!" He pointed with an eyestalk and a grasping-claw. "We have gained a stretch of wall! Surely the end cannot be far away."

"Surely not, my master." Z'Yon wished he had not taken omens with the moltings; he would have had no qualms now about being as excited as V'Zek. He tried to stifle his doubts. He had been wrong before, often enough.

The last bit of white disappeared from the moon. "Now we hold the moment between our claws!" V'Zek shouted in a voice huge enough to pierce the tumult of battle. "Strike hard, and T'Kai falls. The sky gives us victory!"

"The sky gives us victory!" the warriors cried, and redoubled their efforts. The dim red light made seeing hard, but cries of alarm from the walls showed places where the M'Sak were gaining fresh clawholds. Z'Yon decided he had been wrong after all.

The last bit of white disappeared from the moon. "Now is the time," Greenberg said quietly into his comm unit. "Get things rolling, or the T'Kai have had it."

The pause that followed was longer than speed-of-light could account for. The master merchant started to call down curses on Jennifer's head. He wished he could take her damned reader and wrap it around her neck. He was starting to get more creative than that when he heard her say, "Initiated."

He checked his watch. The delay had been less than fifteen seconds. All she'd done, obviously, was get the program started before she answered him. He felt ashamed of himself. The fighting had his time sense screwed up.

He hoped he hadn't waited too long. T'Kai warriors were fighting desperately to keep the M'Sak from enlarging the two or three lodgements they had on top of the wall, and to keep them from dropping down into D'Opt. If the southerners broke and ran now, nothing would save them. But if he had started Jennifer's scheme before the eclipse was

total, odds were it would have been wasted.

Too late for ifs now, anyhow. How long would things take up at the *Flying Festoon's* end? When he judged the moment ripe, he spoke into the translator. The amplifiers around the walls made all the battle din, all V'Zek's shouts, seem as whispers beside his words: "The very heavens proclaim the glory of T'Kai! Look to the sky, you who doubt, that you may see the truth writ large on the face of the moon itself!"

The message repeated, over and over. In the spaces between, the master merchant heard what he most hoped for: quiet. T'Kai and M'Sak alike were peering upward with all their eyes.

"Hurry up, Jennifer, dammit," Greenberg muttered. He made sure the translator was off.

"... Look to the sky, you who doubt, that you may see the truth writ large on the face of the moon itself!" That roar might have been enough to frighten the M'Sak troops, had they not heard it before. More Soft One trickery, V'Zek thought, and handled as ineptly as the rest of their stunts.

Nevertheless, he looked. He could not help it, not with that insistent great voice echoing and reechoing on his tympanic membrane. The moon remained dim and bronze—alarming, but alarming in a familiar way.

V'Zek laughed, loud and long. The last bluff had failed. No one but the *f'noi* in the sky could harm the moon, and from the *f'noi* it always won free in the end.

"Lies!" V'Zek shouted. "Lies!"

And as he watched, as he shouted, the moon changed.

A light sail is nothing more than a gauze-thin sheet of aluminized plastic, thousands of kilometers across. When fully extended, it holds photons' energy as a seaboat's sail traps the wind. Needing no internal power source, it makes a good emergency propulsion system for a starship.

Normally, one thinks only of the light sail catching photons. No one cares what happens to them afterwards. Jennifer did not think normally. On that, as on few other things, she and Greenberg agreed. She realized the light sail could also act as a mirror, and, with the ship's robots trimming it, a mirror of very special shape.

She had been ready for more than a day. She was, in fact, reading when Greenberg called her, but she wasted no time getting the operation under way. The adjustment was small, tilting the mirror a couple of degrees so the light it reflected shone on L'Rau's moon instead of streaming past into space.

As soon as she was sure the robots were performing properly, she went back to rereading "The Man Who Sold the Moon."

The wait seemed to stretch endlessly. The M'Sak were not going to pause much longer, Greenberg thought, not with their chieftain screaming "Lies!" every few seconds. Then golden light touched the edge of the moon, which should have stayed bronze and faint upwards of another hour.

The light stayed at the edge only a moment. Faster by far than L'Rau's

patient shadow, the radiant grasping-claws hurried to their appointed place in the center of the moon's disk, so that it became a celestial image of the emblem of T'Kai.

The warriors of the confederacy suddenly pressed against their foes with new spirit. The humans had promised a miracle, but few, Greenberg knew, believed or understood. Asking a planet-bound race to grasp everything starfarers could do was asking a lot. But since the prodigy worked for them, they were glad enough to accept it.

As for the M'Sak—"Flee!" Greenberg shouted into the translator. "Flee lest the wrath of heaven strike you down!" The barbarians needed little urging.

"Hold fast!" V'Zek shrieked. A warrior ran by him. The warrior was also shrieking, but wordlessly. All his eyes were on the moon, the horrible, lying moon. V'Zek grabbed at him. He broke away from his chieftain's grip, ran on. V'Zek swung a hatchet at him, and missed.

The chieftain's mandibles ground together in helpless fury. Moments before, he had led an army fine enough to satisfy even him. Now it was a mob, full only of fear. "Hold fast!" he cried again. "If we hold, we will beat them tomorrow."

"They will not hold," Z'Yon said softly. Even the shaman, curse him, had three eyes on the sky. "And tomorrow, there will be ambushes behind every tree, every rock. We daunted T'Kai before. Now we will be lucky to win back to our own forests again."

V'Zek's eyestalks lowered morosely.

The shaman was likely right. The M'Sak had gone into every fight *knowing* these effete southrons could never stand against them. And they never had. But now—now the T'Kai, curse them, *knew* the heavens themselves fought for them. Worse, so did his own warriors.

He turned on Z'Yon. "Why did you fail to warn me of this?"

"My master?" Z'Yon squawked, taken aback. Too taken aback, in fact, for he blurted out the truth: "My master, I did tell you the moltings indicated the need for caution—"

"And I told you not to consult them. Do you think you can boast now of disobeying me?" Before V'Zek was aware of willing his grasping-claw to strike, the axe he was carrying leaped out and crashed through Z'Yon's shell, just to the left of the shaman's center pair of eyestalks. Z'Yon was dead almost before his plastron hit the ground.

V'Zek braced, pulled the hatchet free. Killing Z'Yon, he discovered, solved nothing, for the shaman's words remained true. There was no arguing him out of them any more, either. And a little while later V'Zek, like his beaten, frightened warriors, fled north from D'Opt.

Until the sky-*f noi* began to relinquish its grip on the moon, the hateful emblem of T'Kai glared down at them. Forever after, it was branded in their spirits. As Z'Yon had foretold—another bitter truth—few found home again.

Astern, L'Rau's sun was but the brightest star in the viewscreen. Before long, it would not even be that. As soon as the tradeship went FTL, it would be lost to sight; only the computer could

find it again. Musing aloud on that, Greenberg said, "Profit or no, I won't be sorry if I don't come back for a few years. Any time you have to bring off a miracle to get out in one piece, you're working too hard."

"Something to that," Koniev agreed. He was drinking ship's vodka, and for once not complaining about it: a measure of his relief. "Speaking of miracles, that eclipse was visible over a whole hemisphere. I wonder what G'Bur who never heard of T'Kai made of it."

"Giving the next generation's scribes and scholars something new to worry about isn't necessarily a bad thing," Marya said. She moved slowly and carefully, but X-rays said she only had an enormous bruise on her shoulder from a slingstone, not a broken collarbone. Lefthanded, she raised her glass in salute. "Speaking of which, here's to the scholar who got us out." She drank.

"And with a market for our next trip," Greenberg said—he could think about it after all, he found. He drank.

The object of their praise turned pink. She drank too. She turned pinker. "Speech!" Marya called, which made Jennifer swallow wrong and cough.

"A pleasure to pound your back," Koniev said gallantly. "Are you all right now?" At her nod, he grinned, "Good, because I want to hear this speech too."

"I—don't really have one to make," Jennifer said with her usual hesitancy. "I'm just glad it all worked out." A moment later, she added, "And very glad to be going home."

"Aren't we all," Greenberg said. Koniev and Marya lifted their glasses

again, in silent agreement. The master merchant also drank. Then he asked Jennifer, "What are you going to do, once you're back?"

Her blue eyes were wide and surprised. "Why, go back to the university, of course, and work on my thesis some more. What else would I do?"

"Have you ever thought about making another run with us?" Greenberg had never expected to say those words. Plenty of times already he had regretted filling the apprentice slot with her. More than once, he had been tempted to leave her on L'Rau.

She knew that too; whatever else she was, she was a long way from stupid. "Why would you want me to?"

"Because nothing succeeds like success. This little coup of yours will win you journeyman status, you know, and a share of the profits instead of straight salary. And with your, uh, academic background," (he had been about to say "odd," but thought better of it) "you'd be useful to have along. Who knows? You might come up with another stunt to match this one."

"You really mean it, don't you?"

This time, Greenberg judged, the surprise she showed was real, not just the usual expression on her face. Well, these past few days she had surprised him a good deal, too. "Yes, I do," he said firmly.

"We'd like to have you along," Marya agreed. Koniev nodded.

"Thank you," Jennifer said. "Thank you. But—no. Once, for me, is enough. I feel very certain of that. The university suits me fine."

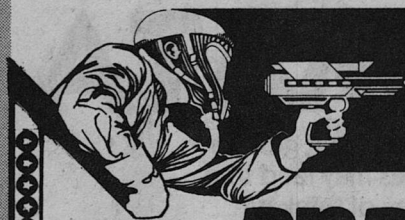
"All right." Greenberg knew not to push it. She certainly sounded sure of

herself, and if that was what she wanted to do with her life, she had the right. She'd be good, too, he thought. Even so, he added, "I'll see you get rated journeyman anyhow. You've earned it, whether you choose to use it or not."

"Thank you," she said again. "That's

very kind. I won't turn it down. Not, mind you, that I ever *will* use it."

"Of course not," Greenberg said. As a master merchant, though, he was used to getting his way, even if it took a while. Maybe he would this time, too.



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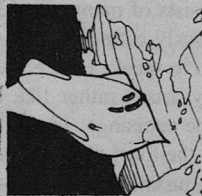
"R&R"
by Lucius Shepard
(*IASfm*, April 1986)

Best Novelette

"The Girl Who Fell into the Sky"
by Kate Wilhelm
(*IASfm*, October 1986)

Best Short Story

"Tangents"
by Greg Bear



Margaret L. Silbar

CELLULAR AUTOMATA

Very simple structures that generate
very complex ones may lead to a
useful new way of thinking
about a wide range of phenomena.

From the moment long ago that our ancestors first picked up and hunted with a splinter of rock, we have relied on tools to mold nature to our advantage. At about the same time these ancestors developed a somewhat more abstract tool, mathematics, perhaps arising out of distinguishing between "one," "two" and "many" of some species of prey. Tools help us to manipulate and think about simple processes, but as civilization has evolved, the tools (and the processes) have also become more and more complex. Nonetheless, despite the qualitatively different appearance of complex phenomena, we can often understand them in terms of simple mechanisms. For the fact is that simple "recipes," often repeated, can give rise to enormous complexity.

Think of just one case—a tiny skiing village whose folk, because of riding double on chair lifts, come to know each other in pairs. When there are only two

inhabitants, there are two pairwise relations—Skier A's relation with Skier B and B's relation with A, which may not be quite the same. If there are ten villagers, each has nine others to know, so there are 90 possible relations. Should there be 50 skiing villagers, there are 2,450 relations (or, 50×49). The number of possible relations grows much faster than the number of skiers, rising as the square of their number.

As it turns out, there are now *tools* whereby one can, from simplicity, generate and perhaps one day better understand the very nature of complexity. One such tool is known as a *cellular automaton*. It consists of many simple, linked, simultaneously acting and identical parts, cells so to speak. Hence, the name. Complexity arises rather like it does in a telephone exchange. In a village of ten skiers, the local phone company, by simply installing 90 wires, could connect each of the ten to nine

others. This became impossible as the world grew smaller and the population larger. The resultant complexity of modern-day phone companies, however, comes from the large number of components and their interconnections, rather than from any great complexity of the individual components themselves.

Now indeed you may wonder, being conversant with such esoteric notions as electrons and electric charge, quarks and quasars, black holes and worm holes, why you've never before even heard of a cellular automaton. It is because much of today's research on them has been published in scholarly journals, not readily available and cloaked in technical jargon. Nonetheless, the idea is not a new one, having first originated in the late 1940s, then lying dormant for a period, only recently again resurfacing. Loosely, the history of cellular automata may be characterized in terms of three periods:

1. The design era, in which the idea was formulated, drawing on an earlier study of the nervous system of mammals.
2. A simulation phase, in which many of the properties of cellular automata were deduced, sometimes using conventional computers, sometimes relying on just plain paper and pencil.
3. A construction phase, where some have actually been built, using silicon and wires.

The three phases—no great surprise—overlap, sometimes making precise definitions rather hard. For some

scientists are still designing, others use today's powerful computers to simulate the automata, rather than actually building them. But hold in your mind the idea of "tool," remembering that a number—indeed all of mathematics—is as much a tool as an arrowhead. Incidentally, it has been conjectured that tools not only help us shape our environment, but ultimately shape us genetically for they define what we can and cannot do. That is as true for the abstract tool, as for the physical one, making it even more important that we gain a feel for both kinds of tools. Let's turn first to the design era.

We ourselves are in a sense automata, for one definition of an automaton says that it follows automatically a predictable sequence of operations or responds to fixed encoded instructions. Indeed, we are programmed to replenish our cells, pay taxes as long as we live, and crawl out of bed to arrive at work at 8 A.M. Monday.

It is perhaps therefore no great surprise that formal considerations of the nature of automata first arose when the Hungarian-American John von Neumann set out to devise an electronic model of a nervous system which would reproduce itself. (His rules and therefore a more precise definition of this particular kind of automaton are given in the accompanying box.)

What is remarkable is that his analysis of the necessary ingredients for self-reproduction occurred *before* the discovery of the double helix structure of DNA and *before* our present ideas behind ge-

But *what* is a cellular automaton?

The Hungarian-American von Neumann was the first to write explicitly about cellular automata, as he tried to understand how biological systems evolve. He embedded (at least in his head) processing elements in a "cellular space." The following characteristics he listed as describing his (never-to-be-built) automata (with additional comments by me in parentheses):

1. An infinite plane is divided up into squares. (He made it infinite to avoid boundary problems, but as we shall later see, one can design an automaton using just a piece of graph paper.)

2. Each square contains a copy of the same "program," or set of rules if you will, together with a processing element, and these with the square are called a "cell."

3. Associated with each cell is a neighborhood, consisting of the cell itself, together with its four immediate neighbors. (Neighbors on the diagonal didn't, for von Neumann, count.)

4. The state of a particular cell at a particular time, $t + 1$, is uniquely determined by the state of its neighbors at the preceding moment, or time t .

5. A cell can just sit there; that is, it can be in a quiescent state. At each time step, some number of cells do nothing.

6. The cells that do change do so by transforming an array of data, as it exists at a certain moment in time, to another array. (This is how the automaton grows and changes, but it always does so according to the initial encoded instructions.)

While the cellular automata we will discuss in this article may differ slightly from that designed by von Neumann, they all share essentially these characteristics and are defined by them.

netic replication had been developed. We now know that DNA operates much like a programmed computer and that the genetic code contains the rules—the "microcode"—that describes how the computer is run.

Why did von Neumann choose to try to model reproduction? He had early recognized the difficulty of describing any specific operation of the brain, say, the ability to speak and understand the written word. The human brain has about 10^{11} neurons, about the same number as our galaxy has stars. While the dedicated network of neurons which governs language ability is much smaller than the total, it is still an enormous (and unknown) number. Von Neumann concluded that the simplest possible de-

scription for natural language production or understanding would therefore be a diagram of all the brain's neural connections!

Reproduction, on the other hand, is one of the most primitive functions of organisms; even one-celled organisms do it. But, as Queen Christina of Sweden once challenged Rene Descartes, how can a *machine* reproduce itself?!

One major problem is just what is meant by "reproduction." Von Neumann discussed this matter in now legendary talks at Princeton which, unfortunately, were never recorded. They were, however, discussed in *Scientific American*, in 1955, by John G. Kemeny, another mathematically-oriented Hungarian who made his way to

⁽¹⁾Recall that Descartes looked on the human body (but not its soul) as a machine that could be explained in mechanical terms; he compared it to intricate water-clocks and fountains.

the States, eventually becoming president of Dartmouth College. The next three paragraphs contain the essence of these ideas:

... "If we mean the creation of an object like the original out of nothing, then no machine can reproduce, but neither can a human being.

... "If we agree that machines are not alive, and if we insist that the creation of life is an essential feature of reproduction, then we have begged the question. A machine cannot reproduce."

The problem, Kemeny concluded (as had von Neumann), must be restated in such a way that replication won't be logically impossible.

... "We must omit the word living. We shall ask that the machine create a new organism like itself out of simple parts contained in the environment."

Von Neumann proceeded to try to show that this was in the realm of the possible. If a machine were properly instructed, it could wander around a "factory," assembling the wheels and gears, nuts and bolts it finds in various bins and stockrooms to reproduce itself. Eventually 3 machines would grow to 6 to 12 to 24, etc., as long as space is available and the parts hold out.

Ridiculous? Not really. Take as a trivial example crystal growth. Suppose you have a small crystalline "seed," a few molecules of ordinary sugar. Intro-

duce it into an environment, a solution, filled with many of the same molecules. If they are at an appropriate temperature and pressure, the seed will cause more sugar molecules to drop out of the liquid phase and to assemble in the same crystalline configuration.

The real problem, however, is to produce a *complicated* machine, not just a crystal, in a *simple* environment.

Von Neumann offered a heuristic idea of *complexity*, but was unable to formalize it (nor has anyone else done so). Von Neumann based his idea on the observation that, for example, man is more complicated than fruit fly.² The number of elements in a system determines in some sense its complexity. (Remember the skiing villagers and the telephone exchange.) Complication, he further said, should measure the ability of a system to do difficult and involved purposive operations.

The *simple* environment, the inspired suggestion of yet another immigrant mathematician, Stanislaw M. Ulam, was a "cellular space" with the "cells" being the raw materials, or parts, to be organized. Previously, von Neumann had gotten himself tied up in knots, trying to build up a system using differential equations. His early models, never built, were "kinematic." That is, they dealt with physical parts moving, coming into contact, fusing. Because of inherent engineering difficulties (such as friction), he turned to algebra and abstraction.³

⁽²⁾Can you imagine what geneticists would have discovered if they had chosen to start with a whale instead of the lowly *Drosophila*?

⁽³⁾On the one hand this is a good thing because it works; on the other hand, it is bad because it takes a lot of hard work to understand how algebra captures the idea of self-reproduction. Hang on, however, and the idea will become clearer.

The parts stockrooms thus evolved into a mathematical environment with cells arranged in a plane. Von Neumann's cells were in a sense a more complicated version of a 1943 model of how neurons interact; he was simply fascinated with it. In the model of Warren S. McCulloch and Walter S. Pitts of the Massachusetts Institute of Technology, neurons were ordinarily said to be either "on" or "off," firing or not firing. In contrast, von Neumann's cells had 29 possible states. At each tick of an imaginary clock, each of von Neumann's cells determined its new state from that of its four immediate neighbors.

Now von Neumann, unlike Turing, really wasn't so much interested in replicating an intelligent being with analytic and decision-making abilities. Von Neumann had a far grander goal in mind. He wanted to develop a theory of automata that would include both natural automata (such as the human nervous system and the glandular system of ants) and artificial automata (such as communication networks and digital computers).

Von Neumann died in 1957 before he could complete the task. He did, however, begin (and Arthur W. Burks finished) a manuscript of some 200 pages, outlining a rather baroque construction. It was without external input or output, but only a number of permissible cell states. This monster abstraction had 182,000 cells. *But*, it could

reproduce itself, actively directing its reconfiguration just as a strand of DNA replicates itself.

It was later shown that reproduction, even for a cellular automaton, could be a much simpler task, requiring only four allowed states per cell. Though simpler than von Neumann's abstraction, such a machine could still be as complex as a modern computer. Neither machine has been built, or, as far as is known, even simulated on a computer.

After von Neumann's death, it was not at all clear what lay in the future for cellular automata. They popped in and out of the literature with a wide variety of names, including tessellation automata, homogenous or cellular structures, and iterative arrays.⁴ They were used for a variety of purposes, in modeling biological systems, for solving problems in number theory, and in applications to tapestries, prime number sieves, image processors, and pattern recognition. Nonetheless, it was a quiet time for cellular automata.

In 1970, however, they really hit the eye of the game-playing public (to say nothing of a number of workers in the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology). This is the legacy of a witty (some say Carrollian) mathematician at the University of Cambridge, John Horton Conway. Large numbers of folk set out to explore the strange, new territory he created in a digital game he dubbed

⁴Indeed, as one group of theoretical physicists paraphrased Pogo the Possum, "We have been working on cellular automata without even knowing it." The group was referring to work on the Ising model, which lies at the heart of much of modern-day statistical mechanics.

"Life." The name arose in analogy to the rise of a society of living organisms, spreading out across the empty plains, then dying and decaying back into the sea of grass. The living or dead in Conway's cellular "checkerboard" world can be thought of as genes in a soup of amino acids or, perhaps, even as Texans immersed in a soup of Alaskans.

The "Game of Life," is made from a collection of two-state automata, obeying just three rules. Nonetheless, the game has the possibility of significantly more "moves" than chess. It also will give you an intuitive feel for how von Neumann's abstract algebraic model leads to reproduction. The game is most conveniently played on a computer, but it can also be pursued with a sheet of graph paper and a pencil or with a large checkerboard and black and white counters. If using graph paper or a computer, the idea is to fill each cell randomly with a "1" or a "0". If you are using counters, start with a pattern consisting of some black counters (the "living" cells) on a largely empty checkerboard background.

In each three-by-three neighborhood there is a center cell and eight adjacent cells. At each time step, each cell determines its new state from that of its eight nearest neighbors. "Genetic rules" govern the survival and death of the cells, as well as the birth of new ones. While the rules are simple, they do not allow one to predict the behavior of the population.

The rules⁵ for the Game of Life are: (1) To *survive* until the next time-step, or generation, a living cell must have two or three living neighboring cells. (That is, if there are two or three nearest-neighbor cells with black counters, the black counter under consideration will remain black.)

(2) *Death* occurs from overpopulation or from isolation. Each cell with four to eight living neighbors dies. (A black counter is placed on top of another black counter or a cell becomes "0".) Every cell with just one neighbor or none also dies (and the same procedure is followed).

(3) *Births*. Each empty cell adjacent to *exactly* three neighbors becomes a living cell. (A "1" or a white counter is placed on it.)

It's very easy to make a mistake if you are an ordinary human being. Conway therefore suggested using two colors of counters. This allows a check of the pattern. Then, to complete the next "move," all dead counters (piles of two black counters) can be removed and all newborns (white counters) can be replaced with black ones.

All this occurs simultaneously for each cell of the checkerboard; together the additions and deletions sum up what happens in one generation in the complete "life history" of the society. Remarkable patterns, some very complex indeed, can occur. Some patterns (as in

⁵For those of you who are already tired of "Life," you might prefer playing with the primordial computer sea of "Flibs," proposed by A.K. Dewdney in the November, 1985, *Scientific American*.

Figure 1) start out asymmetrically and later become symmetrical. Sometimes, a stable pattern—what Conway called “a still life”—is arrived at, nevermore to change. Sometimes, it oscillates forever between two or more different states. And sometimes, the population dies out.

The importance of the initial rules and conditions cannot be stressed too highly.⁶ Conway chose his genetic rules carefully indeed. All simple initial patterns grow, change, and inevitably come to an end. (Entering an oscillatory phase or static phase are considered “ends.”) There should nonetheless, he guessed,

be initial patterns that *apparently* grow without a limit. But he couldn't find any.

Thus, Conway offered a prize of \$50 for the answer to the question: Can an initially finite population in this game grow without limit? To prove that it can would involve discovering patterns that keep adding counters to the field as, for example,

(1) a “gun,” or a configuration that repeatedly shoots out moving objects such as moving “gliders.” A glider, for example, may in four moves, shift itself one column of squares over to the right and con-

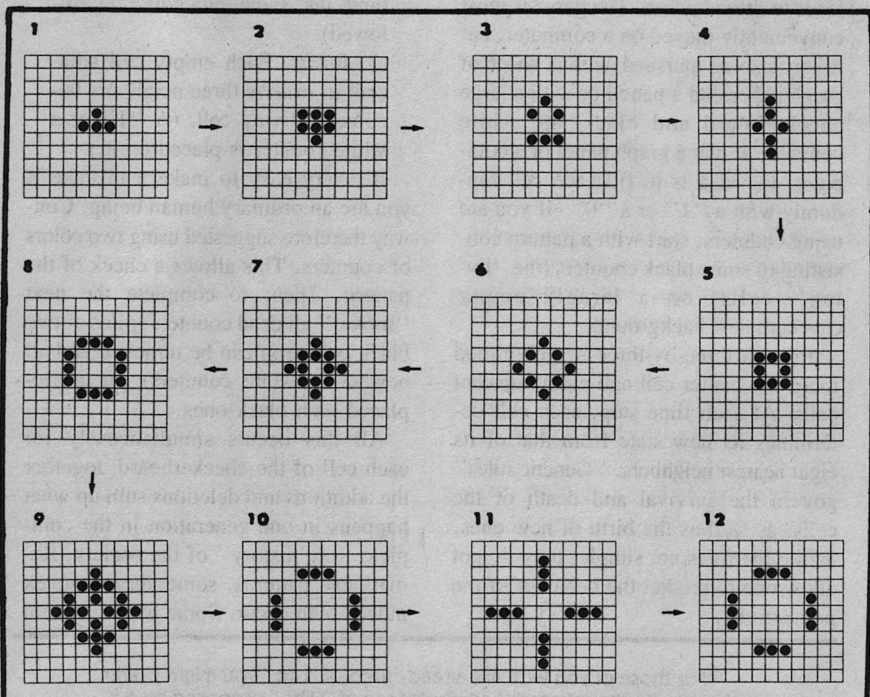


Figure 1: A succession of patterns, from asymmetry to symmetry, arising from an initial configuration in Conway's game.

Adapted from Y. Bouligand, *Dynamical Systems and Cellular Automata*, Academic Press, 1985.

tinue doing so every four moves thereafter.

(2) or, a "puffer train," a configuration that travels through empty space, leaving behind a trail of "smoke" or other static debris.

Using a program designed to display successive generations on an oscilloscope, glider guns were soon discovered by a group working at MIT's Artificial Intelligence Laboratory. Figure 2 shows the configuration that grows into a gun, firing its first glider on the 40th move. It then ejects a new glider every 30 moves, adding each time five more block counters to the population. Quite obviously, the population is growing without limit.

The glider gun led to the interesting possibility that this cellular automaton is computation-universal. Indeed it is. R. William Gosper, who was part of the original MIT group, later showed that the Game of Life can be used to perform all the logical operations of a digital computer. The gliders can store and transmit information and perform the logical operations that real computers do with their circuitry.

In 1984, Gosper, now at Lawrence Livermore Laboratory, also came up with some examples of what may well be "puffer trains." It only took 2,000 steps and a sevenfold multiplication of the original puff period. A few configurations, he points out have, however, puffed along quite nicely for several hundred steps, only to disintegrate. This, he says, "underscores the necessity of experimental proof of apparent unbounded growth."

In the real world, cellular automata have been used to explain the intricate patterns of snowflake growth and radiolaria, to generate fractals, and to mimic spiral galaxies and turbulent fluid flow. As one worker in the field puts it, "Cellular automata have been a kind of Rorschach test for physicists, who recognize in them their pet models." It has even been suggested that they may one day replace that workhorse of everyday science, the differential equation.

Meantime, a young and ambitious physicist is searching to uncover universal features among the myriad of

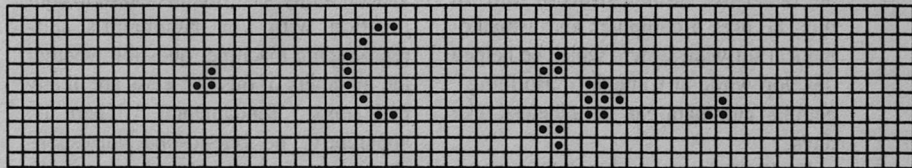


Figure 2: A configuration that grows into a glider gun.

Adapted from *Scientific American*, February 1971.

⁽⁶⁾Just as with von Neumann's self-reproducing machine, a small wiggle in the initial conditions or shift in the rules will destroy the desired behavior (in von Neumann's case, that usually represented by the birds and bees).

possible cellular "creatures." Stephen Wolfram of Princeton's Institute of Advanced Studies hopes to discover from these features general laws, analogous to those of thermodynamics, that classify self-organizing systems. In this, he continues in the tradition of the two mathematical pioneers of automata, the Hungarian born von Neumann and the English Turing.

Wolfram is trying to abstract from concrete examples of cellular automata the general features which would help us understand how raw bits of matter combine to form complex structures, everything from Steven Spielberg's "R2D2" to Texans. The charm of cellular automata is that they show complicated behavior analogous to that found with non-linear differential equations (or iterated mappings). "But, by the virtue of their simpler construction," he says, "they are potentially amenable to a more detailed and complete analysis."

In seeking universal rules for cellular automata, he started from the beginning. "Life," as described by Conway, is two dimensional. Wolfram began with one-dimensional automata; they are rather like infinite strips of film. In this, he uses a computer and a mathematical software system which he helped develop while at Caltech.⁷ "Building" cellular automata can nonetheless take days.

Wolfram first considered the patterns generated by cellular automata evolving from simple "seeds" consisting of a

few non-zero sites. This led him to suggest that patterns take on four forms. They disappear with time; they evolve to a fixed (but finite) size; they grow indefinitely (and at a fixed speed), or they grow and contract irregularly.

What he got depended on what he started with. Suppose he took a particular automaton and fed it different initial states; then he would come up with patterns whose details were different but which nonetheless had similar forms and statistical properties. On the other hand, if the rules governing the generation of the automata were different (remember Conway's "genetic rules"), then very different patterns would evolve.

From this work, Wolfram has so far discovered four universal classes, each with its own characteristics. Class 2 and Class 3, for example, can generate patterns of pigmentation such as are found on mollusk shells. Class 4 have persistent structures, which allow for both storage and transmission of information. (Some members of this latter class are also capable of arbitrary information processing, or universal computation.)

One can, as did the Institute of Advanced Study's Norman Packard in conjunction with von Neumann's self-reproducing machine, question whether the members of this last class are in any real sense "fundamental." There is, apparently, no one-to-one correspondence between the microscopic mechanisms in the model and those of the real world. *What is it then that leads*

⁷Caltech didn't appreciate the fact that it was missing out on a potential money maker. Wolfram was offered the choice of resigning or relinquishing his shares in the company formed to promote his Symbolic Mathematical Package. He resigned.

them to end up producing similar macroscopic phenomena? Were the beginning primordial "blocks" of which we are built really computers?⁸

Meantime, a cellular automaton made of wires and silicon (with which Wolfram has also been involved) came to fruition midway through 1985. It is the Connection Machine, product of a tiny three-year-old company with a big name, Thinking Machines Corporation. This new computer has 65,536 "cells" or arithmetic processors embedded in a memory. Fed instructions one-by-one by a conventional computer, it can per-

form one billion operations a second. (The "average" modern supercomputer in comparison does perhaps 25 million a second.)

The Connection Machine has been heralded as "the second state in the evolution of the digital computer." Perhaps yes, perhaps no. It is by no means the first massively parallel or even cellular machine on the market. But the Connection Machine is nonetheless a different *kind* of machine. As W. Daniel Hillis says, "Not only do you give each piece of data a processor, but you give it a telephone so it can call up other bits of information." Hillis conceived the

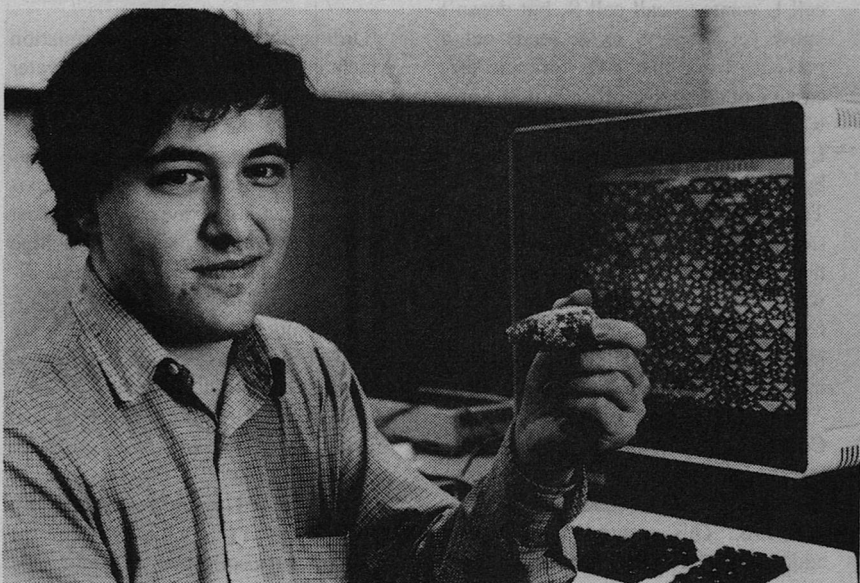


Photo courtesy of Los Alamos Science

Beginning at a random point, Stephen Wolfram generated this cellular automaton on his computer screen. Continuous mathematical replication produces a unidirectional spin pattern. It appears to be similar to the natural pattern on a cone shell.

⁽⁸⁾All we really know is that life appeared relatively soon after it was chemically possible, that is, when the broth of amino acids had grown rich enough.

idea of the machine in 1981 as an MIT graduate student; he is now chief engineer of the Cambridge company.

Like all would-be designers of parallel machines, Hillis had to confront the problem of connections—joining every processor to every other one would be an impossible wiring job. Microcircuitry, moreover, can only be miniaturized so far. The hardwired network is thus a variant of the “hypercube,” the cubical object in an n -dimensional space. Each processor is physically joined to a given number (n) of nearest neighbors.

Let's see how this works. Suppose cell L wants to call cell S, but doesn't know yet where S is. L sends out a message wave that goes through successive neighbors to all cells in the network. When the wave, which contains L's address, reaches S, the S cell replies by sending its own address back to L. The L cell then cancels its original message wave, which is still spreading out through the network, with a still faster wave. And now, L knows where S is for the next time it wants to send S a message. The second time the information will flow much faster.

That is new and unusual about the Connection Machine. It is so flexible that the network can be shaped to reflect the problem. It can refigure itself for each task. This occurs because of the address-to-address connections formed during the running of a program. The path of data through the network is altered, leading to a “virtual network” of arbitrary topology. The Connection Machine's processors can be configured into different “shapes”—rings and matrices, for example. And the prop-

erties of processors connected in rings are quite different from those of matrices.

Whether the Connection Machine (or indeed cellular automata) will occupy more than a very specialized niche in the real world is unclear. No one has yet dreamed up the problems that will fully utilize the Connection Machine. It was originally designed for artificial intelligence research. (Perhaps this is how the company's name arose.) However, it has also attracted the attention of those interested in Star Wars, in modeling the functions of the brain, and in fluid dynamics.

Ordinarily, it is a differential equation which is used to calculate how water flows around, say, the fin of a shark, or air around the wing of an airplane. But, this usually involves an enormous amount of computation (and approximation) in all but the very simplest cases. With the Connection Machine (and a program that operates a two-dimensional grid of 4000 by 4000 cells), it *may* be much easier and more accurate to model the behavior of the fluid as a swarm of individual particles.

Just as the Connection Machine was released, two contradictory papers appeared in the *Physical Review Letters*. Both were based (would you believe it?) on a then as-yet-unpublished paper of Wolfram and a colleague, J. Salem. One of the letters argued that cellular automata *can* be adapted in the real world to solve the problems of fluid dynamics. The other took the opposite tack, claiming that cellular automata will usually be unrealistic, i.e., too simple. Realistic networks, argued the authors, will be

less easily soluble than the equations to which they are an approximation! Obviously, the opera isn't over until we see if the Connection Machine "sings."

Meanwhile, cellular automata have already, albeit in a slightly different context, been used to predict fluid dynamical phenomena. Two short computer-generated movies have been made to convince the skeptics among hydrodynamicists. "Something really trivial, 14 lines of Fortran, can do what large codes with tens of thousands of lines can't," says Gary D. Doolen of the Los Alamos National Laboratory.

This reporter has seen a few movies in her day, but it is really quite exciting to see 10 million cells mimic a jet of high-pressure water moving into still water; the jet evolves into two strong vortices pulled along by the fluid. Known as the Kelvin Helmholtz problem, says Doolen, this is what most people in the field would expect to see. The second movie involves another standard problem that most of the usual big computer codes are not capable of computing. It involves the flow of fluid past a stationary cylinder, as for example, water flowing around a bridge pylon.

The algorithm was developed by Uriel Frisch, Brosl Hasslacher and Yves Pomeau. They ran it on a CRAY XMP supercomputer at Los Alamos National Laboratory. Doolen, who is in charge of making sure such things keep running smoothly, says this algorithm leads to

parallel computation. "It is purely logical. There is no mathematics involved—no addition, no subtraction—and it really flies," he says. (It processes 5×10^{10} bits a second.) Moreover, says Doolen, "it looks like the procedure may generalize to other kinds of physical phenomena." As a result, groups across the States and in France are working very hard trying to determine new regimes in which the cellular automaton is valid.⁹

The idea of modeling a fluid as a cellular automaton on a lattice was actually proposed by Frisch back in 1973. His automaton at that time involved squares in two dimensions. But, Doolen says, "bad things happened with the squares." A sacrosanct conservation law was violated: Angular momentum was too stringently conserved. That is, it was conserved separately by each row and column.¹⁰ There was no way for angular momentum to "flow" from one part of the fluid to another.

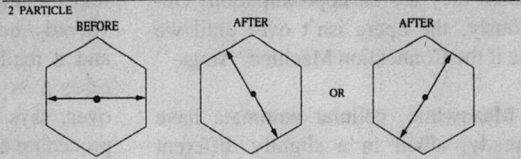
"Going to a hexagon solves that problem," says Doolen, and that is the new idea of Frisch, Hasslacher, and Pomeau. Imagine a space tiled with hexagons. Each particle in the fluid swarm is represented by a vector, corresponding to its velocity. Each cell has six particles which can move in six directions. In the beginning, all particles have the same velocity. The automaton evolves from just two simple scattering rules, pictured in Figure 3. (It is this second rule, the so-called three-body

⁽⁹⁾It is at least within the realm of the possible that what has been developed so far is no more than a simplified version of molecular dynamics.

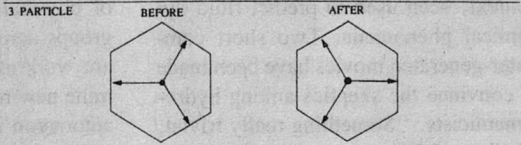
⁽¹⁰⁾Unlike the Game of Life, the squares in this automaton did not communicate with diagonal neighbors.

LATTICE GAS SCATTERING RULES

2-body scattering rule



3-body scattering rule



Gary D. Doolen

(Figure 3.) The rules for scattering collisions in the model for hydrodynamic flow simulated on a hexagonal lattice: If two particles come into a cell with equal and opposite momenta, they will scatter (with equal probabilities) by 60° or 120° . If three particles all come together as shown on the left, they scatter into the configuration shown on the right (and vice versa).

rule, which restores angular momentum to the picture.)

The obvious next problem is to see how to generalize this two-dimensional model of the differential equations of fluid dynamics to three dimensions. The codes are not yet written, but Doolen at least is confident the generalization

poses no problem. It may even turn out that the techniques we learned from the Game of Life will someday teach us how the blood burbles through our veins and arteries. It may also be, to return to the words of Turing, that by the time cellular automata get to that state, we won't know how they did it. ■

● Our overwhelming problem is not to plan the future in detail, but to tackle these key problems and to follow each of them through to its natural conclusion.

Carleton S. Coon
"The Story of Man"

(Submitted by G. Harry Stine)

On gaming

Matthew J. Costello

I can't tell you how many times people ask me what word processing system I use. Am I a Wordstar fan, or Multimate, or perhaps (a giggle here) Paperclip?

And then I tell them I don't use a word processor.

What? they ask. You, with all the words you write, *you* don't use a word processor? (And now, I must admit, I begin to feel an acute sense of embarrassment. As though my darkest secret has become common knowledge.)

Then there are the editors, who, when I finish a book, say, "Don't bother sending us a hard-copy. Just send the disks."

And, gulp, it's confession time again.

No, you see despite the various computers that wander in and out of my house (on a review basis), and despite the sophisticated computer software that I play with, I don't use the computer for anything that resembles a good purpose.

And just why is that? people will ask with an absolute sneer of incredulity. (I mean, what is the world is wrong with this guy?)

And here's the reason.

I write on yellow pads. Double-spaced. I do all my revising, inserting, deleting, and what-not right on the double-spaced

sheets. Then, when it's good and ready (just like a pie in the oven), I dictate my copy onto a tape.

Which is then delivered to my typing service. (And there the computer revolution is in full swing. A powerful AT&T 6300 is used and every word is loaded onto disks, later to be printed by a sleek Hewlett Packard LaserJet.

While I muddle on scribbling on legal pads.

But you see, it's the way I work. I don't think I could still write and hunt for keys on a keyboard. And I'm too busy to take a month or so to experiment.

But I have finally begun using my computer for more than video games. It's still playtime, but with a difference. I've been making, testing, and playing with computer directed robots. And forget word processors and laser printers . . . *this* is a product you must have.

It's called the *Robotic Workshop* (Multibotics Inc. Access Software Incorporated, 2561 South 1560 West, Suite A, Wood Cross, UT 84087; \$149.95—soon to be available for Apple, Amiga, Atari ST and IBM) and it comes with an intimidating array of material. There are dozens of connectors and motors (taken from the Capsela building system for kids) as well as wheels, propellers, and the assorted equipment to create volt-meters, oscilloscopes, and robots.

The key to the *Workshop* is the B-100 interface unit which plugs right into the back of your Commodore or Atari computer and allows the computer to communicate with the assorted gadgets you build. A single disk contains the as-

(continued on page 128)

It's a general principle of science
that observation affects the thing observed.
To what extent is history determined
by our knowledge of it?



Timothy Zahn

BANSHEE



The bar was a small, roadside spot nestled almost invisibly among the mountains of south-central Wyoming. It had probably once been a tourist trap of sorts, I guessed, before newer roads had drained traffic away and left it struggling to survive on the flyspeck towns loosely grouped around it. How it was managing to do so I couldn't guess; even at four o'clock on a Tuesday afternoon a decent bar ought to have had more than three cars huddled together in its parking lot. In my mind's eye I envisioned an interior to the place as dreary as its exterior, aching with a sense of failure, and the thought of facing that nearly made me pass it up. But I hadn't eaten since breakfast and my stomach had been rumbling for the past two hours . . . and besides, perhaps my patronage would help a little. Pulling my old rust bucket into the lot, I climbed out into the hot sun and went inside.

I'd been right about the bar being largely deserted; but on the plus side, the decor was not nearly as depressing as I'd feared it would be. Old and somewhat faded, it had nevertheless been well cared for. Which, coincidentally, was how I viewed the waitress who reached my side as I settled down at my chosen table. "Afternoon," she said with a smile as she set down a water glass in front of me. "Our special today is home-barbequed chicken with . . ."

"Sounds good," I agreed, when she'd finished her description, "but I think I'll just have a medium-rare burger and a glass of beer."

"You got it," she said, smiling again as she marked it down on her pad and moved back toward the kitchen. The chicken actually *had* sounded better, but

the burger was cheaper, and taking that instead would enable me to shift a little more of my limited resources into her tip. Silly, perhaps, but I'd always felt that a little sacrificial scrimping was well worthwhile when it would help brighten someone's day.

Taking a long swallow of water, I moved the glass across the table and pulled out my map. I'd need to find a motel eventually, but I wanted to get at least a little closer to where I'd be hiking before I quit for the day. If I picked up Eleven and got at least to Woods Landing . . .

"Hey! You!"

I looked up to see the barman waving the phone in my direction, an odd expression on his face. "Phone's for you," he announced.

My tongue froze against my teeth. "It . . . what?" I managed.

His expression grew a little odder. "Your name Sinn?"

My stomach tightened against its emptiness. No one knew where I was . . . which meant no one could possibly have called me. But someone had. "Yes . . . yes, it is," I told him. "Adam Sinn."

"Yeah, well, guy wants to talk to you. C'mon—I don't want my phone tied up all afternoon."

I got my legs under me and walked over . . . and halfway there the only conceivable possibility clicked into place. After nearly a year . . . For a second I considered turning around, getting back into my car, and heading for parts unknown. I would have a perfect right to do so; neither Griff nor Banshee had the slightest legal hold over me any more.

I reached the bar and accepted the phone from the barman. Licking my lips, I took a deep breath and held the instrument to my ear. "Hello?"

"Adam? *God*—I was afraid we weren't going to find you."

My jaw clenched painfully, and I knew with absolute certainty that my year away from Banshee had abruptly come to an end. Griffith Mansfield was the archetypical iron-calm man, with a manner and matching voice that were as even and steady as set concrete even at the worst of times. In my two years with Banshee I'd never once heard that voice as shot through with tension as it was now, and it sent an ice-cold spike digging into my stomach. "What's the matter?" I forced myself to ask.

"Full-fledged hell has just broken loose, that's what's the matter," he growled, "and we're right square in the middle of it. Where are you?"

"What do you mean, where am I? *You* called *me*, remember?"

"Yeah, yeah, let me check the read-out." The line went blank for a moment, and the spike digging into my stomach took an extra turn as I realized Griff really *didn't* know where I was. *Checking the readout* meant he'd been on something like the FBI's Search-Spot system . . . and last I knew the FBI was *not* in the habit of lending their magic phone equipment out to hole-in-the-wall agencies like Banshee. Which meant he hadn't been exaggerating: all hell really *had* broken out. "Adam? Okay, I got you. Look, there's a small private airstrip about four miles south of you, at the west end of Lake Hattie. Go there and wait; they'll be sending a T-61 from Warren AFB for you."

I licked my lips again without noticeable effect as my intention of pointing out to him that I was no longer under his jurisdiction died a quiet death. First the FBI's phone search machine, now an Air Force general's commuter jet casually laid on to carry a civilian cross country. Whatever was happening, it was becoming less and less likely that anyone was going to let my personal preferences get in the way. "Griff . . . can you at least give me a hint of what's happening? Has something happened to the rest of the Jumpers?"

"No, no, everyone's fine. As to the rest of it, you'll get everything we know on the plane—if you don't find out sooner. I understand they're going to release it to the media in a few minutes."

"Griff—"

"Look, Adam, trust me; I wouldn't be asking you to come back if it wasn't vitally important. I'll see you soon." There was a click and he was gone.

"Damn," I said softly to the dead line. Laying the phone back on the counter, I looked up to find both the barman and the waitress staring at me with what seemed to be a combination of awe and suspicion . . . and in the waitress's eyes, at least, I could see the dawning realization that she was about to lose possibly her only customer of the afternoon.

That, at least, I could do something about. Digging out my wallet, I found a twenty and handed it to her. "Keep the change," I told her. At least now I could give without having to take quite so much thought for the morrow: whatever Banshee's other financial difficulties, Griff had always insisted on good

salaries for his Jumpers . . . and it looked very much like I was about to become a Jumper again.

I reached the airstrip in ten minutes, and was sitting in my car listening to the radio when the news broke.

Somewhere over western Colorado, Air Force One had just crashed. With the President of the United States aboard.

The T-61's pilot didn't have much more for me than I'd already heard on the radio, mainly because there wasn't much more that anyone knew at this stage. Air Force One had been on its way to Washington from President Jefferson's Sierra retreat when the pilot suddenly announced he'd lost the right inboard engine. Seconds later the radio went silent altogether, and the jets that were scrambled for an overflight reported wreckage strewn across a large swath of smoking cliffside forest. There had been no confirmation of casualties or survivors as yet, but from the sound of things there wasn't much call for optimism. Little to do now but clean up the wreckage, both physical and psychological . . . and to find out, for the record, what had gone wrong.

The latter would be Banshee's job.

We arrived about an hour and a half after leaving Wyoming. A police car was waiting at the end of the runway for me, a lukewarm box of take-out chicken in the back seat reminding me that I'd never gotten the early dinner I'd planned. Indirect evidence of two things: that Griff was getting his balance back, and that sometime this evening I was indeed going to have to Jump. Two of Banshee's Jumpers did best on empty

stomachs, but I wasn't one of them. The thought of what was coming tightened the knot in my stomach; but the hunger down there far outclassed the nervousness, and by the time we pulled up at the familiar nondescript building fifteen minutes later I'd worked my way through all three pieces of chicken and was polishing off the last of the biscuit.

Griff was waiting for me at the front door. "Adam," he nodded, gripping my hand briefly as he pushed the door open. "Thanks for coming. I really appreciate it."

"No trouble," I told him, not entirely truthfully. We stepped out of the entryway airlock. . . . and I found myself face to face with a dress-uniformed Marine.

"He's one of our people," Griff told the Marine before I could get my tongue unstuck. The guard nodded incuriously; but even as we passed him I could feel his eyes giving me an unobtrusive but thorough once-over. I'd seen that kind of apparent unconcern once or twice before, always from truly professional guards who used it as a way to throw people off-guard.

Professional guards at Banshee. "The place has changed," I murmured.

"The Marines are just on loan," he shook his head. "Courtesy of a Washington VIP named Shaeffer. He's in the lounge updating things for Hale and Kristin."

"What about Morgan? Or has he quit?"

"No, he's still with us. He's downstairs getting prepped."

I blinked. "You've got a Jump going already?"

"We will as soon as the model of Air

Force One is ready. Shaeffer insisted on particularly fine detailing, and the modelers just finished it a few minutes ago.”

“Actually, I was surprised more by the speed than the delay,” I told him.

Griff snorted. “Yes, well, for a change, the budget overseers aren’t going to be a problem. It’s amazing,” he added with a trace of bitterness, “the kind of money people are willing to throw around when someone important gets killed.”

I nodded silently.

We reached the lounge and went in. The Washington VIP was there, all right, easily distinguishable by his expensive business suit and taut look. He was standing over the lounge table talking across a map to Hale Fortner and Kristin Cosgrove and—

I stopped just through the doorway, so abruptly that Griff stepped on my heel. “*Rennie?*” I hissed.

Griff squeezed past me into the room. “We needed everyone we could get, Adam—”

“How on Earth did you get him to come back?” I whispered. The painful scene that had taken place when Rennie Baylor was fired from Banshee flooded back from my memory.

“Look, this is no time to dredge up past disagreements,” Griff hissed back. “Not for me, not for any of us—and if I can stand him for three days, so can you. Okay?”

I took a deep breath and got my feet moving again. True, it was Griff, not me, with whom Rennie had had most of his friction . . . but that didn’t mean the rest of us hadn’t suffered with him from the sidelines. Still, for three

days—and under such circumstances—I would do my best to make do.

“—came down about here, among a real mess of hidden ravines and tricky cliff faces,” the VIP was saying as we came up to the table. He looked up, eyes flicking past Griff to lock briefly onto me. “Mr. Sinn,” he nodded in greeting. “Shaeffer—special aide to President Jef—” He broke off, his mouth compressing in brief pain before he could recover himself. “Have you been briefed?”

“Just the basics,” I told him, his tight expression inducing another flicker of pain within me. Shaeffer, clearly, had been very close to the President. “Air Force One lost its right wing—somehow—and went down out in Colorado.”

He nodded. “That’s about all we’ve got at the moment. The search-and-rescue team hasn’t been working for very long; so far they haven’t got anything.”

“No survivors, in other words,” Kristin interjected quietly.

Shaeffer’s lip tightened. “Yeah.” He took a deep breath. “Well. Banshee’s job will be to find out what happened to the plane. As I’ve already explained to Dr. Mansfield, you’ve got essentially a blank check—go ahead and do as many Jumps as it takes to get the job done right. Understood? Dr. Mansfield, how much longer will it be before you can get someone back there?”

Right on cue, the lounge’s lights flickered. “Immediately, Mr. Shaeffer,” Griff answered. “I’m afraid it’s not much of a show, but if you’d like we could head downstairs and you could see Banshee in action.”

“I’m not here to play tourist,” Shaeffer

fer bit out. "I'll be in the communications center if you need me; let me know as soon as the Jump is over."

Griff reddened slightly. "Yes, of course." He turned and quickly left the lounge, heading left toward the elevator. Shaeffer nodded to each of us in turn and followed, branching to the right toward the room where our modest radio, wire, and computer-net equipment were kept.

And I was left alone with the other Jumpers.

For a moment we all just looked at each other. Then Kristin stirred. "You haven't kept in touch very well, Adam."

I shrugged fractionally. "I've been pretty busy," I told her. It was more or less true.

"So have we," Hale said, more than a little tartly. "Work load's increased considerably since you cut out on us."

My eyes flicked to Rennie. "Don't look at me," he said blandly. "I was fired; *you're* the one who deserted."

"That's putting it a little strongly, isn't it?" I asked. . . . but the indignation I'd intended to put into the words died somewhere en route. I hadn't been able to tell them the reasons then, and down deep I knew I couldn't tell them now, either.

"Yeah, Rennie, desertion's much too harsh a word," Hale chimed in. "It's not strictly desertion when the captain advises you to get off a sinking ship."

"What's *that* supposed to mean?" I asked him.

"I think you know," he ground out. "You've always been Griff's favorite Jumper—that's common knowledge. I think he warned you that we were about to be snowed under by a huge work load

and suggested you take off and leave the rest of us more expendable Jumpers to struggle under the pile."

"That's not true," I said, trying hard to keep my voice steady.

Hale snorted. "Of course not. It was just pure coincidence. Sure."

Clenching my jaw, I leaned over the table for a look at the map Shaeffer had left behind. It was an impressive job, larger scale even than the standard 7.5-minute topographic ones I used for backpacking. The crash site was marked by a large red oval near one end, and my recently filled stomach did a couple of turns at the thought of having to go back and watch it happen. "Did Shaeffer say anything about surveying the crash site, or just watching for the primary cause?" I asked.

"That's the way," Rennie said with mock approval. "When you can't win, change the subject."

I focused on Kristin. "Did he say anything about surveying the crash site?" I repeated.

"Not to us," she said. "But, then, we're just the Jumpers. We don't count for anything in that sort of decision-making."

"If you're wondering specifically about body trackings," Hale put in, "I'm sure you'll get a shot at one. They've become almost standard for us these days."

I shivered. Watching people die in mid-air explosions was bad enough . . . but to follow the bodies down as they fell to earth, seeing up close the burned and battered shells that had once been human beings . . .

"Unless, of course," Rennie suggested, "you want to talk to Griff about

exempting you from anything particularly unpleasant.”

I gritted my teeth. “I’ll do my share of whatever comes up. See you later.” Turning my back on them, I headed out of the lounge.

For a long moment I stood leaning against the hallway wall, slowly bringing my trembling knees under control again. I hadn’t really expected to be welcomed back with open arms, but the sheer intensity of the others’ hostility had hit me like ice water in the face. Clearly, Griff had kept his promise not to tell them why I’d left Banshee; whether or not I could survive three days under that kind of pressure wasn’t nearly as clear.

But I would, of course. For whatever reason, Banshee needed me here . . . and I’d always been there when people needed me.

Taking a deep breath, I turned left and headed for the elevator.

The Banshee building’s basement always reminded me of a cartoon I’d seen a long time ago in which one of the characters had bragged that “the house itself isn’t much, but you should see the rec room.” A one-time basement and subbasement had had their walls and the dividing floor knocked out to create a single vast space, with nothing to break it up but strategically placed pillars put in to support the rest of the building above it. The result was a room the size of a small warehouse . . . a room the Banshee equipment still filled to overflowing.

A small sign on the cabinet nearest the elevator proclaimed all this stuff to be the property of the U.S. Government

Time Observation Group, Banshee’s official name. Official or not, though, I’d never heard anyone refer to us by that name, even in official correspondence. Probably, I’d always suspected, because no one up there really took us seriously. With a staff numbering in the low twenties and an operating budget under four million a year, we were hardly a drop in the bucket as far as Washington was concerned. Not to mention the fact that the whole thing was generally considered either ghoulish or a waste of money by most of the handful of officials who knew anything about it.

I don’t know who coined the name Banshee for the group. I know only too well why it had stuck.

There was absolutely nothing theatrical about a typical Banshee Jump, a fact that had disappointed more than one official visitor over the years. There were no revolving lights warning of high-voltage, no large and blinking status boards, no armies of steely-eyed techs huddled over displays under dark-room-red lighting. The lights were normal, our three operators had a tendency to slouch in their seats; and even the Jumper, Morgan Portland, might simply have been asleep on his contour couch amid the handful of sensor leads sprouting from his arm- and headbands. It would have taken a close look at the EEG display—and some knowledge of how to interpret the readings—to realize that Morgan was essentially registering as dead.

All of us Jumpers had long since come to the conclusion that no one really knew how the Banshee apparatus worked.

Oh, all the parts were understood, to one degree or another—that much was certain. The mathematicians could show you all the equations and formulas and tell you how they implied time reversal; the various scientists could show you how the equations related to the real universe, both in physical equipment and in brain and mind structure; and the engineers could show you how all this boiled down to several million dollars' worth of apparatus. There were even those who claimed to understand how a person's consciousness could be decoupled from his body for up to an hour at a time without any major ill effects. But when you put all of it together, no one *really* knew how or why the whole thing worked the way it did. No one knew why there was a seventy-two-hour limit on how far back in time a Jumper's consciousness could go, no one knew why only certain very specific types of people could Jump in the first place. . . . and no one knew how it was our disembodied consciousnesses could sometimes be seen by those about to die.

It had first happened to me on my seventh Jump, and it would forever color all my thoughts about Banshee. A little girl, maybe seven years old, had spotted me as I floated by an airport locker in hopes of seeing the person who had planted a bomb there. At least I assume she saw me; the expression on her face could hardly have been explained by anything else in the immediate vicinity. Her mother had pulled her away a moment later and plopped them both down in a waiting lounge, but she'd continued to glance nervously back in my direction. Two minutes later the bomb had blown out the bank of lockers and most of the roof overhead.

The girl and her mother had been among the casualties.

I shuddered with the memory and forced her face from my mind. . . . and cursed once more the unfeeling idiot who'd taken his inspiration from that and similar incidents to hang the name *Banshee* on us.

A motion off to the side by one of the RF generator cabinets caught my eye: Griff, doing a walkthrough of the equipment. He saw me as I started toward him and changed course to meet me. "So . . . how did it go up there with the others?" he murmured.

"Not exactly your TV-style homecoming," I retorted softly. There was no reason for anyone to whisper while a Jump was in progress, but people invariably did so anyway. "I wish you'd told me Rennie was going to be here. And maybe prepared me a little for the sour apples from everyone else."

He sighed. "I'm sorry, Adam; really I am. If it'd been up to me, you wouldn't be here at all—that despite the fact you're still the best Jumper we ever had. But Shaeffer insisted we bring both you and Rennie back."

"Did you point out to him that three Jumpers are perfectly adequate to handle the half-dozen or so Jumps it'll take to figure out what happened?"

"I tried, but he wouldn't budge." Griff scratched his ear thoughtfully. "What makes it even stranger is that he seemed to know an awful lot about us—must've actually been keeping up with the reports we've filed into the bureaucratic black hole back in Washington."

"Very flattering. Doesn't explain why he's out here being underfoot in-

stead of directing things from the White House, though.”

“No, it doesn’t,” Griff agreed. “Maybe he thinks he can help. Or else needs to at least *feel* like he’s helping.”

“If he wants to help, he’d do better to be in Washington helping brief Vice President McCallum on his new office.”

Griff shrugged fractionally. “From what I’ve read, Shaeffer and Jeffers go back a long way together, since Jeffers’s first stint as mayor in Phoenix. There are other people available to brief McCallum; I get the feeling Shaeffer’s more out for vengeance.”

I shivered. “In other words, we’d better get him the cause of the crash in double-quick time, or else?”

“We can hope he’s more sensible than that. But there’s a strong tendency in people to look for scapegoats when things go wrong.”

I thought back to the other Jumpers upstairs. “Yeah. Well . . . we’ll just have to see to it that we do our job fast and get out from in front of the gun-sights.”

My last word was punctuated by the *snap* of circuit breakers shunting the end-point power surge to ground. Across the room, Morgan’s body threw itself suddenly against the couch’s restraints. A moment later his eyes opened a crack and he burped loudly.

We were at his side by the time the operators had the straps off. “What’d you get?” Griff asked, helping him up into a sitting position.

“It was the right inboard engine, aw right,” Morgan nodded tiredly, massaging the sides of his neck. “Smoke

trail out o’ it just ’fore it caught fire and blew to shreds.”

“Did you get inside the wing and see where the fire started?” Griff asked.

“Sorry—didn’t have time. I was too busy backtrackin’ the line o’ smoke.” His eyes met mine and I braced myself for a repeat of the confrontation upstairs. But he merely nodded in greeting and shifted his attention back to Griff. “I’ve seen a lot o’ engine-fire plumes, Griff—this’un didn’t look right at all.”

Griff swore under his breath. “Shaeffer thought it might be something like this. Okay; come on upstairs and we’ll take a look at the blueprints.”

Morgan nodded and swung his feet over the side of the couch. “Dr. Mansfield,” one of the operators called, “you want us to get ready to cycle again right away?”

“Yes,” Griff answered, taking Morgan’s arm. “Hale will be down immediately for prepping. We’ll be Jumping again as soon as you and he are ready.”

“Why the break-neck rush?” I asked Griff as he helped Morgan navigate away from the couch. “It’s—what, after six already?”

“Shaeffer’s in a hurry,” Griff said tightly. “For now, that’s all the reason any of us need. Give me a hand, here, will you?”

Morgan’s report was strong evidence; but it took two more hours and a Jump by Hale before Shaeffer was willing to come to the official conclusion all of us had guessed at.

President Jeffers’s plane had been sabotaged.

“Something in the engine or fuel line,” Shaeffer growled, tapping his

clenched fist on the blueprints of the DC-9's right wing. "Something that could start a fire despite the flame retardants in the fuel."

"Implies a pretty drastic breach of security," Rennie murmured.

Shaeffer threw him a hard look but kept his temper in check. "I would think so, yes. Finding out just how the bomb was introduced should show where and how big that hole is. Dr. Mansfield, I want another Jump tonight. How soon before the equipment can be ready?"

"Half an hour at the least," Griff told him, glancing at his watch. "But I'd like to point out that it's already coming up on eight o'clock, and the Jumpers will need both a good night's sleep and some wind-down time before that."

"They'll get all the rest they need," Shaeffer said shortly. "Allow *me* to point out that you've still got three Jumpers you haven't even used yet."

I looked over at Kristin, saw her mouth twist sourly. Being treated like merchandise or pack animals had always been especially annoying to her. She caught me watching her, looked quickly away.

"Well . . . I suppose we could go ahead," Griff said slowly, looking around the table at the rest of us. "Late-night Jumps can be rougher than usual, though—biological rhythms and all, you understand—"

"We're up against a time crunch here, Doctor," Shaeffer snapped. "How many times am I going to have to repeat that?"

"Yes, but we've *got* three da—"

"I'm not talking about the damn three-day limit—" Shaeffer broke off abruptly, and for a second a strange look

flicked across his face. "We're dealing with the media here, Doctor," he continued in a more controlled tone. "The American people want some answers, and I intend to get those answers for them. So. Who's next?"

Griff grimaced and turned to Kristin; moving my head, I managed to catch his eye. "I can take it, Griff," I said. "Evening Jumps never bothered me much." It wasn't quite true, but it was close enough.

Griff's lip twitched, but he nodded. "Yes . . . all right, fine. If that's all, then, Mr. Shaeffer . . . ?"

Shaeffer nodded, and the group began to break up. I got out fast and headed toward the elevator; but even so, Morgan managed to catch up with me before I reached it. "Left my jacket downstairs after my Jump," he commented. "Mind if I tag along down with you?"

"No, of course not," I said as he fell into step beside me. "How bad is it?"

"The crash?" He shrugged, a nervous twitch of shoulders beneath his shirt. "Not too bad, leastwise not as long as you're up in the air. Not goin' be much fun at ground level."

"They never are."

"No."

We'd reached the elevator before he spoke again. "So . . . how you been doin'?" We ain't heard much from you since you left."

"Judging by my reception earlier, it's just as well," I told him, hearing an unaccustomed trace of bitterness in my voice.

He nodded heavily. "I talked to Kristin after my Jump. You know, she was kinda hurt the way you just upped and left."

"I didn't just 'up and leave'—"

"You know what I mean. Woulda helped, you know, if you'd told us why you were quittin'."

I looked at him sharply. Had he figured it out? "I had my reasons," I said.

"I reckon you did. But Kristin and Hale don't take a lot on faith. S'pose it's a little late to worry 'bout now. So what do you think of this mess?"

"What's there to think about it?" I replied grimly. The elevator arrived and we got in. "Like you say, it's a mess."

"What 'bout Shaeffer?"

"What about him?"

"Strikes me as a mite . . . overwrought, I s'pose."

I snorted. "He *has* just lost both his employer and a long time friend. How would you *expect* him to act?"

"I'd expect him to be mad as a hornet," Morgan nodded. "Nothin' wrong with that. But there's somethin' under the anger that bothers me. I get a feelin' he's hidin' somethin' big up his sleeve. Somethin' he wants to do, but at the same time is scared of doin'."

I bit at my lip. Morgan had grown up in a backwoods area of Arkansas, and people tended to assume he wasn't particularly bright. But what he lacked in book learning he more than made up in people-sense . . . and if he thought there was something odd about Shaeffer, it was time for me to start paying better attention to the man. "Maybe he's involved in the discussions of revenge against whoever's responsible," I suggested slowly. "McCallum's never struck me as the sort to call in military strikes—maybe it's Shaeffer's job to convince him otherwise."

"Maybe." Morgan shook his head.

"Well, whatever it is, I 'spect we'll hear 'bout it soon enough."

The elevator door opened and we stepped out. "See you later," Morgan said as he scooped up his jacket from a chair near the contour couch. "Good luck."

"Thanks." Squaring my shoulders, I headed over to be prepped.

Twenty minutes later, wired and tubed and mildly sedated, I was lying on the contour couch and we were ready for my Jump. "Okay," one of the operators called. "Here we go. Countdown: six . . . three, two, one, *mark*."

And abruptly I found myself in brilliant sunlight, floating beside Air Force One as it soared over the mountains on its unknowing way to death.

To see the past like this had been a horrible shock to me the first time, and though its impact had diminished since then I didn't think it would ever fade away completely. There was an *immediacy* to the experience; a sense of objective, 360-degree reality, despite the obvious limitations, that was nothing at all like viewing the event on a TV screen. For me, at least—and probably for most of the others, too—that sense came with a suffocating feeling of helplessness and stomach-churning frustration. I was here—really *here*—at the actual real-life scene of a real-life disaster about to happen . . . and there was nothing I could do to prevent it.

Griff had once brought in a psychiatrist who'd tried to tell us that everyone felt similarly when they saw disasters that happened to have been caught on film. If that revelation was supposed to make us feel better, it hadn't worked.

But all this was standard reflex, the thoughts and emotions that had come in one form or another with every Jump I'd made, and even as the frustration rose in my throat, the old professional reflexes came up to cut it back. Gritting my teeth—a sensation I could feel despite having no real body at the moment—I moved forward over the wing and dipped beneath its surface.

It was dark inside the wing, but there was enough light coming in from somewhere for me to make out the details of the fuel tanks and piping and all. It was eerily quiet, of course—vision on Jumps is as crystal clear as if we'd brought our physical retinas back in time with us, but there's no sound or other sensory input whatsoever. Like being wrapped in soundproof plastic, Kristin had once described it. For me it was just one more macabre touch amid the general unpleasantness.

I floated around inside the wing for several minutes, keeping a close watch for anything that might precede the explosion about to take place. From the settings the operators had made I knew I'd have fifteen minutes before the engine caught fire, but time sense distortion was a normal part of Jumping and I didn't want to be caught unawares. I'd been tethered to the right inboard engine pylon, the tether length adjusted to let me get nearly out to the outboard engine in one direction or to the fuselage in the other. The tether was even more of a witchgadget than most of the Banshee equipment as a whole, consisting mainly of a charged electrical lead attached to a specific spot on a scale model of whatever your target vehicle or building was. With a tether in place a Jumper would

stick with that piece of metal or wood or plasterboard through hell and high water; without it, there was no way to hold position even in a stationary building.

The experts could just barely explain the mechanism. The rest of us didn't bother trying.

I was just starting to drift toward the engine itself when the Ping-Pong ball caught my eye.

I'd poked around planes like this one a lot during my time with Banshee and in some ways knew more about them than their designers did; and I was pretty sure there weren't supposed to be Ping-Pong balls floating around inside the fuel lines. Maneuvering around in front of it, I leaned in for a closer look . . . and it was then that I saw that the ball wasn't alone. A dozen more were coming down the line toward the right inboard engine, and a quick check showed that two or three more were already clustered up against the engine intake itself.

There had been a lot of times I'd wished I could touch something on a Jump, and this was one of them. But there was still a lot I could learn with vision alone. The balls were coated with something waxy looking—a gasoline-soluble paraffin, most likely. They were smaller than regulation Ping-Pong balls, too, small enough to have been dropped into the plane's fuel intake or perhaps even hosed in through the nozzle along with the fuel.

I settled down near the engine, watching the balls clustered there, and waited for the clock to tick down . . . and suddenly the balls began spouting clouds of bubbles. I had just enough time to notice that flickers of flame were start-

ing to dance at the balls' surfaces when the whole thing blew up in front of me.

For a second I lost control, and an instant later had snapped back behind the wing to the full length of my tether. The trail of smoke Morgan and Hale had mentioned was coming out of the engine. In a handful of seconds the engine would explode and everyone aboard would die . . . and if I ended the Jump right now, I wouldn't have to watch it happen.

I stayed anyway. White House cartes blanches or not, someone was shelling out a quarter of a million dollars for this trip. They might as well get their money's worth.

Morgan had been right; it wasn't nearly as bad as some I'd seen. The right inboard engine caught fire and blew up on schedule, sending pieces of itself through the air toward me. I ducked in unnecessary reflex and watched as the rest of the wing caught fire, blazing more fiercely than it had any right to. The plane tilted violently, but for the moment the wing and the pylon I was tethered to were still attached and I stayed with it. Then the wing just seemed to disintegrate . . . and as I fell behind the plane with the tumbling debris I watched it arc almost lazily down toward the tree-covered slope ahead.

And coming to Earth far behind the crash site, there was no longer any reason for me to stay. I let go of the past, wishing as always that I could just as easily release the trauma of what I'd just seen; and a disoriented moment later, I was back on the couch.

The operators unstrapped me and began removing the tubes and wires. . . . and as my eyes and brain refocused I

became aware of Kristin's face hovering over me. "Kristin," I croaked, trying to get moisture back into my mouth. My eyes were just the opposite: they were streaming freely. I turned my head to the side, feeling an obscure embarrassment at her seeing me like this.

If Kristin noticed, she gave no sign of it. "Griff sent me to get you," she said. "He wants all of us in his office right away."

I blinked away the tears; and even as I struggled to sit up I noticed the tightness about her eyes. Still mad at me, I decided . . . until I realized her eyes were focused off in space somewhere. "Is anything wrong?"

She licked her lips briefly. "I don't know, but *something* sure as blazes is happening. Griff and Shaeffer have been closeted up there since you left for your Jump . . . and Griff wasn't sounding too good when he told me to come get you."

I swallowed, hard, and concentrated on getting my blood up to speed again. With Kristin supporting me, we were upstairs in Griff's office five minutes later.

She was right: the whole gang was there . . . and one look at Griff's and Shaeffer's stony faces set my stomach churning. Something had indeed happened . . . I looked at Griff, but it was Shaeffer who spoke. "Your report, Mr. Sinn?" His voice matched his expression.

I gave it to him without elaboration, describing as best I could the Ping-Pong balls in the fuel line and the way they'd behaved. Shaeffer listened like a man who already had the answers and was merely looking for some confirmation,

and when I'd finished he nodded. "The searchers on the scene already came to pretty much the same conclusion," he said grimly. "Catalyst bombs, sounds like—gadgets that get the fuel and the degraded fragments of flame retardant to react together."

"Never heard of them," Rennie said.

"They're not exactly on-shelf technology. We've developed a type or two, and there are maybe two or three other countries doing similar work. That could be a blunder on the saboteur's part—exotic equipment makes any trail easier to trace. All right, Mr. Sinn, thank you." He took a deep breath, looked around at each of us in turn . . . and his expression seemed to get a little stonier. "And here now is where we get to the sticky part. I imagine you've been wondering why I came to Banshee in person instead of directing your investigation from Washington. It's because I want you to do something I don't believe you've ever tried before. Something—I'll say this up front—that could turn out to be dangerous." He paused, and the tip of his tongue swiped at his upper lip. "I've read everything President Jeffers ever received on Banshee, and he and I both noted with a great deal of interest that you've been . . . seen . . . on more than one occasion by the people you've been observing."

Kristin shifted in her seat . . . and a horrible suspicion began to drift like a storm cloud across my mind.

"Now, tell me," Shaeffer continued, sweeping his gaze across us Jumpers, "did any of you, during your Jumps the past few hours, ever get a look inside Air Force One itself?"

Hale, Morgan, and I exchanged

glances, shook our heads. "That why Griff set the tethers so short?" Morgan asked. "So we couldn't get inside?"

A flicker of surprise crossed the rock that was Shaeffer's expression. "I hadn't expected you to notice," he said. "Yes, that's precisely why I had Dr. Mansfield set them that way. You see . . . as of yet, the searchers at the crash site have located only a few of the bodies from the wreckage. It occurred to me early on that due to an unusual set of circumstances back at the President's retreat no outsiders actually saw him get onto that plane. And now you've told me that none of *you* have seen him there, either.

"Which means . . . perhaps he never was aboard to begin with."

A brittle silence settled, vise-like, around the table. "Are you suggestin'," Morgan said at last, "that you want us to go back there and change the past?"

His sentence ended on a whispered hiss. I looked back at Shaeffer; and to me it was abundantly clear that he knew exactly what it was he was suggesting . . . and that he was just as scared about it as the rest of us were.

But it was equally clear he was also determined not to let those fears stand in his way. "There's nothing of changing the past about it," he said firmly. "We don't know—none of us do—exactly what happened on that flight. If we don't *know* what the past is, how can we be changing it?"

"If a tree falls alone in the forest, is there any sound?" Hale put in icily. "Do you have any *idea* what will happen if we meddle like this?"

"No—and neither do you," Shaeffer replied. "Face it, people; no one knows what changing even a *known* fact of

history would mean. A *known* fact, notice, which is *not* what we're talking about doing here."

"Oh, aren't we?" Hale retorted. "All right, fine—let's assume for the moment that somehow we keep President Jeffers out of Air Force One. It's been over six hours now since the crash. Are you going to try and tell us that he and his whole Secret Service detachment have been sitting around listening to the news and *no one's* bothered to pick up a phone to let the world know he's still alive? Come *on*, now, let's be serious. We keep Jeffers out of the plane and we've changed history—pure and simple."

"Maybe not," Shaeffer said stubbornly. "It's possible he could be lying low while the crash is being checked out. Especially if sabotage is a possibility, he might want to give the perpetrators a false sense of security. You might recall that for days after the Libyan raid back in 1986 Quaddafi disappeared—"

Hale snorted. "Jeffers wouldn't duck and hide, and you know it. That shoot-from-the-hip style of his was practically his trademark."

"Maybe lying low wasn't his idea," Shaeffer snapped. "Maybe someone persuaded him to do so."

I felt my hands start to tremble. "Shaeffer . . . are you saying *you've* been in touch with him?"

Kristin caught her breath and murmured something inaudible. But Shaeffer shook his head. "No, of course not. Do you think I want to risk frogging up your chances by contacting someone out there?"

"But if you call and find that he's there—" Rennie began.

"And if he *isn't*, then that's it," Shaeffer snapped back. "Right?" He glared around at all of us.

Morgan cleared his throat. "Mr. Shaeffer, we all of us understand how you feel 'bout . . . what's happened to President Jeffers. But denyin' the facts isn't gonna—"

"What 'facts,' Mr. Portland?" Shaeffer cut him off. "We have no *facts* at this point—just speculations and possibilities."

I looked at Griff, who had yet to say a word. "Griff . . . ?"

"Yes, Griff, say something, will you?" Hale cut in. "Explain things to this idiot. Or has the wow-value of the big-city bureaucrat short-circuited your ability to think straight?"

Griff cocked an eyebrow, but that was the extent of his reaction to Hale's harshness. "If you're asking whether or not I'm going along with Mr. Shaeffer's idea, the answer is a qualified and cautious yes. We're talking about the chance to save a man's *life* here."

"Oh, for God's sake," Hale snarled, his eyes flicking around the table once before returning to Griff. "Will you for one minute look past the lure of a real budget and *think* about what we're being asked to do here? We're being asked to *change the past*—Shaeffer's weaseling phrases be damned, that's what's really at stake here. Don't you *care* what that might mean?"

For a moment Griff gazed steadily back at him. "Certainly, Hale, you have a point," he said at last. "Certainly this could prove dangerous. But have any of you stopped to consider the other side

of the coin? If there's a single factor that consistently shows up on your psych evaluations, it's the frustrations Banshee creates in you—the stress of seeing disasters you can't do anything to prevent. Denials; anyone?"

I glanced around the table even as I realized that, for me, all further arguments were moot. The chance to save a life that would otherwise be lost—a life whose loss was filling an entire nation with grief and pain—was all the motivation I needed.

Besides which, Griff happened to be right. All of us hated the helplessness we felt during Jumps; hated it with a passion. If we really *could* do something about the disasters we had to witness . . .

"So," Griff continued after a moment. "Then consider what we've got here: a chance to see whether or not the past *can* be safely changed. Doesn't that seem like something worth taking a little risk to find out?"

"And if it leads to disaster?" Hale demanded. "What then? It doesn't matter a damn how pure or noble our motives were if we screw things up royally. I say we just forget the whole idea and—"

"Mr. Fortness, you're relieved of duty," Shaeffer said quietly.

The words came so suddenly and with such conviction behind them that it took a moment for me to register the fact that the man giving the order had no authority to do so. An instant later everyone else seemed to catch on to that fact, too, and the awkward silence suddenly went rigid. "Someone die and leave you boss?" Hale growled scornfully.

"That's enough, Hale," Griff said quietly. "Go back to your room."

From the looks on the others' faces it appeared they were as flabbergasted as Hale was. "Griff—you don't mean—" Kristin began.

Griff looked at her, and she fell silent. The awkward silence resumed as Hale got up from the table, face set in stone, and left the room. I half expected him to slam the door on his way out, but he apparently was still too stunned by it all to be thinking in terms of theatrics. Griff let the silence hang in the air another couple of seconds before looking back at Kristin. "I believe, Kristin," he said, "that the next Jump is yours. I know it's getting late, but I'd appreciate it if you'd try anyway. If you feel up to it, that is."

A muscle twitched in Kristin's cheek as she threw a glance at Shaeffer's tight face and stood up. "I'll try, Griff. Sure. Shall I go downstairs and start getting prepped?"

"Please. I'll be there shortly to set the tether and slot coordinates and see you off."

She nodded and left the room. Shaeffer watched her go, then turned back to lock Morgan, Rennie, and me into a searchlight gaze. "I realize that in a tight-knit organization like Banshee strangers like me are not especially welcome," he said, his soft voice underlaid with steel. "But at the moment I don't give a nickel damn about your feelings. We have less than sixty-six hours to get President Jeffers off that plane and into temporary hiding; and the longer it takes us, the greater the danger of exactly the sort of thing happening that you've all voiced concerns about." He paused, as if waiting to see if any of us would follow Hale's lead. But we said nothing,

and after a moment Shaeffer turned to Griff. "All right, Dr. Mansfield. Let's get started."

"Now remember," Shaeffer said, leaning close to Kristin as if she were asleep or deaf or both. "You go right up in front of the President's face and hover there where he can see you—*don't* get out of his sight. If he doesn't seem to see you, or else ignores you, come back and we'll try again. Under *no* circumstances are you to stay long enough to see him climb up the steps to the plane. Understand?"

I half expected Kristin to remind him that this was the third replay of these same instructions and that she'd caught them all the first time around. But she merely nodded and closed her eyes. Griff gave the high sign, and with the usual flickering of lights she was gone.

Taking a deep breath, I moved away from Griff and Shaeffer, lingering by the two-foot model of Air Force One and the tiny model limo that now sat on the table beside it. The tether lead's alligator clip was attached to the limo; Shaeffer was pushing this contact as far back as he reasonably could, all the way back to the President's drive to the landing field. Passing the models, I kept going, heading for the rows of equipment cabinets at the building's west end. My father had always gone for a walk in the woods when he needed to think through a particularly knotty problem, and during my two years at Banshee I'd discovered that the maze of gray cabinets back here was an adequate substitute.

I hoped the magic still worked.

Upstairs, half an hour ago, I'd made

my decision . . . but with Shaeffer's pep talk beginning to fade, things no longer looked nearly so clear cut. The greatest good for the greatest number, and attention paid whenever possible to the individual; those were the rules I'd been taught as a child, the standards against which I'd always measured my actions. But to make such judgments required information and wisdom . . . and I could find nothing in past experience that seemed to apply to this case.

How was I supposed to weigh the pain and suffering that could be caused by changing the past?

"Hello, Adam."

I jerked out of my reverie and spun around. Rennie stood there, leaning against one of the computer cabinets, arms crossed negligently across his chest. Blocking my way out.

I made a conscious effort to unclench my teeth. "Rennie," I said with a curt nod. "You taken to wandering the Banshee room, too?"

"Hardly," he sniffed. "I just noticed you head back here and thought I'd see what Banshee's own little White Knight was up to."

I felt my teeth clamp together again. I'd hoped a year might have changed Rennie at least a little, but it was becoming clear that it hadn't. "Just looking for a little peace and quiet," I told him shortly. "If you'll excuse me—"

"Must be a great thrill for you," he continued, as if I hadn't spoken. "A chance to save a real person from real death—why, I'll bet you're so happy about it you haven't even bothered to consider that you might skewer a few

billion innocent people on your lance in the process."

"If you're talking about Hale's rantings, yes, I'm aware of the risks involved. You can also drop that 'White Knight' business any time."

He radiated innocence. "*You're* the one who tagged yourself with that title—or had you forgotten? The White Knight: defender of the lame, guardian of the helpless, picker-up of those fallen flat on their faces—"

"Do you have something to say?" I interrupted. "If not, you're invited to step aside."

"As a matter of fact, I do." Abruptly, all the mockery vanished from his face, and his expression became serious. Though with Rennie, I reminded myself, expressions didn't necessarily mean anything. "I wanted to see if you were as taken in by this whole pack of manure as you'd looked upstairs."

"If you're referring to Shaeffer's plan," I said stiffly, "I think it's worth trying, yes. At least as long as he continues to go about it in a rational manner."

Rennie snorted. "You mean that frog spit about not letting Kristin see if Jeffers actually gets on the plane because if she does that'll make that a 'known' fact? Word games; that's all it is. We know Jeffers got on that plane, Adam—whether we actually saw it or not, we *know* he got on it. Anybody who tells you otherwise is either kidding himself or lying through his teeth."

"Keep that sort of thing up and you'll be joining Hale in exile upstairs," I warned him.

"Maybe I ought to," he shot back. "That'd be the surest way to cancel this

whole thing. Especially if I can get Kristin and Morgan to join me—I'd like to see you handle all the Jumps alone, especially with the breakneck schedule Shaeffer's trying to run."

Abruptly, I was very sick of this conversation. "I can do it all if I have to," I bit out. "Though I expect you'll find Kristin and Morgan have better ethics than you give them credit for."

"Maybe," he shrugged. "Or maybe *you'll* find that they can see beyond the life of a single man. The way White Knights like you don't seem capable of doing."

Clamping my teeth together, I walked toward him, ready to flatten him if he gave me even the slightest cause to do so. But he was smarter than that, even flattening himself slightly up against one of the cabinets to give me room to pass. I brushed by him without a word. . . . but I couldn't help but notice the small smile playing across his lips as I passed.

A moment later I was back in the more open areas of the Banshee room . . . and I'd made up my mind. Whatever legitimate points Rennie may have had, I knew from long and painful experience that everything he did always had an ulterior motive buried somewhere within it. And in this case that motive wasn't hard to find.

He was out to destroy Griff.

The seeds of the conflict had been there from almost the very beginning, when Rennie's perfectionism had run straight into Griff's severe lack of administrative skill. It had become a simmering feud by the time he and I had left Banshee.

I had gone voluntarily; Rennie hadn't.

Which had almost certainly soured his feelings toward Griff even more.

Standing across the room by the couch, Griff half-turned from his tete-a-tete with Shaeffer and beckoned to me. "Adam," he said as I joined them, "Mr. Shaeffer and I are going to head upstairs and see if anything new has come in from the crash site. Would you mind waiting here with Kristin, just in case she finishes her Jump before we get back?"

"No problem," I assured him. . . . and as he and Shaeffer headed for the elevator I realized that I had no choice anymore as to where I stood on this experiment. Rennie was willing to scuttle the chance to save President Jeffers's life in order to give Griff a black eye; and if I had to join Shaeffer in order to stand by Griff, then that was it. End of argument.

I looked down at Kristin's closed eyes, her dead-looking face. The trauma of coming back from a Jump had always been hard on her, and Griff clearly was still maintaining his old practice of making sure either he or another Jumper was on hand to comfort her during those first few seconds of disorientation.

Griff would never win any awards for administration or appropriations appearances . . . but he took good care of the people in Banshee. For me, that was what really mattered.

Pulling up a chair, I sat down next to Kristin and waited for the Jump to end.

As it turned out, Griff's precaution proved unnecessary. He and Shaeffer were back in the basement, looking over a computer printout, when the circuit

breakers snapped and Kristin gasped for air.

They were beside me instantly. "Well?" Shaeffer demanded.

Griff shushed him and held Kristin's hand until her eyes slowly came back to focus. "Griff?" she whispered in a husky voice.

"Right here," he assured her. "That was a long Jump; how do you feel?"

"Okay." She took a deep breath. "Okay."

"What happened?" Shaeffer asked, hope and apprehension struggling for prominence in his voice.

But Kristin shook her head. "He didn't see me," she said. "I'm almost sure he didn't. He was talking to one of his people all the way to the airfield, and it was sunny and—" she broke off, squeezing her eyes shut as a shudder went up through her. "He didn't see me."

I looked at Shaeffer; but if he was discouraged it didn't show. "All right, we'll just try it again," he said grimly. "Dr. Mansfield, do you have any idea whether or not the Banshee images accumulate? In other words, will the President see only one of them no matter how many Jumpers have visited that particular time frame?"

"I have no idea," Griff admitted. "We don't even know what these images are that people see. The Jumpers don't see them, certainly—they never see each other, no matter how many of them are present in a particular slot."

"It's entirely possible that only those about to die can see them," Rennie's voice came from behind me. I jumped; I hadn't heard him come up. "That was

the way a real banshee operated, wasn't it?"

"Depends on which legends you listen to," I told him shortly. Kristin's eyes flicked briefly to mine, then turned away.

"Try to recall we're talking reality here, not legends," Shaeffer said tartly. His eyes studied Rennie for a second. "I believe it's your turn now, Mr. Baylor."

I looked at Griff, expecting him to remind Shaeffer that it was after ten o'clock and that he'd pushed the usual late-night limits by a couple of hours already. But he remained silent, his attention also on Rennie.

Rennie, however, wasn't nearly so reticent. "I was under the impression, Mr. Shaeffer, that the goal here was to rescue the President, not turn Banshee's Jumpers inside out. It's getting late, and if you keep this up you're going to kill us."

"Mr. Baylor, if you don't understand what the hell we're doing here, please ask Dr. Mansfield to explain it to you," Shaeffer bit out icily. "The longer it takes us to make contact with President Jeffers, the greater the risk of changing known history. Remember? Whenever one of you finally gets seen by the President, I'm banking on him recognizing the image as that of a Banshee Jumper and coming to the proper conclusion."

"That he's going to die?"

Shaeffer's brow darkened. "Of course not—that he needs to stay incommunicado until the risk of changing the past is over. Except that from his point of view it'll be the future, of course."

"Would he really think things out that clearly?" Kristin asked.

"If he doesn't, there could be trouble," Shaeffer admitted. "But I think he will. He's been following Banshee's progress closely ever since you were first set up—he's fascinated by the whole concept."

"So how do you expect him to know when he can come out?" I asked Shaeffer. "You think he can postpone letting the world know he's still alive for a full three days?"

"That's precisely the reason I'm pushing to make contact as soon as possible," Shaeffer snapped. "Once we know he's off the plane, I can call California and let whoever's answering the phone know that he can come out. Understand?" He didn't wait for an answer, but turned back to Rennie. "Mr. Baylor? It's your turn."

I held my breath . . . but apparently Rennie wasn't yet ready for the big confrontation. "All right," he said heavily. "I don't suppose I can fight you, Griff, and Adam on this one, can I?" Turning his back on us, he stepped over toward the prep area.

"This isn't supposed to be a fight—" Griff began.

Shaeffer cut him off with a hand motion. "Ms. Cosgrove," he said to Kristin, "whenever you feel ready, I'd like you to come upstairs for a short debriefing."

"I'm ready now," she said, struggling to sit up. Griff put an arm around her shoulders and helped her get her feet on the floor.

We were halfway to the elevator when Rennie's voice stopped us. "I trust you realize, Mr. Shaeffer, that if President Jeffers *does* see me we'll

change known history right then and there.”

Shaeffer turned back, annoyance on his face. “You’re assuming he won’t think fast enough to avoid making any phone calls—”

“Actually, I was referring to the fact that Kristin has already seen this same slot of history and knows he didn’t react to her presence. Her presence or, presumably, anyone else’s.”

We all stood there a long moment, grouped around Kristin, as the silence thickened like paste in the air. “God,” Griff said at last, very softly. “He’s right. We can’t send him back to the same slot.”

Shaeffer’s eyes were defocused. “We don’t *know* how the President would react, though. Do we? He could have seen but not have given any indication . . . damn.” He took a deep breath, looked at Kristin. “Damn it all. Ms Cosgrove, where was he when you ended the Jump?”

“He was just getting out of the car and starting toward the landing strip. It was so sunny I figured that if he hadn’t seen me inside the car he wouldn’t see me out—”

“Yes, yes,” Shaeffer cut her off. “Damn. Dr. Mansfield, can you hit that same end point with the next Jump?”

“No problem,” Griff assured him. “The instruments record both ends of the Jump and we can tag it to the exact second. But if he was already at the strip—”

“Then we don’t have much time left,” Shaeffer said harshly. “I know, damn it. But we don’t have any choice.”

Griff nodded. “I’ll set the coordinates myself. Adam . . . ?”

I took his place at Kristin’s side, and he headed over to the control board. Shaeffer watched him go, then turned back toward the elevator with a hissing breath. “Come on, you two. Let’s get upstairs.”

Kristin’s debriefing was short, calm, and—at least as near as I could tell—totally worthless. Jeffers had gotten into his limo with some aides and Secret Service men, gone straight to the semi-private landing strip where Air Force One was waiting, and headed off toward the plane on foot. If there were a banshee or ghost where Kristin was hovering, neither he nor any of the others ever saw it.

Afterwards, Kristin let me escort her back to her room, but she was clearly not in a talkative mood and we reached the door with barely a dozen words having passed between us. She went inside, and I trudged two doors down to where my old room had been set up for me.

It looked about the same as I remembered it, with the minor exception of a new television replacing the ancient model that had been there before. I resisted the lure of the remote control while I got undressed . . . but even before I crawled into bed I knew I was too wired up to sleep right away. Flicking the set on, I began to scan the channels.

Unsurprisingly, there wasn’t much on except late-night summaries of President Jeffers’s death.

It was thoroughly depressing. The cold hard facts themselves were bad enough, even though the media didn’t yet know what we did about the cause of the crash. But for me, the interspersed segments of national and world

response were even worse. Mine had been one of the landslide of votes that had reelected Jeffers a year ago, but it wasn't until now that I really understood on a gut level how truly popular with the people he'd been. The cameras showed at least half a dozen candlelit memorial marches from cities all across the country and even one or two from overseas. People talked about the shock and the fear and the pain . . . and I lay there and soaked it in, hurting right along with them.

Hurting with people, after all, was part of what being a White Knight meant.

White Knight. A college friend had first coined that nickname for me, and for a long time I'd felt proud of it. It was a statement of my ability to care for people; to serve them and to take whatever bits of their suffering that I could onto myself. It was a fine, noble calling—and I was good at it. It was almost second nature now for me to take the smallest piece of meat at dinners and cookouts, or to give up my days off helping people move or do home repairs. My ability to sacrifice for others enabled me to give away my money, even if I had to do without something myself.

It had enabled me to quit Banshee almost a year ago. And to not tell anyone why.

I watched the news for another half hour, until I couldn't take it any more. Lying in the dark, listening to the unfamiliar sounds of big-city traffic around me, I finally fell asleep.

The news that it was sabotage broke sometime during the night, and by

morning the news programs were hauling in experts to give their speculations as to who was responsible and why. Combined with the eulogies still pouring in from leaders around the world, it made it that much harder, an hour later, to watch a man already dead walking casually across the tarmac toward his plane.

And to labor in vain to warn him. The others had been right: the sunlight was far too bright for the President to have any hope at all of seeing anything as unsubstantial as a ghost.

Mine, Shaeffer had told me before the Jump, was to be the last effort in this particular slot, and so I kept at it all the way up the stairway. But it was no use. I did every kind of aerial maneuver I could think of to try and get his attention, but not once did he so much as take a second look in my direction. Eventually, he passed the limit of my tether, fastened to Air Force One's door, and vanished into the communications section at the front of the plane.

Third strike, and Banshee was out.

I came back to find Griff and Shaeffer leaning over me. "Well?" Griff demanded.

"Uh-uh," I shook my head. The motion sent a brief spasm of pain splitting through my skull. "He never saw me."

Griff seemed to slump. "Damn," he breathed. "Mr. Shaeffer . . . I'm sorry—"

"It's not over yet," Shaeffer cut him off, icy calm. "All right; if we can't stop him getting on the plane, the next step is to try and get him *off* it before the balloon goes up." He stepped back

from the couch and gestured, and as I struggled up onto my elbows I saw Morgan standing nearby. "Mr. Portland, you're next. You'll be Jumping as soon as the equipment is ready."

Morgan nodded silently. His eyes met mine for an instant, and then he turned away from us.

I should have realized right then that something was wrong. But with the Jump and my recovery from it taking all my attention, Morgan's odd reaction missed me completely. "If you're going to try and get him off," I told Shaeffer, working myself to a vertical position, "you'll need to have the tether a lot further forward. When I left he was heading into the forward section of the plane."

Shaeffer nodded abstractly. "He'll be back in his private section before take-off, though. That's where we'll have to try and get to him."

"Ah," Griff said, offering me a hand as I swung my legs off the couch and more or less steadied myself on my feet. "You're talking about getting him out *during* the flight, then?"

"Right. There are parachutes stored near both exit doors. If we can contact him, all he'll have to do is grab one, open the door, and jump."

"Is that all?" an unexpected voice cut in.

We all turned around. "Hale, you were told to stay upstairs," Griff growled.

"So that Shaeffer can dismantle the stability of the universe in peace and quiet?" Hale snorted. "Fat chance."

I looked at Griff. He shrugged fractionally in return, a worried frown starting to settle onto his face. Hale had

always been something of a borderline neurotic anyway, but this seemed to me to be a pretty drastic slippage. "Hale—" I began.

"You just shut up," he snapped back. "You cut out on us once—coming back now just because Griff wants a yes-man on his side doesn't win you any points."

I opened my mouth, closing it again in confusion . . . and only then did I spot Rennie lounging against the wall near the elevator.

And finally understood.

That confrontation among the equipment cabinets hadn't been an effort to convince me to join him in opposing Griff. Instead, he'd been trying to drive me solidly onto Griff's side . . . so that he could use the others' animosity toward me as a lever to get *them* on his side.

"Hale, if you have any specifics to bring up," Griff said soothingly, "we're willing to discuss them—"

"I have one," Rennie spoke up, strolling over. "Mr. Shaeffer, you're talking as if all the President has to do is open the door and jump out and that's that. Right?"

"He was in the Air Force for six years," Shaeffer said stiffly. "He knows how to handle a parachute."

"I'm sure he does. Has it occurred to you that if the pilot radios that they've got an open door the known past will be changed?"

I looked at Shaeffer, the muscles of my shoulders tightening. "Would they broadcast something like that?" I asked. "Or would it just show up on the flight recorder?"

"Depends on whether the pilot was

on the radio at the time it happened, I suppose," he said. "If he wasn't . . ."

"And when someone notices the President is missing?" Hale shot back.

Shaeffer took a deep breath. "All hell breaks loose," he admitted grudgingly.

For a moment we all looked at each other. "Well?" Griff said at last. "What now, Mr. Shaeffer?"

Morgan cleared his throat. "If President Jeffers recognizes us as being from Banshee, as you've suggested he might, wouldn't he realize he has to give the pilot instructions not to mention his departure?"

"Oh, come on," Rennie scoffed. "I, for one, have no intention of just hoping he'll think of all these things on the spur of the moment—hell, Shaeffer, you've been working on this scheme for twelve hours or more and you still missed this angle."

"Rennie—"

"No, Dr. Mansfield, he's right," Shaeffer cut Griff off. "If we're going to do this safely, we've got to make sure the President winds up with only the options we want him to have."

I glanced at Rennie, saw a touch of surprise flicker across his face. Shaeffer's acceptance of his argument seemed to have pulled some of the wind out of his sails. "It gets worse," he said, a bit less belligerently. "If he jumps out of the plane anywhere near civilization, we get exactly the same problem."

"Yes, I'd caught that corollary, thank you," Shaeffer returned tartly. "Let me think."

For a moment the only sound in the room was the steady drone of a hundred cabinet fans. "All right," Shaeffer said at last. "He was in the air for approx-

imately ninety minutes before the crash. We'll start fifteen minutes before the end."

"And what if he spots Morgan immediately?" Rennie growled.

"What if he does?" Shaeffer countered. "What's he likely to do?"

A slight frown creased Rennie's forehead as, for the second time in so many minutes, Shaeffer seemed to have taken him by surprise. "I thought the whole point of this exercise was to get him to pull the ripcord on the flight."

"Sure . . . but put yourself in his shoes for a second. What would you do if you were President and saw a Banshee appear in front of you?"

Rennie's frown darkened. "This isn't any time for guessing games, Shaeffer," he bit out. "If you've got some brilliant idea—"

"We wouldn't be lookin' in on him if the plane was just gonna crash," Morgan said slowly.

"What was that?" Shaeffer asked, an oddly tense look in his eye.

Morgan was frowning off into space. "Well, our business here's s'posed to be findin' out how these things happen . . . and if he was gonna crash, we oughtta be concentratin' on the wings or engines or somethin'. If one o' us just sits there and watches him, maybe he'll think it's somethin' else gonna happen."

Griff inhaled sharply. "Like maybe . . . assassination?"

Shaeffer nodded, almost eagerly. "Right—exactly right. I'm expecting him to assume he's going to be the target of a simple attack, and that you're there to find out which of his aides is the one involved."

“So he’ll just sit there and make sure the door is locked,” Griff nodded. “Makes sense.”

“Or else he’ll assume that there’s a bomb in his private section,” Hale put in.

Shaeffer’s expression soured a little. “In which case he’ll call for a quick search of the plane,” he said shortly. “Either way, the thought of jumping shouldn’t even cross his mind . . . until you start leading him out toward the exit.”

I looked at Morgan, back to Shaeffer. “And what if the President doesn’t notice him?” I asked.

“He will,” Shaeffer said grimly. “This is our last chance, and we’re damn well going to make sure he sees something this time. So. Dr. Mansfield, you’ll be sending Mr. Portland into the slot T minus fifteen minutes to T minus six minutes—no later, understand? Ms. Cosgrove will be next, and after that Mr. Baylor here—all of them Jumping into the same fifteen-to-six minute time slot.”

I looked at Griff, saw his eyebrows go up. “Didn’t we decide,” I said carefully, “that sending more than one person into the same slot—?”

“As each comes back,” Shaeffer went on as if I hadn’t spoken, “you will *immediately* administer a sedative, before there can be any indication one way or the other as to what the Jumper has seen or done. Understand?”

For a long moment Griff just stood there, looking as flabbergasted as I felt. Beside me, Morgan stirred. “Mr. Shaeffer,” he said hesitantly, “I’d be the first to admit I’m not all that smart. But are you tryin’ to say that if we don’t

know what the other Jumpers saw, then a lot of the problems go away?”

Shaeffer’s mouth compressed into a tight line. “I’m hoping the paradoxes will, yes,” he said. “It ought to work—it’s a version of the Schrödinger’s cat setup—” He broke off, took a deep breath. “Anyway, we have to risk it; and we have to risk it *now*, Mr. Portland.”

I looked at Morgan, expecting him to nod and take his position on the couch. “No,” he said quietly.

I stared at him. We all did, for what seemed to be a very long time. “What did you say?” Shaeffer asked at last, very softly.

“I said no,” Morgan told him, equally softly. “Sorry, Mr. Shaeffer, but even the way you got it I don’t think it’s safe enough. And if you’re wrong . . .” He shook his head. “It all goes bad real quick.”

“And you came to this conclusion all by yourself?” Shaeffer growled pointedly.

Morgan’s forehead creased. “Just ’cause I never had much schooling doesn’t mean I ain’t got any common sense,” he said without rancor.

“And common sense is important in abstract physics, is it?” Shaeffer bit out. He shifted his glare to Hale and Rennie. “All right. Which of you two put him up to this? Or would you rather the Marines upstairs ask the questions?”

“You don’t need to do that,” Morgan sighed. “It was Rennie who told me that you couldn’t fiddle things so’s it wouldn’t be dangerous.”

“Common sense may not be the best thing to go by here, Morgan,” Griff put

in quietly. "What about your sense of honor, your loyalty to the rest of us? What do *they* tell you?"

Morgan gave him a long look. "It's 'cause of that that I'm just quittin' straight out," he said. "Otherwise I'd prob'ly do what Hale thought I should: Jump, but stay as far as I could away from President Jeffers."

"Son of a bitch," Shaeffer ground out, turning his glare on Hale as his hand dipped briefly into his side coat pocket. "You're under arrest—both of you."

"On what charge?" Rennie asked calmly. "You had no legal authority to drag me back here to Banshee in the first place—there's been no declaration of martial law, and I wasn't served any kind of papers, Federal or otherwise. You have no power over me, Shaeffer—you *or* Griff. Arrest me and I'll sue your eyes out."

Behind him, the elevator opened to reveal two Marines. "These men are under house arrest," Shaeffer told them, pointing to Hale and Rennie. "Take them to their rooms *and make sure they stay there.*" He looked at Morgan. "Last chance, Portland. Are you going to join them?"

Without a word, Morgan stepped over beside Rennie and Hale. Shaeffer nodded to the Marines and the entire group disappeared back into the elevator.

And as the doors closed on them, all of the starch suddenly seemed to go out of Shaeffer's backbone. His hands went up to rub his face and he actually staggered, and I found myself wondering just how much sleep he'd gotten the night before. Probably not much. "Dr.

Mansfield, you'd better call Ms. Cosgrove down here."

I looked at Griff. "There's no way we can do this with just two Jumpers," I said.

He took a deep breath and nodded. "Adam's right, Mr. Shaeffer. Especially if you still plan to go with sedation after each Jump."

"I'd say it's obvious that idea's not going to work as is," Shaeffer bit out. "Just get Ms. Cosgrove down here—let me worry about procedure."

Griff pursed his lips and for a moment I thought he was going to argue. Then, without a word, he stepped over to the control board phone.

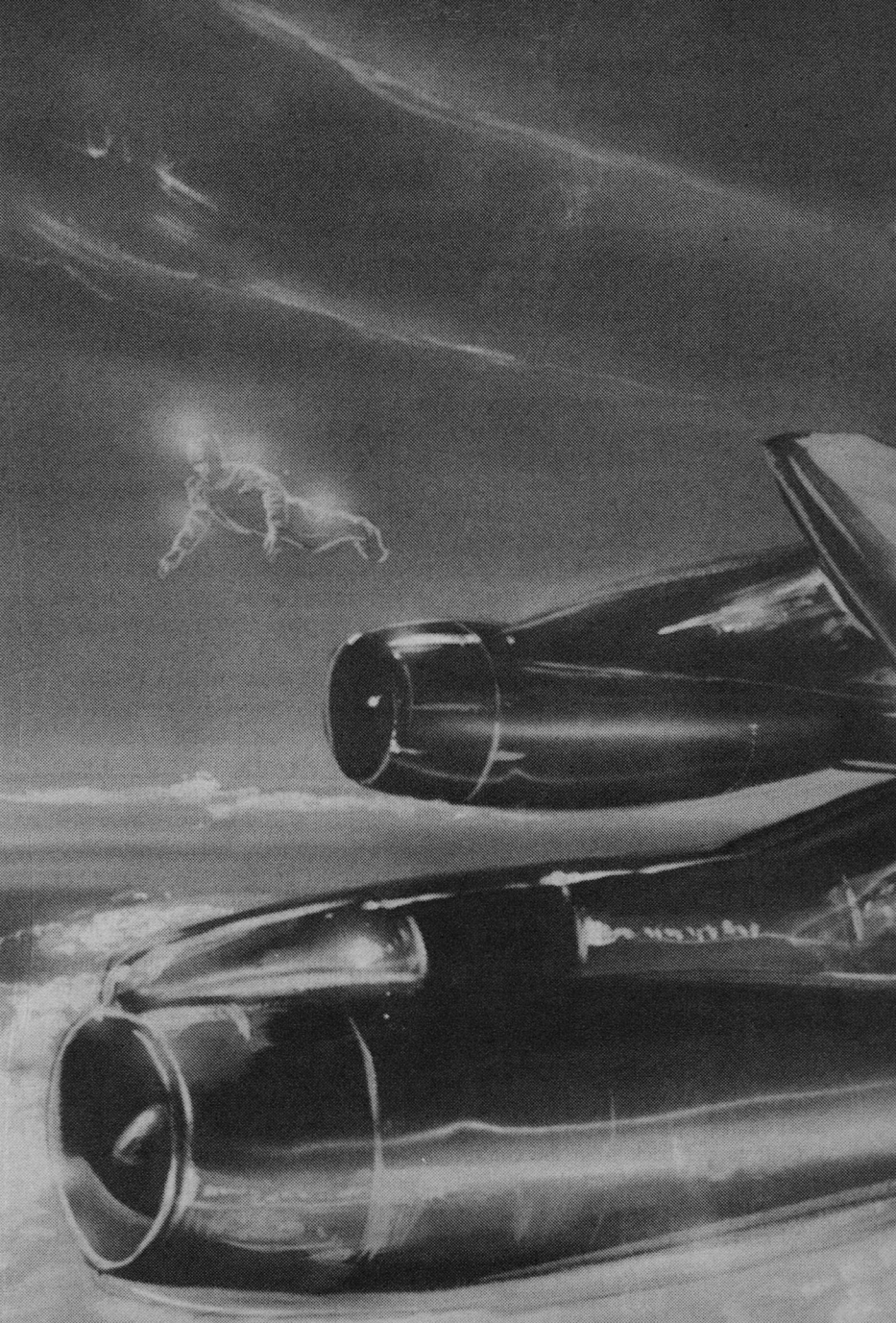
Kristin arrived about fifteen minutes later, looking even worse than Shaeffer did. Her eyes were red and half-lidded, her hair had the disheveled look of someone who'd spent the night doing more tossing and turning than actual sleeping, and her feet seemed to drag as she walked toward us from the elevator. I stepped forward to take her arm; she sent me a halfhearted glare and pulled back from my grasp. "What's going on, Griff?" she asked.

"Mutiny," he told her grimly. "You and Adam seem to be the only Jumpers on our side at the moment."

"We—*what*—?"

"Ms. Cosgrove," Shaeffer interrupted her, stepping over from the control station. "I understand you're still recovering from last night's Jump, but I'm afraid I'm going to have to ask you to do another one this morning."

Kristin closed her eyes, and I saw a muscle in her cheek twitch. "All right," she sighed. "What am I supposed to do?"



"Same thing you tried to do yesterday; get President Jeffers to see you," Shaeffer told her. "We're going to put you in his private office on Air Force One fifteen minutes before the engine catches fire. When he sees you, you will stay in the room, hovering in front of him, until the clock in that room shows three minutes before the crash. That was—what, three-twenty-five, Pacific Time?"

"Right," Griff nodded. "The engine fire probably started a minute or two before that, though.

"Point," Shaeffer agreed, forehead furrowed in thought. "Yeah. All right, then, make it three-twenty. At three-twenty exactly, Ms. Cosgrove, you are to move to a spot in front of the door and then end the Jump. Understood?"

Kristin hesitated. "What if he doesn't see me . . . ?"

"He has to," Shaeffer said, very quietly. "He has to."

For a moment none of us said anything. Then Shaeffer took a deep breath. "No point in delaying it. This is it; let's go."

The lights flickered, Kristin's body sagged on the couch, and I turned to Shaeffer to wait for the other shoe to drop.

It did so immediately. "Mr. Sinn, I want you to wait in your quarters," he said. "When Ms. Cosgrove returns, she'll be put under immediate sedation, but I don't want there to be any chance at all she'll say something you'll hear."

Griff turned back from the control board, his eyes wide. "I thought you said—"

"I said the plan would need modifi-

cation," Shaeffer cut him off. "This is that modification: adapting it to only two players. Problems?"

"Yes," I said with a sigh. "It isn't going to work."

"It's a perfectly reasonable—"

"No, it's not!" I snarled. For once, I was tired of tiptoeing around other people's feelings. "Think about it a second, Shaeffer. Whatever Kristin experiences on that plane, a long nap isn't going to make her forget it. You're the one who mentioned Schrodinger's cat awhile back—do you really know how that experiment was supposed to work, or were you just spouting words?"

Shaeffer held his temper with obvious effort. "A gun is set up so that if a particular radioactive atom in a test sample decays in a given time, the gun goes off and kills the cat. If it doesn't decay, the cat lives."

So he *did* know. "Right," I nodded. "Do you also remember why there's no way to know what actually happened?"

Shaeffer pursed his lips. "If you open the box, the cat automatically dies."

"Right," I said softly. "Were you ultimately planning to kill Kristin?"

He closed his eyes and exhaled between his teeth; a hissing sound of defeat. "Then this really *is* it. Isn't it?"

My stomach churned with sympathetic pain. "Hang onto the bright side," I urged him. "He *might* see her; and if he does, I'll be able to talk to Kristin about it before I do my own Jump. Which means I'll know what the situation is before I go into it."

He gave me an odd look, as if being comforted by what he clearly regarded as an underling was outside his usual experience. Then, turning, he wandered

off toward the elevators, hands clasped tightly behind him. Griff and I exchanged glances and silently settled down to wait.

We waited nearly ten minutes; and when it came, the snap of circuit breakers made me jump. We were crowded over Kristin's couch within seconds, all three of us. She gasped, eyes fluttering—

“What happened?” Shaeffer snapped. “Answer me! What *happened?*”

“Uh . . . uh . . . Griff,” she managed, hand reaching up to grip at Griff's sleeve. Her eyes were wet as she blinked tears into them; wet, and strangely wild. “Griff—oh, God. It *worked*—it really worked. *He saw me!*”

President Jeffer's Air Force One office was small but sumptuous, something that rather jarred against his public image as one of the common people. The room's decor registered only peripherally, though, as I concentrated my full attention on the man standing behind the oaken desk in shirtsleeves and loosened tie . . . the man who was likewise concentrating his full attention on me.

Or, more precisely, on my Banshee image. Or, even more precisely, on Kristin's Banshee image. According to the clock I could just see on the side wall—and the settings Griff had used—I would be overlapping her Jump for another thirty seconds. Enough time for me to orient myself and to get into position in front of the office door where she would be when she ended her Jump. Ready to take over from her.

Assuming, of course, it wasn't just Kristin's image Jeffers could see. In that

case, I'd have to abort the Jump and we'd be forced to wait until Kristin could try it again.

I watched the second hand on the clock . . . and when the half minute was up, I began to drift back toward the door. Holding my nonexistent breath.

Jeffers's eyes adjusted their focus to follow me.

I continued to ease back; and with my full concentration on him, it was a shock when the universe suddenly went dark around me. For a second I lost control and snapped to the length of my tether toward the front of the plane before my brain caught up with me and I realized that I had simply gone into the honey-combed metal of the office door. Fortunately, Jeffers moved slower than I did, and I was back in the corridor outside his office when he hesitantly opened the door. His eyes flicked momentarily around, found me again. His lips moved—soundlessly, of course, as far as I was concerned. But Griff had long ago made all of us learn how to lip read: *Am I supposed to follow you?*

I nodded and pointed toward the rear of the plane, watching Jeffers's face closely. There was no reaction that I could detect. Whatever it was he was seeing, it didn't seem to match the nonexistent body my subconscious persisted in giving me during Jumps. Which meant hand motions, expressions—body language of all sorts—were out.

Which left me exactly one method of communication. I hoped it would be enough.

Carefully—mindful of both the deadline breathing down Jeffer's neck and the danger of him losing track of me if I moved too fast—I began backing down

the corridor toward the rear of the plane. For a moment Jeffers held his ground, a whole raft of conflicting emotions playing across his face. Then, almost reluctantly, he followed. I had another flicker of darkness as someone came up from behind and walked through me, nodding greetings to Jeffers as they passed. For a bad second I thought Jeffers was going to point me out to the other man; but it was clear that he still wasn't entirely sure he wasn't hallucinating, and after a few casual words he left the other and continued on toward me. I got my breathing started again and resumed my own movement, and a minute later we were standing across from the rear door.

And I ran full tilt into my inability to speak or even pantomime. The parachutes were racked across from the door, inconspicuous but clearly visible . . . but moving over and hovering by them didn't seem to give Jeffers the hint. I tried moving away, then back again—tried backing directly into and through one of the neat packs and then back out—tried moving practically to Jeffers's nose, back to the chutes, and then to the door.

Nothing.

I gritted my teeth. With the usual fouling of my time sense I had no idea how many seconds we had left before the balloon went up, but I knew there weren't a lot of them. There had to be some other way to get the message across to Jeffers—there *had* to be—but for the life of me I couldn't come up with one. Back and forth I went, parachute to door back to parachute, repeating the motions for lack of anything better to do, all the while racking my

brain trying to think of something else—*anything* else—that I could do. Back and forth . . .

On what must have been the tenth repetition, he finally got it.

You want me to jump from the plane? his lips said. I started to nod, caught myself, and instead tried moving my whole body up and down.

For a wonder, he interpreted the gesture properly. *Is someone going to shoot us down?* he asked.

Close enough. I nodded again and moved back to the parachutes. Any second now—

Jeffers didn't move. *What about the others?* he asked, his hand sweeping around in a gesture that encompassed the entire plane. *I can't just leave them to die.*

I blinked, feeling my stomach tightening within me. Jeffers's ability to think and care about average American people had been one of my major reasons for voting for him in the first place; to have that asset suddenly turn into a liability was something I would never have expected. I thought furiously, trying to figure out some way to answer him—

From outside came a dull *thud* . . . and an instant later the floor beneath Jeffers tilted violently, throwing him through me and into the parachute rack.

I spun around, heart thudding in my ears, half expecting to see him sprawled on the floor, dazed or unconscious from the impact. It was almost a shock to find him on his feet, fully alert—

And pulling on one of the parachutes.

I didn't stop to try and figure it out. Pulling laterally to the direction of my

tether, I ducked outside for a moment, trying to estimate how much time Jeffers had before we were too close to the ground. Thirty seconds, perhaps, depending on whether the winds would be blowing him toward or away from the mountain sloping away directly beneath us. I went back inside, and to my mild surprise found Jeffers already in harness and fighting his way uphill along the sloping floor toward the door. I held my breath. . . . and as the plane almost leveled for a second, he lunged and managed to catch the lever before the floor angled beneath him again.

I glanced back toward the parachute rack again to fix in my mind exactly which chute he'd taken; and as I did so, something skittering along the wall caught my eye. It was a flat package, covered in bright orange: one of the emergency packs that were supposed to be clipped to the front webbing of each of the chutes. I looked back at Jeffers, but before I could get in position to see his chest the plane almost-leveled again—

And in a single convulsive motion he shoved the door hard against the gale of air outside and squeezed his way out.

I dropped straight down through the floor and luggage compartment, falling as far below the crippled plane as my tether allowed. Below and behind me, Jeffers tumbled end over end, shirt billowing in the breeze. If he'd hit something on the way out—if he was unconscious—

The drogue chute snaked its way out of the pack, followed immediately by the main chute. It filled out, stabilized . . . and for the first time the reality of what I'd just done hit me.

We'd used the Banshee machinery to save a man's life.

All the private agony I'd had to endure throughout my time at Banshee—all the pent-up frustration of watching disasters I couldn't stop—all of it seemed to flow out of me in that one glorious moment. All the millions of dollars—all the backhanded bureaucratic comments we'd had to put up with—it was suddenly worth it. Let them scoff now! We'd saved a life—a President's life, no less. And on top of it, we'd even done so without any of Rennie's and Hale's fears about changing the past coming true. The minute I was back, Shaeffer could direct the searchers at the crash site to move their operations back a couple of miles to where I could see Jeffers coming down. . . .

And as my attention shifted from Jeffers's parachute to the rocky, tree-covered slope below, the flood of wonder and pride washing over me evaporated. Beyond his landing area, perhaps a mile further down the slope, a small village was clearly visible.

A village he'd be able to walk to in an hour.

I don't remember much about the minutes immediately following the Jump. There was, I know, a lot of shaking of my arms and some fairly insistent use of my name, but for some reason I was unable to really come out of it, and after a short time the voices and hands faded into blackness and disturbing dreams.

Eventually, though, the dreams faded. When I was finally able to drag myself back to full awareness, I found I was back upstairs in my room, lying on my bed with an intravenous tube running

into my arm. I lifted the arm slightly, frowning at the tube.

“Just relax and don’t try to move,” a voice said from my other side.

I turned my head, and with a complete lack of surprise found Griff sitting beside the bed. “What—?” I managed to croak before my voice gave out.

“You came out of the Jump in something approximating a hysterical state,” he said. “Babbled something about Jeffers bailing out and changing the past and then collapsed. Shaeffer’s had them pumping stuff into your arm ever since.”

I glanced again at the needle and shivered. “How . . . what time is it?”

He checked his wrist. “Almost four-thirty.”

Which meant I’d been out of commission for something close to three hours. “What’s been happening with the search?”

Griff shrugged fractionally, the lines around his eyes and mouth tightening a bit. “Nothing, as far as I know. Shaeffer’s been running back and forth between here and the communications room, not wanting to launch anything major until he could talk to you and find out just what you were talking about back there.”

A shiver went down my back. “He got out of the plane,” I whispered. “The parachute opened okay, and he was on his way down. . . . but there was a town an hour’s walk downslope of him. There’s no way he could have missed it.”

Griff swore under his breath as he scooped up the phone and punched at the buttons. “Get me Shaeffer . . . Mr. Shaeffer? This is Griff. Adam’s awake, and we’ve got a hell of a problem. . . .

Okay, and if you’ve got more of those maps maybe you’d better bring them . . . Right.”

He hung up and looked back at me. “You think you’ll be able to locate the exact spot where he went down?”

I shivered again. “With that town sitting practically beneath him? Of course I can.”

He pursed his lips and fell silent.

Shaeffer arrived a couple of minutes later, a stack of his fine-detail maps in his arms. “Glad to see you awake,” he said shortly, his mind clearly on other things as he all but pushed Griff out of his chair and sat down, laying the maps across my chest. “Show me.”

I propped myself up on my elbows and began sorting through them. Someone had sketched out the plane’s trajectory across the maps in red, and it took me only a minute to find the one I needed. “Here,” I said, tracing a circle around the spot with my finger. “He came down about here.”

Shaeffer’s eyes were shining as he glanced at the number in the map’s corner and then at the spot I’d indicated. “All right,” he breathed. “All right. Important point, now: did you notice whether or not he had an orange emergency pack attached to his parachute?”

“No, he didn’t. In fact, I think I saw it on the floor just before he jumped out. It must have come off while he was getting into the chute.”

Shaeffer grunted. “Good. I guess. Eliminates the problem right away of why there wasn’t a transponder for the search team to tag onto. Unfortunately, it also means he didn’t have any food or water with him, either. Any chance he could have had trouble with the land-

ing itself? Would another Jump be a good idea?"

I sighed. "I don't know. Shaeffer . . . what about that town down there?"

"What about it?"

"Well, it's *there*—right in the most obvious path for him to have taken. But it's been twenty-five hours now since he landed, and . . ." I shrugged helplessly.

"Maybe he's been smarter than all of you gave him credit for," Shaeffer said. "Maybe he realized that you were from the future and knew to wait until we came looking for him. Or maybe he didn't notice the town at all on his way down, in which case staying near his landing site was the only rational thing to do." Abruptly, he got to his feet. "Whichever, there's one easy way to find out."

"You going to send out the searchers right now?" Griff asked.

Shaeffer arched his eyebrows. "As Mr. Sinn just pointed out, he's spent approximately twenty-five hours in the Colorado Rockies. It would be rather a waste of effort to have gotten him out of the plane and then let him die of exposure, now, wouldn't it?"

I took a deep breath. "I want to make another Jump first."

They both looked at me. "Why?" Shaeffer asked.

"I just . . . want to see what happened after he landed."

"In an hour or two we'll be able to ask him what happened," Shaeffer said scathingly. "Besides, you need more rest before you can Jump again."

"And besides, if I don't know what happened, I won't be taking any further risk of changing the past?"

Shaeffer's lip twitched. "Something like that," he said. "Look, I don't have time for this. The past is secure, Mr. Sinn—the fact that we're still here and all our memories are still intact proves that. Right? The important thing now is to go out there and bring him home. There'll be plenty of time later for speculation and back-patting." With a nod to Griff, he pulled open the door and left.

I looked at Griff. "Griff . . . ?"

He shrugged. "I don't know, Adam," he admitted. "Everything certainly *feels* okay. Though if our memories are also malleable I suppose feelings aren't necessarily a good indication." He locked eyes with me. "I don't think it's necessary. . . . but if you want to do another Jump, I'll okay it."

I hesitated; but Shaeffer was right. Whatever had happened, the very fact that Jeffers was still lost out there implied that what we'd done hadn't significantly altered the known past. "No, that's all right," I sighed. "I guess I can wait until Jeffers tells us himself what happened."

"Okay," Griff said softly. "In that case, you'd better concentrate on getting some rest."

"I think I can manage that," I agreed, closing my eyes.

The lights went out, the door opened and closed, and I was alone. *So that's it*, I thought. *Looks like all the worry was for nothing . . .*

The opening of the door snapped me out of the doze I'd been drifting into, and I opened my eyes to see Morgan framed in the doorway. "Adam?" he whispered. "You awake?"

"Yeah," I told him. "Come in, but

leave the overhead light off if you don't mind."

"Okay." He closed the door behind him and groped his way to the bedside, where he flicked on the small lamp there. "So," he said, eyeing me closely. "You did it, huh?"

"Shaeffer seems to think so. He tell everyone already?"

"Not really, but when Hale and Renie and me were let outta our rooms, it was a pretty good clue. So tell me what happened."

I gave him all of it, and when I'd finished he sat silently for a long moment. "Well?" I prompted. "What do you think?"

"I don't like that town bein' there so close. Worries me pretty bad, if you want to know the truth."

"It worries me, too," I admitted. "But since Jeffers never showed up there everything must be safe—"

"It must, huh? S'pose the only reason nothin's happened yet is 'cause we can still change it?"

"I . . . don't follow you."

He took a deep breath. "We still got somethin' like forty six hours to go back and try to get the President to do somethin' we want 'fore that slot's closed, right? Well, maybe we're s'posed to do somethin' else to him . . . and maybe if we *don't*, it'll suddenly happen that he *did* get to that town after all, and that he was picked up twenty hours ago—"

He broke off, and as I looked into his eyes I shivered. A temporarily shattered but still-fluid past sitting there on hold was a possibility that hadn't even occurred to me. From the expression on Morgan's face it was clear he didn't care for the idea at all; I knew it sure had *me*

scared. "What do you think we should do about it?" I asked.

He snorted. "It's not *we*, Adam: it's *you*. Shaeffer let us out of our rooms, all right, but he ain't gonna let us downstairs anytime soon, leastwise nowhere near the couch."

"So what do you think *I* should do about it?" I growled.

His eyes held mine. "Go back there," he said bluntly. "Go back and . . . stop him."

"Stop him how? Put out my foot and trip him?"

He didn't even notice the sarcasm. "You're the guy that got him outta the plane—I figure he'd follow you anywhere you took him. So . . . lead him off to a ravine somewhere and get him to fall in."

I stared up at him, not believing what I was hearing. "Are you *crazy*?" I said at last.

"It's the only way," he insisted. "You pick the ravine right and you can make him walk miles out of his way 'fore he can get out."

"And if I pick the ravine wrong and the fall kills him?" I snapped. "That would fix things up good, wouldn't it?"

His eyes dropped away from my gaze. "He was dead once already, Adam," he said quietly. "All you'd be doin' is puttin' the universe back like it was s'posed to be."

"No," I bit out. "That's *not* all I'd be doing. I'd be committing murder."

"Then get him lost or somethin'. Lead him away from the town, so far off he couldn't find his way back."

"Morgan, that town's barely a *mile* away—and I'll only have an hour back

there before I have to end the Jump. How can I get him *that* lost *that* fast?"

"Then droppin' him into a ravine's your only shot. Our only shot." He took a deep breath. "I know it's risky. But you're just gonna have to take that risk."

"Oh, right. *I* have to take the risk. But of course you'll be with me in spirit, right?"

"Hey, friend, I'm in this a whole lot tighter than that," he grated. "Me and everyone else in the world. We'll all have to suffer whatever happens if the past gets changed. Maybe you oughtta try thinkin' about that for a change."

Slowly, I shook my head. "I'm sorry, Morgan. I can't deliberately risk someone's life over an unknown and possibly even nonexistent set of consequences. I just can't."

A look of contempt spread over his face. "That's it, huh? You're gonna spout fancy words and all that and then just go ahead and take the easy way out. Like you usually do."

"I've never in my entire life taken the easy way—"

"*Damn it all, will you shut that crap up?*"

I shrank back against my pillow, stunned at the totally unexpected outburst. "Morgan—"

"*Every time,*" he snarled. "Every single damn time I've seen you have a choice, you always took the easy way. Maybe you didn't think so, but you did."

"Yeah?" I snarled back. "Well, maybe you just haven't ever seen the whole picture."

"And maybe it's *you* who hasn't. You talk up a good fight with that White

Knight stuff of yours, but you know what?—you ain't a White Knight at all. All you are is what we used to call a professional martyr. You make a little sacrifice that costs you something and figure that's proof you've done somebody some good."

Somehow I found my voice again. "That's unfair. You have no idea what I do and how I do it."

"No? You want me to tell you why you quit Banshee? And why it hurt all of us more'n it helped?"

I swallowed the retort that came to me. "I'm listening," I managed to say instead.

He took a deep breath. "Griff told you Banshee's money was gonna be cut, and you did some figuring and found out that even with Rennie being bounced out there wasn't gonna be enough left for four Jumpers. So instead o' workin' out a deal—lettin' us all go part-time, maybe—you just up and quit."

I felt my face go red. All my efforts to keep them from finding out why I'd done it . . . "Do the others know?"

His lip twisted. "No, 'course not. How you think Kristin would feel if I told her you'd quit your job for her? 'Specially since it good as trapped her here?"

"She'd probably—what?" I interrupted myself as the last words registered. "What do you mean, trapped her? She's earning more now than she ever has in her life."

He sighed. "That's just what I meant, Adam. Don't you see?—this Banshee job's pretty much a dead-end one. There just ain't anywhere to go with it. But the money's too good for her to just walk away and start somethin' new from

scratch. Same for Hale and me, for different reasons."

"Oh, really?" I scoffed. "So tell me, where would you suggest someone with Hale's abrasive personality might go?"

"Again, that's what I meant," he said wearily. "Here at Banshee Griff hasn't got much choice but to put up with him, so there's no reason for him to try and change himself." He hesitated. "For me . . . heck, we all know I'm just a hick from the backwoods. Right? I don't have much schooling, and until I do I can't really find any better job than I've got right here. Now, if I was only workin' part of the year here, I could maybe go off to college somewhere, maybe get a degree. But stuck here, on call all the time . . ." He shook his head.

For a long moment I gazed at him in silence, thoughts spinning like miniature tornadoes in my brain as a horrible ache spread throughout my being. Had I really been the cause of all that? It was inconceivable—what I'd done had been to *help* them, not hurt them. And yet, Morgan's arguments were impossible to refute.

And impossible to ignore.

"It pretty well boils down," Morgan said at last, "to what my Ma used to call *tough love*. Like taking off a band-aid—short hurt for long help. If you can't do that . . . maybe you oughtta stay clear of that White Knight business of yours."

I took a deep breath. All the shadows of the past—all the sacrifices I'd made for others—rose up en masse to haunt me. How many of them, I wondered, had been useless? How many had been worse than useless? And perhaps most

painful of all was the fact that it was too late to do anything about any of them.

Almost any of them. "Pick up the phone," I told Morgan, sitting up in bed. Gritting my teeth, I pried up a corner of the tape holding the intravenous needle in place against my arm and ripped it free. *Like a band-aid*, he'd said. . . . "Griff's probably in the communications room. Find him and tell him I want to do that Jump after all. And tell him I'll want another look at those maps of Shaeffer's."

From ten thousand feet up, the sun that fatal afternoon had been shining from high in a cloudless sky, seemingly bathing the world in light and heat. From ground level, however, things were considerably different. The sun, still high in absolute terms, was nevertheless almost at "sundown" as it approached a long ridge towering up in the west. The view off to the south was even more sobering, as the thin haze of white frost visible on the peaks there was mute testimony to the fact that the sun's heat was more illusion than reality. In half an hour or less, when the sun disappeared behind the mountains, the temperature on the slope would begin its slow but steady slide.

Jeffers clearly knew it, too. I'd timed the Jump to arrive after he was down, and by the time I got there he was standing in the middle of the cracker-box-sized clearing where he'd landed, industriously gathering up the parachute silk. Hovering behind him, I watched as he wadded it up and draped it around himself in a sort of combination vest and sari, securing it tightly around him with belt and tie.

I felt terrible.

Never before had I done even two jumps in a single day, let alone three: and now I knew why Griff was usually so strict on the one per day rule. Nausea, dizziness, and a steadily increasing fatigue dragged hard at me, distracting me from the task at hand. *Please*, I begged silently, *let him just sit down and wait for rescue. Conserve his energy . . .*

With a final tug on his tie, Jeffers took a minute to look around him. His eyes lingered on the plume of smoke in the distance, and I saw his fists clench in impotent anger. Then, taking a deep breath, he squared his shoulders and started off downslope.

Toward the town below.

I groaned inwardly. So he *had* seen the village during his descent . . . and my last chance to avoid making the hard choice was gone. *Tough love*, I reminded myself; and moving out in front of Jeffers, I hovered before his eyes and waited for him to spot me.

He did so within a handful of steps. *Are you the same one?* his lips said. I tried the up-down motion again and he nodded understanding. *You're not still tethered to the plane, are you?*

In answer I moved over behind him to the parachute pack still strapped to his back. *Good. Can you lead me to the town I saw when we were coming down?*

I swallowed hard, and moved out again ahead of him. Morgan had been right; there was no trace of the hesitation he'd shown back aboard the plane as he set out to follow me.

He trusted me.

Clamping my teeth against both the guilt and a sudden surge of nausea, I

kept going. *Tough love*, I repeated to myself. *Tough love*.

It worked for over half an hour. We tramped through groves of spindly pines and over hard angular rock, always heading downslope even as I kept us angling toward the south, and for awhile I dared to hope I could simply get him lost and leave it at that. If I could get him turned around sufficiently he might hesitate to strike out on his own after I left him. Even if he knew—and he might not—that my time limit meant that wherever I led him he would never be more than an hour's walk from the town.

But even while I hoped, I knew down deep not to rely on wishful thinking. So I kept us going the proper direction . . . and five minutes short of my goal, the bubble burst.

Without warning, too. One minute I was leading Jeffers across a particularly rough section of ground, a patch littered by dozens of branches apparently blown off the nearby trees by a recent wind-storm; the next, he abruptly stopped and frowned up at the sky. *We're heading southwest*, he told me. *Wasn't that town more due west?*

I suppose I should have anticipated that he'd eventually notice the direction we were heading and come up with some kind of plan to allay any suspicions. But between the physical discomfort I was going through and the even more gnawing emotional turmoil I hadn't thought to do so. I had a rationale, certainly—that I was leading him to the town via the safest path available—but with all communication one-way there was no way for me to relay such a com-

plex lie to him. Even if my conscience would have let me do so.

He was still watching me. Carefully, I did my "nod" and then continued on a couple of yards in the direction I'd been leading him. He watched for a few seconds and then, almost reluctantly, began to follow. I breathed a sigh of relief. Five minutes more of his trust was all I needed. . . . five minutes, and I would be able to betray that trust.

Tough love. Tough love.

Three minutes later, we reached the ravine.

It was both wider and deeper than I'd envisioned it from Shaeffer's maps, probably fifty feet from rim to rim at this spot and a hundred feet or more from rim to bottom. It was also considerably starker than I'd expected. There were stunted trees lining both rims and along the very bottom, but the sides themselves were nothing but rock and gravel and an occasional clump of grass or small cacti.

And with the sun now behind the western mountains, the growing gloom was beginning to mask what lay below.

Jeffers spotted the ravine as we approached, of course, and for a moment he stood at the edge, peering as far over as the gently rolling slope permitted. *What now?* he asked.

In answer, I drifted over the edge and moved a few feet down the side, scanning the area immediately beneath me as I did so. I had indeed led us to the precise place I'd hoped to: barely thirty feet down, the increasingly steep side abruptly became sheer, dropping almost straight down to the trees below. Together with the loose gravel of the sides . . . I returned my attention to Jef-

fers, praying that he wouldn't look any further, but just trust me and step out over the edge.

But whatever trust he still had in me wasn't nearly that blind. *Isn't there some other route?* he asked, not moving. *This doesn't look very safe to me.*

Again, there was nothing I could do to communicate with him except to repeat my motion into the ravine. Rubbing at his jaw, he looked both ways along the edge, as if trying to decide whether he should instead try to go around it. But the slopes in both directions were at least as intimidating as what he could see of the ravine—I'd made sure that would be the case when I chose this place. For another minute his eyes searched the area around us, looking perhaps for a place where he could tether one of the lines from his parachute as a safety rope. But it was clear that none of the half dead trees in the vicinity would stand up to any force, and after a minute he clenched his teeth and nodded. Holding gingerly onto the nearest trees for support, he stepped onto the slope and started down.

He got five steps before he lost it.

He screamed, or perhaps swore, as the ground slid abruptly out from under his feet and he started down. Dropping down on his butt, he rolled over and flattened his torso against the rocky slope, hands scrabbling for purchase. But there was nothing there to grab onto; and as the slope steepened, his hands ceased their attempts as he seemed to realize that he was doomed. Faster and faster he went, his passage throwing up dust and clouds of tiny stones as he fell down and down toward the bottom and certain death—

And an instant later hit and collapsed onto the wide granite ledge thrusting its way out of the side of the ravine.

For an awful minute I thought all my careful planning had been in vain, that the fall had in fact killed or lethally injured him. Then, to my vast relief, he rolled over and levered himself stiffly into a sitting position. He looked at the ledge, glanced up, then eased forward to peer over the edge at the sheer drop below. And then his eyes found me . . .

I forced myself to look back at him, to accept the expression of betrayal on his face. Morgan had been right on this one, too: tough love meant short pain. . . . and there was still enough of the martyr in me to want to claim some of that pain for myself.

Though no doubt both Jeffers and Shaeffer would be able to find plenty of pain for me at the end of the Jump. But that was all right. I'd saved Jeffers's life, and I'd saved the past, and that was all that counted.

Smiling to myself, I left.

I found Morgan, Kristin, and Griff sitting around the lounge TV when I finally felt well enough to leave my room. On the screen, coincidentally, was President Jeffers, giving his first public speech since his rescue. The two days of rest seemed to have done *him* a lot of good, too.

"Hey—Adam," Griff half turned as I came into the lounge. "How're you feeling?"

"Groggy, but pretty good otherwise," I told him, pulling up a chair next to his and nodding in turn at Kristin and Morgan. "I'm a little surprised I didn't wake up in Leavenworth."

He snorted gently. "What, you think Jeffers is going to hold a grudge?"

"The thought had crossed my mind."

"He had a lot of time out there to figure out why you did what you did. Shaeffer's a little madder, I'll admit, but I think he understands, too." He exhaled loudly. "So. Rumor has it Banshee's going to be getting a fairly dramatic budget increase. Would you ever consider coming back?"

I shrugged. "I don't know. It depends on a lot of things."

"Such as?"

Such as whether my coming back would help the other Jumpers. *Really* help them, not just hurt me. "Oh, you know. Things."

Griff grunted. "Well, anyway, I hope you do. Especially now that there's a whole new area waiting for us to work in."

"You mean changin' the past?" Morgan put in quietly.

Something about the way he said that . . . "You okay, Morgan?" I asked, craning my neck to look at him.

His expression, too, was . . . strange. "Listen" he said, nodding toward the TV.

I shifted my attention to the set. ". . . will seek out those responsible for this cowardly attack on me—and through me, on the American people. I am further directing the Pentagon to draw up contingency plans for punitive military action should we find evidence of foreign governmental involvement. . . ."

I licked my lips. "He sounds serious."

"He's angry, and he's bitter," Kris-

tin said. "He lost a lot of friends on that plane."

Morgan took a deep breath, exhaled it slowly. "Tell me," he said slowly, "any of you ever heard o' Hezekiah?"

Griff glanced a frown toward me. "One of the kings of ancient Israel, wasn't he?"

"Of Judah, yes," Morgan nodded. "A good one, too . . . except that when God told him it was time for him to die, he fought and kicked against the deci-

sion. And God backed down—gave him another fifteen years to live."

A cold shiver worked its way up my back. "And . . . ?"

"And durin' that time he had himself a son who wound up bein' one of the worst kings Judah ever had. And helped to destroy the whole country."

I looked back at the TV. . . . at the image of the man whose death I'd helped to reverse. "I hope," I said quietly, "that kind of history doesn't repeat itself."

Morgan nodded. "Me, too." ■

IN TIMES TO COME

Cultural interference is, for very good reasons, one of the grand old themes of science fiction. Just recently, in these very pages, Harry Turtledove has been taking a thoughtful look at the question of when, if ever, one culture is justified in interfering with the development of another. *My Newton and the Quasi-Apple* explored another variation on the theme, and I suspect most science fiction writers have dabbled in that territory at one time or another. Which is hardly surprising: it's an important question, with so many possible ramifications that there's lots of room to explore.

At this point you're probably running through some of the other examples you remember—and I'll bet the vast majority of them involve some far *future* civilization interfering with some *alien* culture at an (at least apparently) more primitive stage of development. But who says cultural interference has to come from outside—or wait for tomorrow?

Next month Michael F. Flynn begins a most thought-provoking two-part serial about an organization which has quietly been shaping *our* history from within, for more than a hundred years. That's enough time for dissension to develop in the ranks, and things quickly become rather sinister for the outsiders who stumble onto knowledge not meant for them. I think you'll enjoy it.

And are you *sure* it's fiction?

EPIPHANY

Arlan Andrews

Whether an idea is true,
and whether it is useful, are
two separate questions.



Arthur
George
187

Arthur George

Brother Henry Crook saw the huge alien striding down the dusty road in front of his church. Dogs barked, a couple of barefoot boys in overalls stood in awe peering from behind an old oak as the tall humanoid walked in measured paces—six feet at a step—and slowly moved its gigantic head this way, then that, as if searching for something. Brother Henry was reminded of Beanstalk Jack's antagonist, and wondered if the boys considered their bones might be ingredients of alien bread. He smiled and wiped away sweat from his brow and his lip. The fierce July sun in Arkansas made the humidity unbearable, and as preacher, Brother Crook didn't like to use the air conditioner until Sunday morning.

Outside, the lazy summer was suddenly quiet, silent as space. Brother Crook looked up from his pulpit and watched the alien duck through the open church doors, barely clearing the seven-foot openings. The being looked around the empty church in mild surprise then caught the preacher's eye, and started up the aisle toward the front of the church.

The man from the stars was a light-skinned, clean shaven humanoid, like himself, but where Brother Crook was five eight and one hundred sixty pounds, the visitor was wide shouldered, broad chested, six hundred pounds; at least eight feet tall, maybe nine. A giant. *And handsome as an angel*, the preacher thought, *in its*—his, he corrected—*his multicolored covering that shimmers as might the surface of a star.*

Brother Crook kept his gaze on the stranger's eyes as the distance between them diminished. Dark, those eyes, and

wearily, set deeply back under a powerful brow. How strange such contradiction from so awesome and commanding a figure. *A lost soul?* Brother Henry wondered. *Does it—he—have a soul?*

Face to face they stood, eye to eye, with the preacher's position behind the raised pulpit making up the height difference. So close, Brother Crook could see the depths of infinite space from whence the man had come to this small church in rural Arkansas. So close, the large sad eyes bespoke mysteries witnessed, unimaginable forces contested and tamed.

The alien spoke.

"Why do you call yourself Brother?" it demanded, the diction and accent reminiscent of an aristocratic British television personality. "And," a giant arm seemed to envelop the volume of the small church, "why do you stand in an empty space? Alone?" The giant's stare returned to plumb the soul of the small human. The alien grunted and backed up to deposit its large mass on a squeakingly protesting front row pew.

Brother Crook's gaze followed the alien and he forced a smile. "Brother from the stars, I welcome you to the Crystal Valley Missionary Baptist Church. I am plain Mr. Henry Crook, the called preacher for this congregation. I don't call myself 'Brother.' They do.

"And we are all brothers and sisters in Jesus Christ, our Savior." He held up the old Bible that he was using to plan his sermon. "I am here alone today, Brother, because I wanted to practice my sermon."

The giant crinkled his cheeks in a sardonic grin. "You know about us, the

Gnarthi, human?" Ignoring the preacher's friendly demeanor and slight nod, the alien continued. "We alone amongst the millions of intelligent species have spanned the entire Galaxy." With great arms appealing to the tattered acoustic tile ceiling, almost touching it from a sitting position, the Gnarthi cried out in a booming voice. "In my twelve thousand years, human, I have visited a hundred thousand worlds. This Earth of yours is only a mote, less than nothing!"

Halfway between pleading and threatening, the alien stood with fists clenched and trembling, and looked toward the tiny human who stood with open mouth and pounding heart. "In all this vast Universe we have never found another culture like yours. Preacher, tell me why you *believe!*"

The Gnarthi lightships had arrived some weeks before, an instantaneous and simultaneous materialization in the capitals of all 203 countries of the Earth. They appeared to be mostly traders and scholars, not invaders. After the initial shock of *knowing* that "We Are Not Alone" wore off—something a world saturated with space opera movies and television had always suspected—only human traders and scholars cared much. Nice-looking but secretive giants who otherwise seemed human and spoke all languages were not all that interesting, after all.

In the United States, they were seen mostly on talk shows. The odd scholar might be found in the Library of Congress or at a computer terminal in a university. They were not showy; the technology they offered in trade was not

all that advanced. Poverty and war on Earth? None of their business. Disease? A little help with *druzhiba* and mutAids. Nothing else, though. No rides for humans to other stars, no visits to the Milky Way. The aliens had vaguely hinted that a Galactic moral or legal code kept them from interfering with normal development of a newly contacted race. Most everyone wondered why they had even bothered to come to Earth, a question the Gnarthi had never answered.

"Why do I believe, Brother Gnarth?" the preacher replied, knowing well that the aliens all used the same appellation and apparently did not comprehend the humans' use of individual names. He lovingly lifted the Bible and spread it open for the Gnarth to see. From television he knew that the giant's amazing eyesight could easily allow him to read the text from fifteen feet away. "This book, I believe, is the Word of God. And it tells me what to believe. And how to believe." The giant sat unmoved, not responding.

"Brother from the Stars, this ancient Word tells me that God sent Jesus Christ, His only begotten Son, to die that we mortal sinners might have eternal life." The alien stood and interlaced the enormous fingers. Flexing his hands, the knuckles cracked like a machine gun. The Gnarthi approached the pulpit, shallow breaths a wheezing gale.

Face to face once more, Gnarthi spoke to human. Slowly, evenly, the alien spoke, gargantuan energies barely repressed, overweening intelligence glaring from sad eyes. "Brother

Crook—I call you by your title only, no kinship conferred—the Galaxy is twenty thousand light years thick, at the Lens, and one hundred ten thousand across. If a light year were foot, the Galaxy would be the size of this county of yours!

“In this enormous volume are two hundred billion suns, a hundred million intelligent races. And in all of this—‘Creation’ you call it—not one other race dares to think themselves favored of a God, a Creator of All, a Caring Intelligence. Give me evidence. Convince me!”

A cur dog sniffed at the church door, positioned itself, relieved its bladder in a loud puddling noise. The preacher shouted past the alien, “Get out, Butch! Bad dog! You know better!” The Gnarthi turned its massive head and studied first the dog, then the human. *The eyes are mirrors of the soul, but I see nothing reflected*, the human thought. Brother Crook wondered if the alien was comparing the behavior and the relative intelligence of the two Earth life forms. Though he would never know, his supposition was correct.

“My belief comes from this Book,” the human began. “God’s Word says—”

“—Not proof! Circular reasoning!” boomed the Gnarthi from the doorway where he was shushing away the confused canine and closing the doors. “*Objective proof, human!*”

“Tell me, Brother. How did your Creator Create this Galaxy we Gnarthi stride through at will?”

“In Genesis, God says that He created Heaven and Earth in six days and rested on the seventh.”

“And you believe that nonsense?”

Brother Crook glared back with a fierceness that took the alien aback. “Of course I do! It’s in the Bible!”

As the morning wore on, they hashed and rehashed Evolution, Free Will, Sin and Original Sin, theological arguments old hat to Brother Crook but apparently totally novel to the Gnarthi. Finally, exasperated, the alien picked up the Bible and asked softly, “Brother Crook, tell me how you, an educated, intelligent and well-read human being, can believe the legends, myths, rumors, half-truths that you know are not true?”

“How can you use this book as a basis for evaluating your interface with the Universe when you can be certain that it is flawed?”

By this time the preacher was weary of body and amenable to relaxation of the soul. “You know, Star Brother,” he said with a crooked grin, “You’re the very first person to challenge me with that precise question.” He stood and paced in front of the pulpit, in the prayer row, taking his Bible from the giant’s hands. He stroked the worn cover as a mother might caress her first-born. “Since you are not really a human, by Earth standards, if I have your word not to repeat any of this, I will tell you what I have told no other man.” The giant nodded slowly. “I love this Book, Brother Gnarth. As a young man, I accepted its words as literal. Then in seminary I learned how it had been collected, translated, reinterpreted. Undoubtedly it does not read the same now as it did two thousand years ago. No doubt it is incomplete.” He turned to the Gnarthi and smiled. “And that forms the basis of my belief, now, Brother Gnarth.”

The alien jerked his head back, puzzled. Brother Crook held up his hand for silence. "In a minute, Brother. Just let me finish. This Bible is flawed, but so are humans. The stories change from translation to translation, from scholar to scholar, but so do human stories. The morality, the ethics, all vary from culture to culture. The interpretations vary with time. Truth is relative.

"What Jehovah required from a primitive nomadic tribe had to be different from what Jesus expects of a civilized nation." Alien and Man locked eyes. "Or what He expects of a civilized race. In the New Testament, God even goes so far as to reorder the priorities, giving us a personal Savior, a way into heaven.

"I know you find this hard to, ah, *believe*," he stumbled over the word as the Gnarthi frowned, "but I have no difficulty reconciling this old collection of myths and legends and morality plays with biology, evolution, quantum mechanics, psychology—even star travelers like yourselves!"

The alien could stand it no further. "Why, human? Why, in the face of all knowledge and experience do you still believe?"

Brother Crook came over to the Gnarthi and put his own steady hand over the giant's trembling one, and both on the Bible. "Because, Brother, God recognized human limitations. Why a perfect record for imperfect beings? What would be accomplished by a precise revelation of universal truth to irrational, approximate minds? It would be only a source of constant irritation, unrealizable goals. Properly understood, properly utilized, this Bible is a compass that leads Mankind, however inefficiently,

to God.

"Mutual love, understanding, cooperation we find in the Bible. A strong race must have those, true, but not enough."

"Necessary but not sufficient," the Gnarthi murmured. "A mathematical tenet."

"True," answered the preacher. "And now the final one—faith."

"And why that?"

"I interpret the Bible's insistence on faith—in God, in Jesus—to imply that imperfect, irrational humans cannot understand the totality of laws that operate the Universe. We are implored to seek Truth to make ourselves free, but beyond that, to surrender to the overwhelming mystery of the Universe and feel it flow through us.

"That is Faith, Brother: the power that lies beyond Reason, the binding force of all Creation, fleshing out the interstices of spacetime; the ethical Ether, the philosophical touchstone upon which the very quanta and quarks play out their eternal games of light and dark."

The alien stared, surprised. He said, "Human, Brother. An emptiness suffuses our race. Wars and tragedies abound in the Galaxy as they do on your Earth, yet great despair is a permanent condition everywhere else but Earth. To be sure, your race has seen, still endures, misery, but somehow a core of—hope, you call it?—remains. A seed that blossoms when conditions are propitious. An ember that billows when the wind of hope blows once more.

"And in your rationalization of your acceptance of acknowledged myths as

a basis of interpreting the role of intelligence in the Universe, you have exercised 'fuzzy logic,' a form of reasoning that provides useful answers from imprecise algorithms. Acceptable conclusions from flawed theorems. A very useful survival trait from a most primitive society.

"You have given me, our race, perhaps the Galaxy, a most precious gift."

"Faith, Brother?"

"And hope, Brother. Hope." Gracefully the alien bowed and gently clasped the human's free hand. In silent understanding, Brother Crook passed over the ragged book of ancient knowledge to his alien visitor. The Gnarthi said, "I shall carry your message across the Galaxy."

"Will they believe?" Brother Crook asked. "An irrational message from this small insignificant place?"

The alien smiled for the first time. "This book tells of a man from a tiny primitive village who used advanced knowledge of human psychology to spread a message to billions of humans. Do you think the Gnarthi less capable? There is a way." He walked down the hallway, ducked clear, then paused on the steps. With the evening sun at the giant's back, Brother Crook saw him only in silhouette. But he could have sworn the oversized eyes radiated an infinite weariness.

"Brother Crook, I will carry the message personally," the alien said. Then, a sudden great sadness in his voice, he continued, "In my culture, you see, I am a lowly craftsman, an artisan. You humans would call me a carpenter."

Through the open doors Brother Crook watched the alien walk slowly down the empty road and into the darkness. ■

ON GAMING

(continued from page 81)

sorted programs to run the various projects.

While the kit might at first appear a bit daunting, the manual is a model of clarity. There are 50 projects ranging from getting a simple motor to run to electronic speech and inventing a simple radar unit. Each project is written in, hard to believe, intelligible English. All important concepts are explained so that you'll understand what you're doing. All the necessary parts are listed as are the steps in the program used to get the project running.

The *Workshop* has some neat features. You can use your joy stick to control the interface, giving the motors commands to speed up or reverse directions. The first few projects have you

constructing robotic arms and variable speed fans. As you progress, you work with gyroscopes, generators, light and color.

Obviously, if you have children, the *Robotic Workshop* is a real treasure. But there's enough intriguing experiments that will easily keep you occupied. For example, you can use the I/R sensors in the kit with one of the program's routines to measure the speed of a baseball bat (or any other moving object). There's even a project for creating a burglar alarm, all controlled by the computer.

So now, when people ask me if all I do with my computer is play games, I simply say no.

I've, ahem, been doing some work with digitalizing speech.

(And I don't tell them about the nifty gyrocopter I have on the drawing boards. That's top secret.) ■

Jay Kay Klein's **biolog**

● When you get to be an engineer at one of the world's foremost research laboratories and have been a science fiction reader since childhood, you have two of three essential ingredients to become one of *Analog's* famous hard-core science fiction writers. Arlan Keith Andrews, Sr. already had the third element when at 14 he felt the urge to write his first SF story, in longhand. He first appeared in *Analog's* sister publication *IASFM* with a poem "The Ancient Engineer" in January, 1980. His first listed appearance here was in July 1982 with another ancient engineer piece about constructing the Tower of Babel. His one-page poem published in June, 1982 went unremarked in the issue's table of contents and the annual index at year's end. A similar fate befell his already published five letters to the editor.

Arlan was born and raised in Little Rock, later attending New Mexico State for a B.A., an M.A., and a Sc.D. in Mechanical Engineering. Robert A. Heinlein and John W. Campbell (*Analog's* early, long-time editor) were the two most important influences in his life. From the former he secured at age ten the ideal of becoming a Renaissance Man. To JWC, he gives thanks for a decided benevolent open-mindedness and creative contrariness—traits not often appreciated in this world. Like Campbell, Arlan likes to mix in mysteries of the universe with hard-faceted engineering facts. Hence, a lifelong fascination with UFOlogy, and a string of articles on this, psychic phenomena, and items once associated with Charles Fort.

After five years as a co-op student at White Sands Missile Range, doing track-

ing with telescopes and cameras, he was hired on as a mechanical engineer with Bell Laboratories. Prior to the SALT talks, he was on the anti-IBM project. While helping to design a Home of the Future, he circulated copies around Bell of a Bradbury story about such a house.

It wasn't until 1970 that he attended a science fiction convention. "It was fantastic," he says. "I met Isaac Asimov in the first 60 seconds, and he introduced me to Sprague de Camp and Judy-Lynn and Lester Del Rey." Next year, Asimov introduced him to John W. Campbell, for whom this was a last public appearance, as a guest of honor. Arlan had spent years looking for other Heinlein/Campbell inspired persons in such places as White Sands, engineering school, and Mensa. He found the best examples in SF fans and among SF writers.

His stories come from dreams, nightmares, and most importantly from a bored but active mind desperately trying to find humor and new meaning in human situations. His humor often tries to poke holes in pompous individuals who take their trivial accomplishments seriously while ignoring the great feats of our civilization's technology. Arlan hopes to be around next century to quaff a few root beers in freefall while toasting those who prepared the way with their imagination and dedication. ■

Arlan Andrews



Rick Shelley

THE LIZARD, THE DRAGON, AND THE EATER OF SOULS

The best of intentions can lead
to the most painful regrets—but regret doesn't
have to be a stopping point.





Judith Mitchell

Doctor Elizabeth Morley finished her breakfast—black coffee and two cigarettes—before dawn. Ken was in the shower. Paulie was still sleeping. Beth returned to her bedroom for sunglasses. She expected to spend much of the day outside. On her way to the front of the house then, she paused for a moment at the door of her son's bedroom. Until recently, Beth had always gone in to kiss Paulie good-bye in the morning, even if he was sleeping. Finding him sleeping with the Jones girl had cured her of *that* habit.

The sounds of the shower ended. Beth glanced toward the bathroom, then hurried to the front door. She didn't want to face Ken until they were at work. Alone together at home, they might resume last night's argument, and Beth didn't want the stress of a domestic quarrel early in the morning.

An ancient white and violet church bus chugged up the hill past Beth's driveway. Beth wrinkled her nose in disgust, and looked up at the gloomy sky full of thick clouds. It wasn't *supposed* to rain, and the clouds were predicted to disappear by afternoon. Beth decided to chance the weather and walk up the hill to work.

The bus was unloading on the shoulder of the road when Beth reached the ornate zoo gate, the main entrance to Morley Genetic Specialties—Castle Frankenstein to insiders and a few detractors. There were perhaps two dozen protestors getting off the bus. Beth recognized only Edgar Brass, Brother Ed, founder and president of Brother Ed's College of Modern Revivalism a few miles away. Once or twice a month Brother Ed brought students to Castle

Frankenstein to demonstrate the proper way to demonstrate. The group's protest signs were neatly stacked. From the fresh look of the wooden handles, Brother Ed had finally popped for new signs. Idly, Beth wondered if the messages were also new.

A guard opened the gate for Beth but kept his eyes on Brother Ed's menagerie. None of the guards liked the regular visits of the burgeoning Bible-thumpers. But class wasn't in session yet. There were no cameras or tourists around so early.

"Good morning, Dr. Morley," the guard—his name plate read BORIS—said.

"Morning, Chet. I thought you were going on vacation." All of the guards who came in contact with the zoo-going public wore nameplates with names like Boris or Igor or Vampira, part of a marketing strategy Beth was accustomed to despite her original groans.

"Next week. Thought I'd miss this month's circus parade." He gestured at the protestors. Brother Ed meted out a careful frown but went on with his preparations and instructions for the class.

Beth walked on a few steps and looked down the zoo's central mall. Beth toured the zoo several times a week but—reluctantly—she decided that she couldn't spare the time this morning.

"Tomorrow, for sure," she whispered, a promise to herself as much as to the animals that couldn't hear her. Then she walked up the yellow brick road to the Castle that wasn't a castle behind its facade and her office.

Beth had stacks of work waiting, as usual. The top right drawer of her desk,

her "In Basket," was always jammed full. But she couldn't concentrate on routine paperwork that morning. Oscar Stoltz was due in and Beth dreaded the coming confrontation.

The specifications for the Stoker contract, six sheets of legal-size paper cluttered with single-spaced type, lay on top of the desk. Beth only had two days left to decide whether to accept that challenge. The specs, a lamp, the telephone/intercom, and a ten-quart ashtray were the only items on the desk.

"I swear I'm going to hire an administrator for the routine crap," Beth said after a dispiriting look at the work remaining in the desk drawer. For three years she had been swearing that oath. And breaking it. Beth got up and paced through the length of a cigarette. She heard her secretary settling down to work in the outer office. Beth sat, lit another cigarette, tapped it on the ashtray's rim before any ashes could accumulate, and tried reading the Stoker specs again—an attempt that lasted less than ten seconds. Another tap of cigarette on ashtray and she reached for the intercom.

"Jeanne, see if you can get any word on Stoltz."

"I've already called the airport. His flight is listed 'on time.'"

Beth took three quick puffs from her cigarette, ground it out, and wasted a moment feeling appalled that there were already a dozen butts in the ceramic bowl. The cigarettes were as safe as genetically-engineered tobacco and filters could make them and after all, it was the tobacco that brought in the money to start Castle Frankenstein seven years before—but Beth felt an atavistic

guilt about smoking so much . . . and working so little.

The phone, her private line, rang. "Beth Morley," she answered, picking up the receiver and leaning back in her chair.

"Morning, dear." The words were tentative, a cautious probe.

"Morning, Ken," Beth replied, closing her eyes.

"Is the Stoltz demonstration still on?"

"As far as I know," Beth said. There was a pause. Beth sensed that Ken was reluctant to resume their argument.

"Have you decided what to do about Stoltz?" he asked, gingerly.

"You know how I feel about it," Beth said.

"Paulie's here talking to St. George already. He still wants to try. This is important to him, Beth."

"I know," she replied, concealing her sigh.

"And we really can't afford to lose a ten million dollar sale."

I know that too, Beth thought. Ten million might not actually bankrupt the company, but they had already spent three of those millions in research and production costs. The real pain would come from other customers—potential customers—who would never have the same faith in Morley Genetic Specialties' promises or ability.

"You can't hide him from the world forever," Ken said, bolder. "Paul really wants this, hon."

"I know," she said again. Guilt wasn't the least of her prods. "But I don't know if I can do it," she whispered, and when Ken didn't answer, she said, "Talk to you later."

Beth hung up and stared at the Stoker specs. She started to read as she opened the center drawer of her desk. She didn't have to look as she reached for a cigarette—there were a half dozen open packs in the drawer—and lit up. This time she got through the first page before she tossed the specs aside, stubbed out the cigarette, lit another, then stood and crossed to the window. From her third floor vantage she could see all the way to the wrought-iron main gate—a montage of mythical beasts and cinematic monsters. Morley Genetic Specialties covered 800 acres of rolling countryside. The gate was a quarter mile from the offices, farther from the labs, barns, pastures, crop lands and such that were the heart and soul of the operation. But the zoo was right up front to bring in tourists who were rarely interested in the real work of the company, who only wanted to gawk at the outlandish creatures Castle Frankenstein produced.

Another cigarette. Beth stood and looked around the office—the carved motto on the wall behind her desk: “If it can be made, we’ll make it;” the name plate lying on the credenza: “Mad Scientist,” that she sometimes wore.

Damn it, Elizabeth Maria Morley, you shouldn't be so damn nervous, she thought. It's not your first movie deal. It's not even the first time you couldn't produce precisely what the customer wanted.

“But you’ve always been able to convince them it was,” she said, stubbing out her cigarette . . . then jumping when the intercom buzzed.

“Jack Haphin says to be at the Pit by eleven,” Jeanne said.

“Tell him we’ll be there,” Beth re-

plied, “if Stoltz arrives.” She glanced at her watch. It wasn’t nine-thirty yet.

God, I hope this presentation works, Beth thought as she fired her next cigarette and spritzed her mouth with breath-spray. She ducked into the private bathroom adjoining her office to check herself in the mirror. It was too late for major repairs, but she decided none were needed. *He's not going to care what I look like,* she assured herself.

Then the emergency Klaxon sounded.

Beth was moving before the first blare faded. As she went through the outer office, Jeanne called, “Rex escaped.” *That's all we need,* Beth thought. The elevator was too slow, so she took the stairs and almost fell headlong down the last flight.

The Bush Buggy started first try. Beth backed out of the parking slot while she tried to get more information over the radio.

“He’s headed toward the zoo,” Ken said from the Reptile Barn. “He’s all lathered up about something.”

Other vehicles were moving toward the emergency. The Klaxon didn’t sound often, but when it did, people *moved*. Beth turned right on Buck Boulevard, behind the zoo, then left on Mockingbird Lane . . . which put her almost face to face with Rex.

—Short for Tyrannosaurus Rex.

Beth shoved the brake pedal in the general direction of Malaysia and the car slowed to a stop. Another Bush Buggy came to a stop behind Rex.

“C’mon, Rex,” Beth coaxed, standing and leaning over the windshield. “Let’s not scare the customers, okay?”

Rex stood still as Beth got out of the

car. The dinosaur cocked his head to the side and waved his futilely short arms, growling softly. Beth walked slowly toward him, one arm out, hand open, palm up—acutely aware that Rex was three times her five foot three. Rex gave her a louder growl.

“C’mon, baby, it’s just Momma.”

A voice from the other car called, “I’ve got a dart gun ready.”

“Don’t use it if you can avoid it,” Beth called softly.

Rex glanced from Beth to Pete Djubek, Head Reptile Keeper, confused. When Beth came closer, Rex leaned forward. At least he closed his mouth.

“That’s it, baby,” Beth cooed. Even with Rex bent forward, his creator had to stretch to pet the top of his snout. Rex squatted. The sound he made was almost like a dog whimpering . . . a very large dog. Pete came up, dart gun at his side. A few other people had gathered, but hung back.

“I don’t know what got into him,” Pete said. “He did some roaring in his pen and then ripped through both fences and hightailed it this way.”

“Anybody hurt?” Beth asked, still stroking Rex’s snout.

“No. Ken got Paulie out of the way quick. Nobody else was around.”

“Good. You have his leash?”

Pete moved his Bush Buggy up and stood in back to put the leash—a heavy anchor chain—on the dinosaur and fastened the bitter end to a ring welded to the car’s frame. Rex submitted meekly. Beth got out of the way and Rex stood. His growl this time was softer, a ritual complaint.

“Get the construction team to fix the pen and strengthen it,” Beth said. Pete

nodded and climbed into the driver’s seat.

“You know,” he said, “the way he was acting, I’d swear he smelled a female in heat. I’ve worked with a lot of animals like that.”

Beth laughed. “So have I. We’ll have to run tests, find out what Rex thinks is a female tyrannosaur.” Rex was one of a kind, engineered for a Japanese monster movie.

“Hope it’s not something weird like a butterfly,” Pete said before he started the car forward in low gear. “Butterflies are a pain in the ass.” Rex followed along without any trouble and Beth returned to her Bush Buggy.

“Damn! she said, slapping her forehead. “Stoltz!”

“He’s in your office,” Jeanne said when Beth arrived, breathless.

“How long?” Beth asked, panting. *Those damn cigarettes*, she thought.

“He got here right after you left. I mean *right* after. He must’ve been in the elevator when you ran out.”

“Damn.” Beth took a deep breath, then went into her office, which was clogged with more smoke than her cigarettes could possibly account for. The wrong kind of smoke. Beth moved into the smog and saw her visitor stand, sucking a thick black cigar with all the delicacy of burning rubber.

“Sorry to keep you waiting, Mr. Stoltz. We had a minor crisis.”

“Dr. Morley. I’ve been looking forward to today with considerable anticipation.” He chuckled and his whole body shook. “I did take time for a quick tour of your remarkable zoo,” he added as they shook hands. “If I’d known you

would be delayed, I could have lingered."

Oscar Stoltz was over six foot tall and looked like a weightlifter too long from his dumbbells. He wasn't exactly fat but looked as if he might explode into obesity momentarily. His collar barely restrained pendant jowls. Pudgy, moist hands stuck out of rigidly starched sleeves. His handshake was so limp Beth had to fight an instinct to wipe her hand afterward.

"Have a seat," she said, gesturing at the matching leather settees in the corner. "We have a little time before we go see your new pets." Even with the time lost calming Rex, it was only 10:15.

"*Ja, meine Drachen,*" Stoltz said, sitting carefully.

Beth winced inwardly at the affection. Stoltz's family hadn't seen Germany in generations. She sat on the other sofa and reached for a cigarette, hoping that a cloud of familiar smoke would buffer Stoltz's cigar.

"My babies, they are beautiful?" Stoltz asked in a bad movie accent. His attitude reeked as badly as his cigar: *It's all shtick, but I'm famous and filthy-rich so naturally you'll think it's cute as hell.* It could never occur to him that no one ever found his attitude cute.

"I think they're beautiful," Beth said, "but I'm biased about all my babies. I don't mind saying that this has been our most difficult order. Your dragons needed as much physics as genetics."

Stoltz nodded and dropped his now-defunct cigar into an ashtray. "Now we can shoot our movie," he said as he

pulled out another cigar. "I've been waiting years to do this film."

"This might sound strange since we make a lot of money doing this," Beth said, "but is it really worth the expense of developing real creatures just to make your movies a little more realistic?"

"At the bank, it's worth it." That was accompanied by a nod so vigorous that it cleared a temporary hole in the smoke. "Besides, we have no choice. You people made a cartoon duck real, taught him to talk, put him in a sailor suit. If the cartoons are real, the features must be at least as real. All your fault."

Beth decided it was time to head for the Pit, if only to get Stoltz's cigar into the open air. He made her feel nervous, vulnerable.

"It's about time for our presentation to start," she said, getting up and slipping a pack of cigarettes into her pocket. After lighting up, she still wasn't sure what she would say when Stoltz's dragons didn't live up to his expectations. That he would be so bowled over by what they *could* do to overlook what they *couldn't* do was too much to hope for.

"You have protestors outside your gate," Stoltz said as he levered himself up.

Beth managed a short, hard laugh. "Nothing to worry about. Just Brother Ed's College of Modern Revivalism. For two grand, he'll teach you everything you always wanted to know about fleecing marks in the name of God."

"You sound rather critical."

"Critical? Would you like to hear his motto, his recruiting slogan? 'If you can sell used cars, you can sell God.'"

"He gets students?"

“So many he has a six month waiting list, according to him. The only thing that motivates our protestors is a TV camera.”

That took a growing smile off Stoltz’s face. “A man like that can be dangerous if he gets something worth headlines and TV coverage,” he said. And, “I have a film crew coming this afternoon for the documentary I’ll do about my dragon movies. And *Hollywould Today* is planning to interview me for this evening’s show.”

It took all Beth’s willpower to force a smile and answer. “I didn’t know about any of that,” she said, keeping her voice painfully neutral.

“There’s no problem, is there?” Stoltz asked.

“No problem with your own crew, of course, though we could have saved you the expense. We tape all our presentations. But the *Hollywould Today* people . . . well, we’d rather not have them shooting our show.”

Stoltz waved a meaty hand. “The interview will just be me making the announcement. I don’t let anybody steal my thunder.”

Beth nodded. Her smile was pure relief. “We’d better get going.”

“After you, *Frau Doktor*,” he said with an expansive gesture.

In the outer office, Beth asked Jeanne, “Is the carriage ready?”

“Right out front.”

When Stoltz climbed in, the carriage tilted and its leaf springs creaked. When Beth got in on the other side, there was no noticeable compensating movement back.

“To the Pit, Mark,” Beth told the driver.

“Right, Doc.” Mark clucked at the team and flicked the reins.

“Cute gimmick,” Stoltz said, pointing at the animals with his cigar. “Unicorns. Great come-on for the rubes.”

“The unicorns are real, a viable, patented species that always breeds true. We’ve raised hundreds.” Beth rose quickly to any implied criticism of her *babies*, any of them.

“An astute business move,” Stoltz said. “It’s reassuring to know you understand box office.”

“The unicorns, like your dragons and our other exotic animals, are only a sideline. Our important job is providing food the billions of people on this planet need. Better grains and vegetables, more productive food animals . . .”

“Yes, yes, of course,” Stoltz interrupted, “but how many people will pay ten bucks to stare at a yard-long ear of corn for two hours?”

There was no polite reply to that so Beth didn’t try.

The Pit was a natural amphitheater 200 yards across and 50 feet deep. There were a few large rocks at the center to serve as a nest for the single speckled brown egg. An observation platform on the rim was furnished with binoculars and chairs. Apart from that, the rim was as bare as the bowl, with no easy way to gauge scale. The camera positions and other observation points were concealed. The egg in the bowl might be the size of a football or the size of a limousine.

Stoltz and Beth had to climb twenty yards. The path was gentle, but Stoltz was puffing when they reached the top. Before he sat down, he surveyed the amphitheater and the egg in the center.

"Come now, Dr. Morley," he said, "such hokum for an old showman?"

Beth gave him a breezy shrug of her shoulders. "I thought an 'old showman' might appreciate a proper setting," she lied, trying to salvage something. "Besides, caution is advisable. You're not looking for pussycats."

His eyes narrowed. "But I *am* looking for animals that can be trained to work with people. You're not saying my dragons are too wild for that?"

"Not at all, but you can't train an animal in its egg."

"I have the best trainers waiting to work with them. I don't settle for less." Stoltz was all business now, no affected accent or language. *I don't settle for less* was delivered in the most solemn tones.

Several members of the dragon project came up.

"Mister Stoltz, this is Dr. Ken Fischer, your project director," Beth said. Ken shook hands with Stoltz, then introduced his colleagues.

"We should have action within the next few minutes," Ken announced.

Beth winked at him before she turned back to Stoltz. "The field glasses will give an excellent view," she said, pointing to one of the tripod-mounted instruments. "We are taping, but I thought you'd like to see this live."

"Excellent equipment," Stoltz said while he adjusted the binoculars. "Almost like being right down there."

Beth slipped on an earphone so she could monitor the conversation among the technicians and pass along anything Stoltz might like to hear, like: "A hint of a crack."

"I see it," Stoltz said after a few anxious seconds.

Minutes passed. Beth pulled away from her binoculars to wipe sweat from her nose and under her eyes. The crack widened suddenly. Pieces of shell broke loose. Stoltz coughed without taking his eyes from the lenses. He was intent, excited—as Beth had hoped.

Another lull. "The next flurry should bring the hatchling out," Ken predicted. Correctly. More pieces of shell fell free, then the top teetered and slid off. The dragon stood on wobbly legs for a moment, then staggered and fell out of the bottom of the shell.

"Sickly looking," Stoltz said.

"When he dries off and rests, you'll get a better look," Ken said.

The hatchling flapped its wings weakly and tried to stand.

"That's going to fly?" Stoltz asked.

"Not for three or four days," Beth told him.

"I wasn't planning to spend the week."

"No need. The first one hatched five weeks ago and two more last week. They're all flying nicely. We'll look at them in a little bit."

"How big do they get?" Stoltz asked as two workers went down to collect the hatchling. Stoltz fired up another cigar. And Beth lit a cigarette.

"We're not sure," she admitted. "They should grow as long as they live, rapidly at first, tapering off at maturity—according to our projections, which are usually accurate. At a year they should be 12 feet at the shoulder, 30 to 35 feet from nose to tail, wingspread about 50."

"How old do they have to be before my actors can fly them?"

That was the question Beth had been dreading.

"They meet the letter of the contract specs," she said, banishing a thought that she should cross her fingers. "They fly. They breathe fire. They grow large enough to carry two, even three people. Barring accident or illness, they could live hundreds of years." She blew smoke. The cigarette smoothed the edges of her tension. She met Stoltz's stare without flinching.

"I guess I have to accept that for now," he said. "You have a reputation as the best monster factory around." Beth cringed at *monster factory*—a reporter's tag that seemed determined to cling. "But I've got a feeling something's not kosher about this deal."

"We *do* have a reputation," Beth said. "We'll make any plant or animal that's biologically and physically possible. We've created bacteria to eat the mountains of plastic we've thrown away in the last century. Food crops that provide ten times as much for the investment in time, labor and land. In time, we'll have houseplants that grow steaks indistinguishable from anything off a steer. And we've created exotic animals for dozens of movies and HV shows. We've got your fire-breathing, flying dragons."

"That's all I need to know," Stoltz said, but his voice and eyes made it clear that he was taking nothing on faith.

Beth glanced at Ken. He was waiting to see which way Beth would go. The showy set-up and evasions had only aroused Stoltz's suspicions. If he didn't get some solid answers, he might even get unreasonable. Beth faced Stoltz.

"The dragons fulfill the contract but

even so"—she held up a hand to still Stoltz's instant reaction: a frown, the start of a protest—"because of a technical problem, I may need to invoke the 'necessary and reasonable' clause to provide an alternative that won't cost you anything extra."

"What kind of problem?" Stoltz's voice was so icy that Beth couldn't suppress a shudder.

"I'd rather let our babies show what they can do first," she said.

"Just remember, I'm not going to pay ten million dollars for garden lizards I can't use. I'd rather spend the money on lawyers."

"We have the problem covered. You'll see for yourself, right after lunch."

"I never eat lunch," Stoltz said, "but I do have to locate my camera crew. And remember, I have that interview on *Hollywould Today*."

"We're in big trouble, Ken," Beth said. They were alone at the Pit. A driver had taken Stoltz to try to locate his people. The other project workers had also left.

"Maybe not," Ken said. "Besides, you're only doing what you knew you'd have to do." He pulled Beth close and they hugged.

"Once word gets out about Paulie and the others . . ." Beth still couldn't bear the thought of that.

"You know we're covered legally."

"Maybe. If Brother Ed and all the do-gooders get hold of the story, we could still get shut down. Child abuse, unethical research. Who knows what else."

"You can't hide them forever. We'll just do whatever's right."

Beth didn't reply. She had *always* tried to do what was right for Paulie, ever since she realized that he was a person and not just an experiment.

Beth and Stoltz rode to the reptile ranch in silence, until they neared their destination. "We do have the problem covered," Beth said. "I'm sure you'll appreciate the problem, but there's no reason why your audiences should ever know."

Stoltz just chomped harder on his cigar and looked back at the car following with his camera crew.

The main reptile barn was a large cinder-block building set in a narrow valley at the farthest corner of the complex. Beth parked her Bush Buggy—the unicorn-drawn carriage had no longer seemed appropriate—at the end of a line of parked cars. The camera crew pulled up next to her. As Beth and Stoltz walked toward the barn, the cameraman and his technician moved off to the side, starting to photograph everything without intruding.

Ken came out and said, "Shall we start inside?"

The barn smelled like a barn. Although the interior was scrupulously clean, there was a strong, rancid odor. The barn had just recently been subdivided by a new block wall. Tall wooden doors were closed between the halves, but Beth and the others could still hear noises from the other side.

"Rex is still a bit cantankerous," Ken told Beth softly.

The near half of the barn had six large stalls enclosed by metal rails and chain-link fencing. Three of the pens held

dragons that were identical but for size. One was twice as big as the others.

"The hatchling's getting our usual newborn examination," Ken explained. "These two"—he gestured at the smaller pair—"were born eight days ago. They weigh 150 pounds and stand 40 inches at the shoulder. Wingspan 15 feet, overall length 10." He moved down the line. "St. George here"—he pointed at the larger dragon—"is five weeks. Almost 300 pounds, 6 foot tall, 28 wingspan, 20 overall. We've clocked him at 34 miles an hour in level flight."

The dragons were green-gray with leathery hide, sharp claws and teeth. Yellow eyes tracked the intruders alertly. The teeth were occasionally bared around a siblant hiss. Stoltz didn't appear anxious to get close.

"You say they *do* breathe fire?" he asked.

"Yes, but they're safe now. No fuel." She walked right up to St. George's pen.

"Fuel?" Stoltz moved closer but stayed behind Beth, not that she would be much of a shield for his bulk if she was wrong. St. George stared at the producer and he felt, or imagined, fire in the dragon's eyes.

"Feed them a few kilos of sauerkraut or chili. You'll see." Beth barely held back a laugh. Around her babies she couldn't stay depressed for long. "They make fire the old-fashioned way, natural gas. A digestive short circuit. We thought they would need artificial ignition but—pure serendipity—they manage on their own."

"Manage? How?" Stoltz asked.

"When they feel a belch coming,

they grind their teeth. Exceptionally hard teeth. Spark, Whoosh.”

“It doesn’t harm them?”

“It hasn’t,” Beth said seriously. “But we don’t let them do it much and they always have water.” She wouldn’t take dangerous chances even with such ugly babies. “You’ll see. And you’ll see St. George fly.”

Stoltz backed away. The dragons *looked* perfect for his epics. “Come now, Dr. Morley,” he said, with less ice than before, “you say they fly, they breathe fire, they get huge. What’s this problem you’ve tried so hard not to tell me about?” His cigar had gone out some time before, but he hadn’t bothered to relight.

Beth looked at Stoltz, at Ken, at St. George, and back to Stoltz.

“I don’t care for fencing around myself.” A loud noise from the other half of the barn distracted her for a moment. Rex was still upset. “Shall we go outside and let Ken and the keepers get the dragons ready?”

As soon as Beth and Stoltz got outside, both took deep breaths of fresh air . . . then lit up fresh smokes.

“They *do* meet the letter of the contract specs,” Beth said. “But there’s a glitch that probably would have been covered if anyone had thought of it. They fly, they breathe fire, and they’ll get huge.”

“But?” Stoltz prompted when Beth hesitated. They were alone. The camera crew was still filming inside the barn.

Beth took a deep breath. “By the time they’re big enough to carry a sizable load, they’ll be too heavy to lift their own weight off the ground.”

“They only fly when they’re small?” The expected explosion.

“By seven months of age, they probably won’t be able to fly at all. Simple physics, I’m told. The lift/drag ratio becomes impossible. Something like that. No way organic muscles can manage. We went way over budget on research—which comes out of our end.”

“What’s the heaviest load they can fly with?” Despite the letdown, Stoltz had to ask.

“Based on our best simulations, they should be able to fly carrying 100 to 120 pounds at their peak. For maybe a month to six weeks.”

“Then it’s impossible.” Stoltz’s sorrow gave way to anger. “They’re useless, and I told you I won’t pay for something I can’t use.”

“And I told you,” Beth replied, “we’ve got it covered.”

“Impossible.”

“No, just very hard. Mostly”—her voice started to crack—“it’s hard to make myself offer the option. I hate to take risks with my children.” She walked away from Stoltz. “Especially this one.”

“Either they can fly with my actors or they can’t.”

“That depends on the actors,” Beth said.

“You want I should use children? Munchkins?”

“No. Listen, your big stars wouldn’t do their own flying anyway, would they? You use doubles, stunt people?”

“Of course.”

“Then, like I said, we’ve got it covered.”

“I thought we were through fencing.

Are you going to tell me your wild idea or do we go on playing silly games?"

"I'll show you," Beth said. Ken and Mark brought the two young dragons out of the barn on leashes and led them into the adjacent field. Two steel posts stood some 30 feet apart. The camera crew circled around, seeking the best angle. Beth's cameras weren't visible again. Wherever possible, Castle Frankenstein employed concealed observation points to avoid influencing the behavior of animals being studied.

"They were going to feed the dragons as soon as we came out," Beth told Stoltz, "and they've got more food out there, nice spicy fodder." The two young dragons started munching. Ken and Mark beat a speedy retreat. Stoltz fired up yet another ropy cigar. There was little breeze, so Beth was able to move out of the cloud, which drifted toward the barn.

One dragon gave a small burp. A short tongue of flame briefly appeared. Almost immediately, the other dragon produced a slightly longer flame. For five, six minutes, it was like a belching contest between teenage boys as the dragons spouted fire, drank, ate. Flared . . . and so forth.

"Not bad," Stoltz allowed, "if they can do it on cue."

"I'm sure your trainers will find a way," Beth said. "As they age, they get more distance. St. George can get 15 feet on a good belly-buster."

Stoltz nodded. "Distance isn't critical, if the other problem can be solved." He was skeptical, but Beth thought he wanted to believe, wanted a solution.

"You'll be able to judge that," she said. "While those two get the gas out

of their systems, we'll show you St. George flying." She made a covert signal, then said, "Keep your eyes on the top of the barn."

Stoltz leaned back with the cigar jutting out of his mouth. A small caw of delight, almost like the distant cry of a crow, sounded as leathery wings came into view over the barn. Stoltz made a similar noise.

"It flies!" he said, releasing a new cloud of smoke. "It really flies!"

Stoltz's camera crew was caught by surprise. The dragon was overhead before the two men knew. The cameraman nearly fell backwards trying to get his camera aimed, trying to track the new dragon.

"Look close." Beth's voice broke. She didn't want to watch, but she couldn't look away from the dragon—or the tiny figure on its back.

"There's someone riding it! How?" That was all Stoltz could say. The dragon climbed, passing over the watchers. The downbeat of its angular wings produced a noticeable breeze.

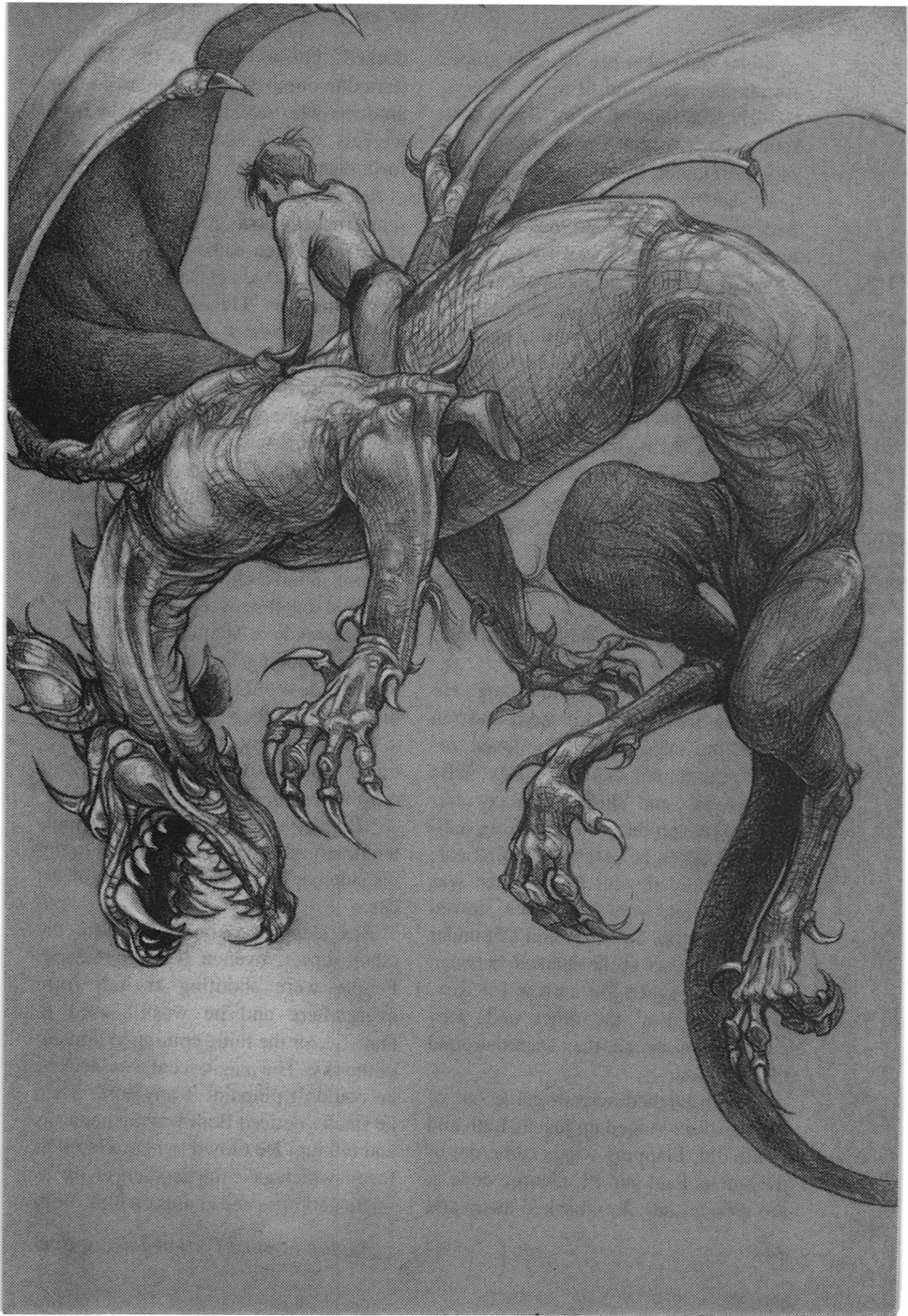
"My son the dragonrider," Beth said—painfully.

Stoltz coughed and dropped his cigar, not half-smoked, as he tried to keep dragon and rider in sight. "That's the dragon we saw?"

"St. George," Beth confirmed. The dragon climbed to 100 feet, moved through a tight figure eight, then went into a short dive that made Beth gasp.

"How old is he?" Stoltz asked, squinting for a better view.

"Only eight, but an adult," Beth said. With obvious bitterness, she added, "My doctoral dissertation, you might say."



Stoltz glanced at her while he groped for another cigar and lit it.

"There are six of them. I was host-mother for two, but I'm also Paul's biological mother, by at least two-thirds."

A sudden crashing sound from the barn made both turn and look. A growl became a roar, followed by the noise of wood being ripped like paper.

"Rex!" Beth said, realizing what was happening. She started toward the barn but stopped when the dinosaur appeared and bellowed—showing the full extension of his massive jaws. Beth saw the broken chain and wondered if anyone had been hurt inside.

Rex extended his head and sniffed the air. He looked at Beth and Stoltz, then started moving toward them. *Fast*. His head dipped, his tail came up to balance him.

"Get behind the cars," Beth told Stoltz. "I'll try to calm him."

Stoltz didn't ask questions. He clamped his cigar in his teeth and ran toward the line of cars. Beth moved forward and started talking to Rex, who ignored her and shifted to race after Stoltz. The producer was panting dangerously when he reached the first car, almost collided with it. His face was red. His cigar was gone. Rex slowed but didn't stop. Stoltz couldn't fit under any of the cars so he ducked between two, into a space too narrow for Rex, and cowered at the other end. Rex paused for a second, then started around the vehicles.

A high-pitched scream came out of the sky. Rex looked up just as Beth and Stoltz did. Flapping wings came out of the sun as Paul and St. George dove at the tyrannosaur. Rex backed away and

ducked, but as soon as St. George started to climb, Rex turned back to the producer who was stumbling away from the cars, too exhausted to run, looking for a place to hide.

Rex picked up speed. The dragon screeched and dove, giving Stoltz a little extra time. Men came out of the barn with ropes and chains, shouting to get Rex's attention. He looked their way, briefly, then went after Stoltz. The producer didn't try to understand, but the tyrannosaur was obviously after him, personally. And he had run as far as he could. There was little consolation in noting that his cameraman was getting all of this action, hiding at the corner of the barn, just the camera and half his body visible.

Beth shouted and waved her arms as she tried to get between Stoltz and Rex. The dragon dove again, screeching. Rex faltered, looking around in confusion. Reprieved, if only for a moment, Stoltz managed two deep breaths and coughed to clear his lungs, resigned to whatever might happen, knowing he couldn't outrun the terrible lizard.

"Lights, camera, action," he muttered, straightening up and trying to tug his suitcoat into some semblance of order.

Rex stepped to one side, then the other, upset, even a little frightened. People were shouting at him from everywhere and he wasn't used to that . . . or the thing coming at him out of the sky. The magic scent was weaker; he couldn't pinpoint it anymore. Then he finally noticed Beth waving her arms and talking. He turned to her, a familiar face—which gave the handlers an opening to get ropes and chains on him. With

a line held tight on either side, they turned Rex toward the barn. He didn't fight the steering. St. George continued to circle overhead, just low enough to keep Rex occupied.

Stoltz remained rooted, his fear slow to recede, hardly believing that he was safe. The monster was being led away in chains. Beth was moving toward him. The camera crew came out of hiding. Automatically, Stoltz reached for a cigar and got it lit despite badly-shaking hands. No cigar had *ever* tasted so wonderful. Stoltz took a deep drag and exhaled a thick cloud of smoke in relief.

Rex bellowed and tried to pull loose. *The magic scent!*

Beth looked from Rex to Stoltz, made the connection. "Put out that damn cigar!" she shouted, running to help control Rex. And console him.

Rex was back in his pen. Welders were erecting new barricades of heavy construction I-beams. After a detour to get Stoltz's suitcase from his rental car, Beth and her guest were in her office. Stoltz used the private bathroom to make repairs and change clothes. Beth used the time to try to assess—and find some way to minimize—the effects of the day's disasters.

—Stoltz's cameraman said he had it all on film. That was bad enough, but perhaps not the worst. As soon as Stoltz disappeared into the bathroom, Beth went out to instruct Jeanne. "Find out if that *Hollywould Today* team was here. And find out if anything of St. George could be seen down at the main gate." Brother Ed would love to have something big to interest the media . . . and draw students.

When Stoltz finished his toilet, Beth was back at her desk, smoking two cigarettes at once—one in each hand—she was so preoccupied.

"Thank you," Stoltz said meekly. He set his suitcase near the exit, then sat across the desk from Beth, just as she was stubbing out her two cigarettes and lighting perhaps her fiftieth of the day.

"Could I have one of those? I don't feel much like a cigar just now."

"Sure." Beth passed him a pack from her center drawer. While Stoltz was lighting up—his hands were still shaking—she opened a file drawer in the credenza. The drawer was full of cigarette cartons. She pulled one out and slid it to Stoltz. "That'll keep you going for a while," she said. "I get them free. Part of the pay-off for developing the safe tobacco and filters."

Stoltz nodded, his face tinged ashen gray.

"I'm sorry about all the trouble," Beth told him. "Rex is normally quite placid." Stoltz nodded again and Beth wondered that he hadn't started yelling about lawyers and lawsuits. Perhaps inevitably, Beth was lighting a cigarette when the door flew open and Paul ran in, wearing a grin that scarcely fit his diminutive face.

"Did I do good, Ma? Did I do good?" His voice was high-pitched and thin. His head barely reached the top of the desk.

Beth smiled. "You did real good." The impossible grin grew. "Do I get the job?" Beth looked to Stoltz, as anxious as her son for the answer to that.

"You get the job," Stoltz said, nodding weakly. He spoke softly, as if he

didn't trust his voice yet. "All six of you."

Paul shouted, "Yea, whoopee," and ran from the office. The door slammed behind him.

"A baby," Stoltz whispered, looking at the door.

"No, he *is* an adult," Beth said, trying to hide the sorrow that always came when she talked about Paul. "He reached puberty at five. He stopped growing at twenty-nine inches, except for that silly little moustache."

"Is he always that . . . exuberant?" Stoltz asked carefully.

"Usually. I know what you're getting at," she added defensively. "Paul is a genius for his size. All six of them are. Intelligence had to be one of the traits we bred for. They're all perfectly proportioned. That means a smaller than normal brain. Paul's as bright as, maybe, an above-average third grader."

Stoltz saw a tear running toward her mouth.

"An experiment that never should have been attempted," Beth said. Then she hesitated. Explaining about Paulie—something she had never tried with a stranger—would be difficult, and painful. But Stoltz *had* to know.

"Do you know what idealism is, Mr. Stoltz?"

He blinked, so startled by Beth's intensity that he wasn't even insulted by the implications. But the question was rhetorical. Beth didn't wait for a response.

"Do you know what idealism is when you get so focused on your goal that you lose sight of everything else? It's fanaticism. Blind fanaticism."

She stopped and lit a cigarette with

hands that were trembling almost as violently as Stoltz's had earlier.

"I was determined to be the woman to save the starving billions. I had dozens of 'brilliant' ideas. Paulie was one of them—Paulie and the five other babies." Beth got up and walked to the farthest corner of the office. She wiped at her eyes.

"An experiment," Beth said, her voice muffled. Stoltz turned in his chair. "That's all it was at first, just another experiment. I was twenty-two and all I could see was that I could make it possible for the world to support twice as many people even without new resources. All we needed were smaller people."

She turned and faced Stoltz. Somehow, tears had extinguished her cigarette. "You want to know what started it? A goddamn basketball game. Ken wanted to go to some basketball game and I said, 'Why pay all that money to see a bunch of freaks run up and down in their underwear.' An argument. I told Ken that seven-and-a-half foot tall people were as much freaks as two-foot tall giraffes would be. By the time we stopped fighting over that, I was thinking about tiny people—not dwarves or midgets, a new subspecies."

"How could any university approve such research?" Stoltz asked, unable to hold back the question.

"They didn't. The approved research was a theoretical consideration of the possibility backed with tests on lab animals—mice and rabbits." Beth came back to the desk for another cigarette.

"I had help, of course," she said. "Ken and two other grad students—girls who were as fanatic about the idea as

I was. Three host mothers, six children. Various donor parents—most of whom still don't know."

Stoltz didn't even blink through the recital. He could hardly react. All he could do was absorb the story.

"We all had easy pregnancies. I hardly showed even just before I gave birth. A private clinic. An obstetrician who knew just enough about the experiment to be prepared for complications.

"The experiment was a smashing success. Until they brought my two babies into my room so I could see them." Beth was crying freely now. "And Paulie was the most beautiful, *tiniest* baby I ever saw. My Son!"

Stoltz remained quiet for several minutes. Finally, very softly, he said, "I'm surprised I never heard about it."

Beth pulled a bunch of tissues from a drawer and mopped her tears, fighting to control her emotions.

"It was kept very quiet," she said. "Even now . . ." Beth shook her head and lit a cigarette, not noticing the one burning on the rim of the ashtray. "If it wasn't for the problem with your dragons, you wouldn't be hearing about him now. But Paul heard about our trouble and decided he wanted to be in the movies. His idea."

"He saved my life today."

"I guess I had no right to keep them sequestered so long," Beth said, starting to regain control. "Paul's father says I'm too protective." She shrugged. Memory of the arguments helped her concentrate on doing what she could to continue protecting the six. "I can't help that. I feel that way about all my babies. How much more when it's really my son?"

"I'll take good care of him," Stoltz promised. "All of them."

"They're still legally minors," Beth said. "The wrong publicity—*any* publicity perhaps—could destroy this place and get them put away in some kind of institution, wards of the State."

"It wouldn't do me much good either," Stoltz said, getting her message. "I might never get my pictures made." Both of them stood. "But my people all sign secrecy pledges."

"Again, I'm really sorry about your run-in with Rex today," Beth said, going around the desk.

Stoltz managed a lukewarm smile. "I'll probably use it in a movie. Someday." He stuffed the carton of cigarettes in his suitcase and zipped it. Beth opened the door and held out her hand.

"We'll get everything sorted out," she promised. "Your first six dragons will be ready for delivery in a month."

Stoltz nodded and reached out to shake. Then: "Ouch!" He yanked his hand away and brought it to his mouth. A trickle of blood was visible.

"Oh, no!" Beth said, anguished. She looked at her own hand. "I'm sorry. My ring got turned around. Jeanne, do you have a bandage handy?"

Stoltz inspected the tiny cut. "It's nothing," he said. "Today, it's nothing." He picked up his suitcase and—very quickly—left.

Jeanne chuckled softly.

Beth took off the ring that was gimmicked with a tiny syringe and set it on Jeanne's desk. "Get that to the lab so they can freeze it, fast," Beth said dully. She was too drained for any emotion yet.

"Right away," Jeanne said. "By the

way, the news team didn't get here until after you were back, so *they* didn't see anything. Apparently, neither did Brother Ed or any of his students. Or, if they did, they haven't said anything about it—and that's not likely." She put the needle ring in a small pill bottle, wrote the date on the label, then looked up. "What kind of code do you want on this?"

"I don't know," Beth said, putting her mind to the question. "If I was sure that Paulie's going to be okay working with him . . ." She shook her head, and after a long, frozen silence, laughed. "You know, one of these days we may sell Stoltz a slime monster or something made partly from his own genes." After a much less merry laugh, she added, "Oh well, we can always change the code later if he turns out to be a good guy."

She crossed to the window and looked down the yellow brick road toward the zoo. So much depended on Stoltz now. He was probably already into his interview with the *Hollywould Today* people.

"For now, just file it under 'Dragonshit.' "

Stoltz was gone with his camera crew. The *Hollywould Today* team was still around, though. After doing a short feature on the zoo and monster factory, they were giving Brother Ed a chance to parade his stuff and his students. That footage might be sold to a news department or two.

"You need me for anything else?" Jeanne asked from the doorway.

Beth shook her head. "No. See you in the morning."

Beth switched on her desk lamp. She dumped a fresh carton of cigarettes into the center drawer—ready for the morrow—then turned her attention to the Stoker specs for the last time. The note she scribbled was short. "Tyler, make our apologies, but I don't want to bid on this. We've got enough bats around here now." She signed the note, clipped it to the specs and tossed them toward the far left corner of the desk. Then she opened her "In Basket" drawer and sighed. She needed another four to six hours to catch up but she had no intention of working late. She was still too drained.

"One last cigarette," she mumbled, lighting up. Time to head home for a hot shower, a cold drink or three, and a light dinner. She sucked in smoke and let her eyes slide closed.

A loud "Boo!" from the doorway startled her, though she knew it had to be Ken even before her eyes popped open.

"That's not funny," she said, getting up.

"Okay. You want a ride home?"

"Let's walk." Ken nodded, accepting the invitation. They kissed in the doorway.

Walking down the yellow brick road, Beth finally read some of Brother Ed's new signs. "ABOMINATION" and "BLASPHEMY" were old standards, but there were also new ones like "SCIENCE IS THE WHORE OF THE DEVIL" and "BEHOLD THE EATER OF SOULS."

Brother Ed was still carrying on for the camera, ranting in rare form. For once, Beth listened carefully to his spiel, but there was nothing about St.

George, nothing that might indicate that Brother Ed had seen Paul.

“Goodnight, Dr. Morley, Dr. Fischer,” the Igor at the gate said.

Beth nodded and Ken waved.

Then Brother Ed spotted them.

“There *she* is,” he shouted, “there’s the Eater of Souls in the flesh, daring to trespass on God’s holy ground, creating these abominations before the Lord.”

Ken started toward Brother Ed, quite willing to give the revivalist a chance to meet his Maker, but Beth held him back. With difficulty.

“You’ve got that wrong, Brother Ed,” Beth said. The camera switched to her. “You’re the Eater of Souls, not me, selling your phony get rich schemes to all these suckers.”

That hit Brother Ed where it hurt, but he was too smart an operator to let himself be provoked into an unseemly re-

sponse in front of a news camera and tuition-paying students.

“I pray for you,” he said. “I pray the Lord will have mercy on your sinning soul.”

“A tiny favor, Brother Ed,” Beth asked in a *so-sweet* voice that would alert anyone who knew her.

“Do you see that small barn over there?” She pointed toward the near side of the zoo. Brother Ed looked, then nodded.

“When you’re doing your preaching out here, or whatever it is, would you aim your bullhorn that way? You see, we’re training a talking jackass and I want to be sure we get the voice just right.”

Before Brother Ed could react or the *Hollywood Today* reporter could ask any questions, Beth tugged at Ken’s sleeve and they hurried down the road for home. Their laughter soothed a lot of pain. ■

● Despite the drastic changes all around us, it is remarkable how rare is the sense of newness. Perhaps to feel that something is really new we have first to expect it. It is the realization of the expected that strikes us as the birth of the new.

Eric Hoffer

(Submitted by G. Harry Stine)

The Alternate View

CULTURAL DIFFERENCES

G. Harry Stine

Be forewarned: I intend herein to report evidence that supports an alternate view. That's part of the purpose of this department.

I'm not as well traveled as many authors, but I've been exposed to people from other cultures and countries for over forty years. I've long known in my guts that the people of Mexico, France, Germany, Japan, the slavic countries of eastern Europe, and the people of the Soviet Union are *different* from us Americans.

But the prevailing view is pervasive: "All people are the same; they're all human beings who share the same common heritage; it's impossible to discern any difference between the brain of an American, a Frenchman, a German, a Russian, a Chinese, a Malay, etc." We're told that if we could only get to *know* people in another culture, we'd realize how alike we all are.

Anyone who has done business on an international basis knows full well that this viewpoint is incorrect. What flies in New York bombs in Tokyo or flops in Frankfurt.

The awful truth is this: The more you get to know people from another culture, the more you realize how *different*

they are. We're deceived by the similarities.

I enjoy reading anthropology because the anthropologists study the different human cultures, past and present. (In science fiction, we authors attempt to extrapolate anthropology into the future, usually doing a very poor job of it. One obvious exception, of course, is Chad Oliver who *is* an anthropologist!) Lately, I've been reading some of Dr. Edward T. Hall's works—*The Silent Language*, *The Hidden Dimension*, and *The Dance of Life: The Other Dimensions of Time*. Mr. Hall taught at Bennington College and is professor emeritus of anthropology at Northwestern University. Like myself, he grew up in the American West, where he worked for the government on Indian reservations and learned firsthand about cultural differences. After getting his Ph.D. at Columbia, he spent some time on the island of Truk helping the U.S. Navy and the Trukese understand one another. He's also worked extensively for the government designing programs for the selection and training of Americans working overseas. He now lives in Santa Fe, which is certainly an amalgamation of Indian, Spanish, and Anglo cultures. With his wife Mildred, he continues to work on identifying the subtle, often hidden differences in thinking and communication between cultures.

For example, it took him 30 years to get the State Department to believe what he had to say about conversing with an Arab. Most Americans feel decidedly uncomfortable talking to an Arab because he likes to stand close enough to see your eyes and feel your breath—regardless of what either of you have been eating.

There is also the matter of what Hall calls the "information context" of correspondence or conversation.

The French are a "high-context culture" where a person requires very little information to understand what you're talking about; he already understands your message because of other information he's received through a wide variety of information networks. The French assume that other people they're dealing with are similarly well grounded and they don't feel it necessary to provide much information.

The Germans, on the other hand, are a "low-context culture" and require detailed information about everything under discussion, sometimes demanding data going back to the origin of the problem in 1347 A.D. They expect others not to be as well versed as they are and therefore feel a need to communicate all the information they have, often in a highly pedantic fashion.

The German gives the impression of "talking down" to the Frenchman who feels insulted at being told things he already knows. The German is irritated with the Frenchman for not telling him enough. Is it any wonder the French and the Germans haven't gotten along very well together historically?

From a cultural viewpoint, irritation is a signal that someone has broken an unspoken rule of conduct. These rules are decidedly difficult to learn without living in a culture because what we call "culture" is a huge mosaic of unspoken rules and assumptions which amount to a hidden code. But even when you're familiar with the hidden code of another culture, your own cultural background

usually means you're unconsciously going to break the rules.

This falls right in tune with my article, "How To Get Along With An Extraterrestrial . . . Or Your Neighbor," which appeared in the February, 1980 issue and dealt with the new field of metalaw. It's especially congruent with the rational restatement of the Golden Rule, Haley's First Canon of Metalaw: "Do unto others as they would have you do unto them." Obviously, the Golden Rule is disastrous even here on Earth today; it could be deadly when dealing with a real alien culture! (One hopes that it doesn't turn out to be deadly here on Earth.)

Another aspect of cultural difference is how people say "no" in different cultures. A Japanese cannot say no to a request because it's impolite; when he says, "I will try my best," he really means, "I absolutely cannot do it." Furthermore, when he says "yes," he doesn't always mean it; he's saying that he hears you, or he acknowledges what you're saying, but not that he agrees or will do something. Thus, when a Japanese-American deal falls through, the American will conclude that the Japanese is unreliable. Actually, the word of a Japanese businessman is his bond and he has a high sense of personal honor. When a Japanese strikes a deal, he's discussed it with his team, reached a consensus, understands every detail of what is being agreed to, is prepared to start at once, and takes personal responsibility for it. The American tends to agree in principle, leave the details to subordinates or experts, and make changes as the job progresses; both Americans and Germans tend to pass

the buck and give excuses, which the Japanese cannot understand. (Any wonder why the Japanese have dominated the automobile industry lately?) The "ugly American" is a real image which arises from the American attitude, "Let 'em do it our way or not at all!" Lately, this has been perceived by many American business people as being very, very risky in today's world where we Americans are beginning to have a new respect for cultural differences and thus become more flexible. Hopefully, other people from other cultures will do the same.

Another aspect of cultural differences is the perception of time. This is exemplified in the old Peggy Lee song entitled "Mañana" dating from the 1940s. Everyone takes his own cultural time system for granted and projects it into other cultures, and this is another cause for stress and irritation between cultures. Dr. Hall believes that this time difference is the critical difference between cultures and that two different time systems exist, "monochronic" and "polychronic."

Anglo-American culture is monochronic. We follow a schedule because wasted time is wasted money. We believe time can be saved or squandered. Promptness is important. If you're late for an appointment, you've committed a grave offense. In addition, the degree of acceptable tardiness depends on the culture. In New York City, it's acceptable to be as much as 30 minutes late. In Tokyo, if you're going to be one minute late, you'd better call ahead, apologize, and explain why in detail.

Latin American and Middle Eastern cultures are polychronic. People do many things at once without scheduling, and personal relationships come before

schedules. If you have a business appointment at 2:00 P.M. in Cairo, you might end up waiting all afternoon while the Egyptian takes care of some family matter or handles a sudden crisis with a favored customer. People in polychronic cultures think nothing of waiting even as long as a week to see someone. They use modern telecommunications quite differently. As for running the trains on time, that's a very difficult thing to accomplish in a polychronic culture. It's also very difficult in these cultures to keep modern technology working, so they hire monochronic Americans or English to do it and then frustrate the hell out of them when the necessary part can't be obtained *right now*.

No given culture is purely monochronic or polychronic but usually a unique mixture of the two.

The two time systems don't mix, and people who've grown up with one find it difficult if not impossible to change.

Dr. Hall believes that we must learn to understand and thus live with cultural differences rather than try to change. He's right. Doing this does not mean becoming a "one-worlder" or a left-wing liberal—it's being done mostly now by very right-wing business people—but simply being practical about the world as it exists.

In the present and the future, we must discard the dangerous delusion that "all people are alike." They aren't. Authors who write about multi-cultural space crews and colonists had better understand this; in space, cultural diversity may become even greater. And it won't change here on Earth for centuries. (It will change, but slowly, slowly.) Business people have already learned this.

It's also important that it be known and understood by diplomats, politicians, and military commanders. One would like to hope that the men with the red

telephones are continually asking the question, "What were the Soviets *really* thinking when they made that last remark?" ■

The following table adapted from Dr. Hall's book, *Differences: How To Communicate with the Germans*, summarizes the contrasts between monochronic and polychronic cultures.

Monochronic Cultures	Polychronic Cultures
Do one thing at a time	Do many things at once
Involved with doing the job	Involved with family, friends, customers, relationships
Concentrate on the job	Highly distractable
Take deadlines, schedules seriously	Take time commitments lightly
Follow plans	Change plans
Concerned about not disturbing others follow rules of privacy and consideration	Only concerned with close relations, friends, close business associates
Have private offices (managers and employees separated)	Have public spaces (managers and employees sharing space and information)
Need information; low context	Already have information; high context
Have great respect for private property and seldom borrow or lend things	Always borrowing and lending
Emphasize promptness	Almost never on time
Deal with short-term relationships	Build lifetime relationships





FLASHBATTLES

W. T. Quick

Decisions about some situations can
be painfully difficult even if your
knowledge of them is purely theoretical.
But when you've actually
been there . . .

“First you have to go in the Box,” they told him. “It’s the law. . . .”

- click -

Something soft, warm and wet slapped him in the face and Corporal O’Hara screamed.

It was a rag of bloody flesh. Three feet in front of him, Gunnar Larsen danced a grisly pavane as pulsed laser beams methodically sliced him into ragged shreds. Around the edge of the clearing a troupe of capuchin monkeys chattered and shrieked, their black and silver plumage a sharp knife of color against trees so thick and green they seemed painted and unreal.

“Overhead, incoming incoming—”

O’Hara recognized Bobby Washington’s soft Arkansas drawl, jumped and twisted with fear into a wired-up whine that cut like a scalpel. Larsen finally—mercifully—collapsed and O’Hara stared at his corpse, at the intricate web of smoking gashes crisscrossing his jungle camos. Larsen’s left foot, its boot torn away, jittered and hopped in some bizarre post-death reflex.

His vertebrae slowly stretched beneath the weight of his batpack. Sweat burned into his eyes. He smelled new earth and cooked meat. Now in the distance chirped a terrifying metallic sound; *wheep-wheep, wheep-wheep*. Taut skin below his eyes twitched as he recognized the familiar chopped cough of jet-copters, a covey of Matsushita Dragonfly gun platforms.

Swallowing and swallowing again, hoping he wouldn’t puke and fill up his helmet faceplate, O’Hara crawled forward over Larsen’s body, rejecting quickly the notion that the corpse might

provide some protection from the gunships. A narrow stream barred his path to the edge of the trees. He bellied down into the shallow water and tasted the tart copper flavor of diluted blood. The rhythmic beat of rotors was almost overhead. He knew another instant would bring them above the clearing, where laser-traced HE rounds would churn everything below into a bowl of fire.

Oh God I let Gunnar die. Oh God—

No good. He knew it wasn’t true, but on another, deeper level it was as *factual* as death or guilt always is, grim, unforgiving and eternal. Bye-bye, he thought. Hello, hello.

He elbowed up the slope on the other side of the stream, saw ghostly manikin shapes flitting in the jungle beyond, and whipped up his Uzi47 with one hand. Its cumbersome stock had been designed for two-handed use, but he’d taught himself a different way. It was one of the reasons he was still alive.

Put the fucking designers *out here*, he thought savagely.

He laid down a wall of flame along the edge of the trees, watched gummy sap begin to bubble on the smooth brown bark, and held it until a thick pall of smoke shielded his passage into the shadows beneath branches charred like insect bones.

The flight of Dragonflies roared over the clearing, downdrafts from their triple rotors rippling across the yellowed grass in ever-widening circular patterns. O’Hara saw Larsen’s helmet roll slowly across the scorched earth. Gunnar’s eyes, white and empty as boiled eggs, stared sightlessly at the crowded blue sky. A cloud of HE bounced Larsen up, simple as a poker chip, twisted him,

peeled off his face, and dissolved him forever.

O'Hara flipped his helmet shield and vomited in great, heaving gouts. But he never let go of the Uzi, and he never closed his eyes.

What had the Padre said? "Out here, we're *all* pacifists . . ."

- click -

Commander O'Hara caught the scramble call at 0430 hours and hit the flight deck running three minutes later. His mouth tasted like a case of gin had died there.

"Yo, Wally."

His crew chief gave him a hurried thumbs-up and slapped the top of his helmet. Already the canopy of O'Hara's blunt-nosed F-23 was swinging slowly shut. For a moment he had the usual flickering premonition—the top of a coffin coming down. He ignored the feeling. True or not, there wasn't anything he could do about it. Pros knew better; you got through the mission to get through the day. That was all.

He flipped down the black globe of his helmet and blinked up a display. All systems were go. Carefully he raised his right hand and waved once.

The slingshot threw him into the sky as the afterburners kicked him in the ass. He went straight up, his gut twisting beneath *g*-force, wondering if this would be the time they got him.

Charley McNamara and Ed Hughes took up station off each wingtip. The sky screamed beyond his canopy; down below, the U.S.S. Rickover disgorged flight after flight of shrieking aircraft, like a hornet's nest poked with sudden sticks.

He smelled the rancid odor of smoking oil and checked his displays. Everything was a-okay. As he thought the antique word he grinned. Those right-stuff flyboys would have liked the F-23 just fine.

Coming up out of the shadows of the dayline was a thicker wedge of green. It would be a short mission, some drop-at-will stuff supporting the doggies on the ground. He brought his flight straight down out of the sun, passed the thin line of white breakers at just under Mach one and blew for village tango foxtrot.

Target acquisition showed the infrared signatures of morning cookfires. He shook his head sadly. If you sold everything in that village, it wouldn't buy the coffee maker in the officer's mess back on the Rickety. But somebody said village tango foxtrot—he wondered what its real name was—had pulled the lucky number today. It wasn't his job to make judgments. He was a trigger. He was a weapon.

The first pass was conventional HE, thousand-pounders, and he caught a quick glimpse of straw shanties rising from the brown earth. On the trip around he flipped two rockets into the flaming cauldron. It was enough. Analysts would want pictures, though. He threw the F-23 across the burning remnants of village tango foxtrot just above tree top level, idly looking down while the highspeed cameras did their work.

It was fast, the scene that caught just at the corner of his vision. He had to think about it as he swept over the beach at ten thousand feet, but finally he had it. A boy, nine, maybe ten years old, with an automatic rifle in one hand and an infant cradled in the other. The baby's face had been a red mask. Tiny,

acid-filled bubbles began to percolate in his stomach.

He didn't know how much more he could take. Could he have seen the boy's eyes? Was he just imagining the darkness there? Could he have *seen*?

He rather suspected the answer was yes. He hoped the bottle from the night before wasn't empty. He was tired. When he got back to the Rickety, he would need breakfast. Need it bad.

- click -

It must have been subliminal. Perhaps a part of O'Hara heard the sirens before his brain truly registered their thin, distant wailing. Maybe that moment was frozen at the base of his spine, a more primitive place, chilled in Neanderthal colors and shapes that needed no higher intelligence for comprehension.

Late afternoon sun beat quietly through the windows of his dining room, illuminating a billion individual floating golden dust motes. He marked the weave of the table cloth; *fleurs de lis*, each raised surface tarnished faintly amber against a scrubbed white background.

His china seemed unutterably precious, the familiar silverware more valuable than rubies. On his plate a pork chop nuzzled against a narrow ridge of mashed potatoes. The piece of meat made him feel sad and ridiculous at the same time. He raised his eyes.

She met his gaze, two thin lines slicing suddenly down between her eyebrows.

It's already too late, he wanted to say, but nothing came out. She frowned. "What—?"

He nodded. "We have to go to the basement."

"Downstairs?"

He forced himself to nod again. "Yes, down to the basement." He stood up and reached across the table and took her hand above the table cloth, the china, the silver, the pork chop. Touched her fingers in the dancing afternoon dustmotes.

In darkness they held each other and listened to the rising scream of sirens.

"It's too late, but I love you. It's my fault," he whispered into her ear, feeling his lips graze the complicated bits of cartilage. He wanted her—it was important—that she *understand*.

"Hush," she said. "I know. Now, hold me please . . ."

Light bloomed. Too long a moment later his brain began to boil.

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- click click clickclickclick -

The Box looked like a sinister amalgam of ancient Amana refrigerator and state of the art coffin. They opened its lid and sat him up and disconnected a length of shining crystalline optical fiber from the socket at the nape of his neck. One of the technicians reached down and gently wiped the tears from his face with a white handkerchief.

"You're okay," he said softly. "You'll be okay. It's only dreams." Then, because the tech believed himself a compassionate man, he leaned over and wiped away the new tears.

At a press conference following his swearing in ceremony, UPI asked a question and President O'Hara answered, "War? There will be no war. Not in my administration."

He smiled the famous smile and nobody thought he seemed haunted at all.

the reference library

By Tom Easton

- Death Is a Lonely Business**, Ray Bradbury, Bantam, \$3.95, 216 pp.
- When Gravity Fails**, George Alec Effinger, Arbor House, \$16.95, 290 pp.
- Yarrow**, Charles de Lint, Ace, \$2.95, 245 pp.
- The Sun, the Moon, and the Stars**, Steven Brust, Ace, \$16.95, 224 pp.
- Chanur's Homecoming**, C.J. Cherryh, DAW, \$3.95, 398 pp.
- M.Y.T.H. Inc. Link**, Robert Asprin, Donning, \$7.95, 151 + x pp.
- Fandom Harvest**, Terry Carr, Laissez Faire Produktion AB (Rasundavagen 129, S-171 30 Solna, Sweden), \$16.00 (+ \$2 for postage and packing; make checks payable to John-Henri Holmberg), 191 pp.
- Wild Cards II: Aces High**, George R. R. Martin, ed., Bantam, \$3.95, 416 pp.
- Tales from the Planet Earth**, "created by" Frederik Pohl and Elizabeth Anne Hull, St. Martin's, \$15.95, 268 pp.

Ray Bradbury is a legend in the fields of science fiction and fantasy. He began writing in the days of penny-a-word pulp, but he, almost alone among SF writers, proved able to move into the richer territory of the slick magazines and find fame and wealth. His secret was a keen sense of what thrills the human soul, a rare warmth and sympathy for his fellow beings, an ear for deft (if strained) phrasings such as "the limousine swerved in one boa constrictor glide away from the curb," and a sentimentality that always teetered on the razor edge of sloppy sentimentalism.

I suspect that, like many writers, Bradbury achieved his marvels with the aid of a little notebook. Bound in black plastic or leather, it fits neatly in the hip pocket of the beginning writer's jeans or the breast pocket of the mature, successful writer's sports coat. In it, whatever his age or condition, the writer records, as they occur to him, story ideas, nifty juxtapositions of words and concepts, and observations of character

on the street or at a party or in a dream. And then, when he wants material for a story, he flips through the recorded pages, finds tidbits he likes, and writes.

What happens later in the writer's life? He has accumulated all these little notebooks, and he has never used most of the goodies in them. He couldn't! There are too many of them, and most never fitted any yarn he was working on. Besides, no story can stand more than so many cute touches per page.

Or can it? The writer detects a challenge: He took the best ore from those old notebooks when they weren't so old. What is left is tailings, poorer ore, but still containing the golden metal his readers love. Can he, maybe, use everything he never before found use for, all the witty comments on world and life and fate, all the quirky characters and doings, all the deft (if strained) descriptions, and use them all in a single novel? Of course he can, and he does.

I may be wrong. I often am. But this is a view that Bradbury's 1985 novel, **Death Is a Lonely Business**, now out in paperback, forces upon me. It is so rich in cute items like that snaky limousine that it is absolutely insufferable! The effect is as if Bradbury had followed only the first half of the advice his unnamed protagonist offers for success as a writer: throw up into your typewriter every morning, and clean up at noon.

That protagonist, of course, is Bradbury himself, a young writer struggling in a shabby apartment in a decaying Venice, California. He finds a corpse in a half-submerged lion cage, and as he stumbles around town, he learns of an apparent plot against the town's neglected misfits: The incompetent barber, the fat soprano who never leaves her tenement, the ex-movie star, the . . . Only the competent are safe—Bradbury,

whose night terrors face him off against the fame and fortune that await, and Crumley, the literate cop who has an unfinished novel in the bottom drawer of his desk.

It is the novel's author who earns its coverage here. The book is a detective story, not SF or fantasy, and it is not by itself particularly noteworthy. A short story, at most a novelette, would have handled the thin plot entirely adequately. The novel fattens up only with the emptying forth of those notebooks I mentioned, and then it becomes endlessly irritating.

But, but, there is something else there. Bradbury's journey into his notebooks is also a journey into his past, an examination of his origins and the alternatives that once faced him. Did he ever consider becoming a cop? Is Crumley Bradbury's personal vision—or nightmare—of alternate, frustrated reality? Was he, for a time, stuck on operatic music, here embodied in the fat Fannie? Was he, as he intimates here, a fan of old movies?

The answers surely exist in the texts of interviews, in the introductions and head notes of his story collections, in biographies, in . . . but I am relying here only on *Death Is a Lonely Business*. If you do the same, you too will find enjoyment in these pages. If you fail to read in this spirit, if you fail to seek the author's nostalgic self-revelations, then you will be sorely disappointed.

George Alec Effinger has a varied and highly original voice. He can write the ambitious *Wolves of Memory*. He can write the absurdist *Nick and Bird of Time*. And he can write . . . Well, what is his latest, **When Gravity Fails?**

It's not absurd at all. Nor is it ambitious, or not as ambitious as *Wolves*.

It is also less original than one might expect, for it is Effinger's bid to join the cyberpunks. *When Gravity Fails* is a gritty, action-packed, tale of underworldly murder and intrigue, but we have to see it as derivative.

Effinger's cyberpunk technology is a little different. In essence, he treats the human brain like the central processing unit of a computer. Most of his characters have sockets into which they can "chip" moddies (personality programs) and daddies (add-on abilities such as languages). In the dens and alleys of the Budareen, the red-light district of a decadent Arabian city, you can find prostitutes who can be any movie star you like; they may or may not be female, or originally female, or hetero, or homo. The human form has become as labile as the human mind.

Effinger's hero is Marid Audran, a hustler who has so far refused to be wired for moddies and daddies. But the story opens when a stranger wearing a James Bond moddy shoots the low-level diplomat who is about to hire Marid to find his son. Soon more are dead, some gruesomely. Clues mount up, the reader senses nasty forces moving behind the scenes, and Marid finds himself enlisted by the local underworld kingpin, Friedlander Bey, and "encouraged" to get wired.

As a nice touch of homage, Effinger has Marid conceive the idea of trying the moddy of a fictional master detective. But gravity fails, after all, and the Earth-tugged fatty, Nero Wolfe, is no help. In the end, it is tooth and nail against the nastiest nasties you could hope not to meet. Marid would do much better to try a Travis McGee, or a Mike Hammer, or a Saint. But he does not; Marid must take his lumps *à la* Archie Goodwin, though he does learn something of human fickleness, rather *à la*

McGee (shed a tear, for there will be no more McGees; John D. MacDonald is dead).

Charles de Lint's **Yarrow** is a tasty item about a Canadian writer, Caitlin Midhir, and a psychic vampire who feeds on dreams and finds hers especially delicious, but though this provides the tale's plot, discussing the book solely in terms of Cat's tale would miss the point. The book is still more "about" the wellsprings of fantasy, writing, and writer's block, and although de Lint disclaims any personal connection between himself and the story—except the obvious—one is tempted to draw certain psychological parallels.

Only psychological parallels? Well, we certainly can't get literal, for Cat is a loner who draws on her dreams for the raw material of her fictions. She has dreamed of an Eire-like land of faery since childhood, and in her dreams there is a storyteller who shares his stock in trade with her. But a day comes when she dreams no more; nor, then, can she write a word worth keeping, and she despairs.

De Lint reveals early on that Cat's is no psychological block. There is, in her town of Ottawa, a man who has, since the days of Greece, fed only on dreams. Those of common people nourish him, especially when he drains them of their whole souls. Those of creative people—strong dreamers, true dreamers like Cat—are his caviar; he sips, savoring, relishing, and they suffer nothing, except the loss of their creativity. Eventually, the demon decides to binge, and his favorites too lose their souls and lives.

Is there any defense? Ancient shamans knew how to chase the demon off, but the modern world is ignorant. Cat despairs. Eventually she learns that the

vampire not only steals her dreams but despoils the land of their origin—her mentor is dead!—and finds unsuspected friends and strengths. Will she be able to save her soul, her creativity, her sanity? Read the book, and find out.

Better yet, let me slip into my schoolmasterish mode to say: Read the book in conjunction with George Zebrowski's "The Idea Trap" in *Universe 16*. Then ask yourself to what extent de Lint and Zebrowski are discussing the same thing and share the same philosophy. Is one an optimist and one a pessimist? One a believer in open systems and one in closed systems? Which?

The Armadillo Press is a New York book producer or packager whose mission is to bring classic fairy tales "back to an adult audience with original novels by acclaimed fantasy and horror writers—a growing library retelling the most beloved stories of the world in interesting and often startling new ways." The first of the series that I've seen is **The Sun, the Moon, and the Stars**, by Steven Brust, and it is indeed interesting.

It is in fact far more interesting than I had expected. The fairy tale is there, but it plays a supporting role, paralleling and throwing into bold relief many elements of the primary tale. The latter is a consideration of the nature of art and creativity at a Chicago studio set up by several painters and drawers after their graduation from art school. Their plan was to take a whack at success for two years. Now the years are three, and success has proven elusive. Should they attempt a show? Can they afford one? Must they get *jobs*, of all things? Narrator Greg submerges in the creation of a vast and ominous painting while events conspire to teach him a little humility; in the fairy tale, the Gypsy

Csuscari must find the sun, moon, and stars, kill dragons, overcome the lure of commercial employment, and also learn humility.

Despite the fairy tale and despite the publisher, and even though I use both to justify covering *Sun, Moon, and Stars* here, the book is neither SF nor fantasy. What it is, is art, given depth by unlikely apposition and mystery by the use of the names of paintings as section heads. And it works very nicely.

The series is done. It began with *The Pride of Chanur*, continued with *Chanur's Venture* and *The Kif Strike Back*. And now we have **Chanur's Homecoming**, in which C. J. Cherryh finally draws together the tangled threads of interspecies intrigue in a distant sector of the galaxy. The plots and counterplots which many readers have found baffling become as clear as anything in human political psychology, once Cherryh makes clear that the mahendo'sat and kif have essentially alien psychologies and sociologies. And as we realize this, we also realize that Cherryh has created perhaps the most convincing aliens in SF history. I don't mean the lion-like hani, for they are essentially human, despite the primacy of their females and the pride-like social structure on their world of Anuurn, designed to serve as a foil for the human reader. Nor do I mean the mahendo'sat, for they too are human, in the machiavellian vein. But the kif, ah, the kif—pure, murderous predator, loyal only to the moment, but in a way that indeed might support a technical civilization. Are there humans like this? Yes, but we call them sociopaths and lock them up or shoot them; we do not consider that their thought processes could have any validity, under any circumstances, and it is very much to Cherryh's credit that she

had been able to see past the human prejudices I presume she shares with the rest of us.

The series began when Pyanfar Chanur let a lone human, Tully, take refuge in her ship and defied the kif who wanted him back for torture and interrogation about his species. The mahendo'sat came to her aid, the kif kidnapped Tully and a Chanur crew-woman, Chanur got them back. The price for her gains was playing pawn for both the kif and the mahendo'sat. As *Homecoming* opens, the mahendo'sat are out of action, with the only chieftain in the neighborhood a kif prisoner. Chanur manages to get him free, but only on the condition that she keep him as her prisoner. She is now a kif vassal. She will obey the kif, on threat of the immediate destruction of Anuurn and the extinction of her species.

Like hell she will. She promptly proves herself to be a Personage, endowed with the charisma that rules both kif and mahendo'sat, and enlists portions of every species in sight under her banner. In the end . . . I won't say, except to add that Tully's conspecifics still don't get out of the wings, and that, if you can tolerate the tangled web Cheryh loves to weave, you'll love her tale.

Robert Asprin is making quite a thing out of Skeeve and Aahz and the rest of that myth-begotten crew. Six novels—from *Another Fine Myth* to *Little Myth Marker*—and two “graphic novels.” And now Donning has given him a contract for six more Skeeve novels, all in one swell foop, and the first is **M.Y.T.H. Inc. Link**.

Says Asprin: “In this volume readers get a chance to see the Myth universe through eyes other than those belonging

to the central character. . . . In the upcoming volumes, . . . the Skeeve-narrated volumes will have the regular ‘Myth’ titles, and those from other viewpoints will be designated by the ‘M.Y.T.H. Inc.’ label. This particular volume has sections of both, hence the ‘Link’ between old and new formats. Get it?”

Got it, guy. Like a virus. I loved the first few of these novels. They were done for love and fun, and they showed it. Now Asprin and Donning have whiffed the scents of fame and money, and that shows too. Asprin is trying to grow Skeeve up and turn the incorporated (the “Inc.,” get it?) myth crew into a titan of Deveelish commerce, and he has to strain to make it work. This volume revisits a scene or two from past volumes and flogs a couple of character jokes—the gangster with an MBA, the couth troll—to death. The imagination flags.

Things get interesting only at the end, when Aahz says the hell with it—things are getting just a bit *too* crass around the office—and goes home to Perv. Skeeve will go chase him down in a future volume, while the rest of the M.Y.T.H. crew takes off to settle Queen Hemlock's hash. I wish Asprin had gone directly to these tales, leaving all the “Link” business to a footnote.

Skip this one. It's the “Myth Step” I expected several volumes ago.

We knew Terry Carr as an anthologist (*e.g.*, *Universe*) and editor (*e.g.*, the *Ace Specials*), and even as an SF writer. But he was also an SF fan—a BNF, in fact—and had been an active fan writer

ever since he was a pup almost forty years ago. This much you know if you are addicted to fanzines, but many of us are not so addicted, and this is news to us.

What kind of fan writer was Terry Carr? Try **Fandom Harvest**, a collection of columns, articles, and editorials published by John-Henri Holmberg, whose own fannish activities—and (he claims) his reformation of Swedish fandom—were inspired by the discovery of a moldy stack of Carr's and others' fanzines. The book is well produced, though it does have a distressing number of typos, and enchantingly illustrated by Grant Canfield's cartoons. The textual contents, selected by Carr, include a certain amount of juvenilia, but even that is remarkably deft. And all reveal the workings of a delightful mind and a joyful fandom, with a happy sprinkling of legends such as the one about the Hero with wings.

If that fandom sounds a lot like a constant string of college bull sessions, well, so be it. Those were fun days, in SF and out of it, and I congratulate all who manage to make them last into more "mature" years.

Like me, you probably grew up with superheroes comics. Eventually, they began to seem too simple, even in their modern incarnations as "graphic novels" (e.g., the Batman extravaganza I covered recently), but you continued to crave heroes and villains who gained strange powers from cosmic accidents, a realm where the good and the true *are* the beautiful and where justice reigns, a world of wish-fulfillment where

everything always turns out for the best. Perhaps that is why you became SF fans. Certainly, it is why you enjoyed *Wild Cards*, the collective novel in which George R. R. Martin and his good buddies recreated our heroes with the aid of an alien virus and put them up against the real world to grand effect.

It is also why you will be delighted to hear that **Wild Cards II: Aces High** is now out, and that it is an excellent tale that hangs together pretty well, considering its collective nature. This one is not a tale of origins, nor of McCarthyite intolerance for the different; rather, it hales us back to those comic books of yore with evil Egyptian Masons who are working to bring to Earth the Swarm, a ravaging destroyer out of Lovecraft; the Swarm itself and its awful depredations; and the fight of the aces and jokers against disaster.

Martin's frame story concerns the activities—observing all, and even taking part at times—of one Jube, the Walrus, an alien who is collecting data for distant masters (he reminds me so strongly of the "alien publisher" of that excellent new magazine, *Aboriginal SF*, that I suspect Martin of using one creation twice). This device does a great deal to unify the book, for the individual stories by Zelazny, Williams, Snodgrass, Shiner, Milan, Cadigan, Miller, and Martin necessarily track the threat and the fight for life and freedom in snapshots. Still, the snapshots are all from a single family picnic, and there is a good deal of unity even without the frame. The writers put plenty of thought into coordinating their efforts.

Who wrote the best story here? Martin's "Winter's Chill" is remarkably

evocative of loneliness and the power of a shell. Walter Jon Williams's "Unto the Sixth Generation" is a nice takeoff on the Frankenstein story. But I liked best John J. Miller's "Half Past Dead," whose zen archer hero owes nothing to the wild card virus—he is, quite simply, super.

The most interesting—if arguably not the most successful—item of the month may be **Tales from the Planet Earth**, "created by" Frederik Pohl and Elizabeth Anne Hull. It began when, shortly after writing "Sitting around the Pool, Soaking up the Rays," and after reading Tetsu Yano's "The Legend of the Paper Spaceship," Pohl had a brainstorm. Both stories concerned the invasion of the human brain by extraterrestrial aliens—in Pohl's case, the aliens are using humans as organic waldoes that permit them to meet and bargain for Earth's wealth, and the humans be damned—and the brainstorm took the form of, "Hey, Betty Anne, why don't we get a whole bunch of other SF writers, all around the world, to write more stories on this theme. And then . . ." And then they talked St. Martin's into agreeing to publish the book.

The end result was *Tales*. In it, Pohl speaks for the U.S. and Yano for Japan. Ye Yonglie and Tong Enzheng represent the People's Republic of China with "The Thursday Events" and "The Middle Kingdom" respectively; intriguingly, they show us how propagandistic SF can be, and thus suggest that we take another look at our usual fare. Spider Robinson speaks for Canada, André Carneiro for Brazil, Joseph Nesvadba for Czechoslovakia, Lino Aldani for It-

aly, the late A. Bertram Chandler for Australia, Jon Bing for Norway, Ljuben Dilov for Bulgaria, Brian Aldiss for England, Carlos M. Federici for Uruguay, Janusz A. Zajdel for Poland, Sam Lundwall for Sweden, and Karl Michael Armer for West Germany.

Tales is thus the best—the only!—way you have ever seen or will ever see to sample *world* science fiction (with the surprising omission of the Soviets), and it does a marvelous job of supporting Pohl's assertion that you can find SF writers everywhere, even if you must settle for an American expatriate such as the Harry Harrison who here represents Ireland or an American resident such as the Somtow Sucharitkul who speaks for Thailand.

Does *Tales* give you the true flavor of non-American SF? Of course not. Most of the tales within its covers had to be translated, after all, and as Pohl warns, "*Traduttore, traditore*" ("To translate is to betray"). I also gained a sense of editorial homogenization ("*Redactore, traditore*"?). Yet one does sense a broad range of cultures, politics, nationalisms, world-views, stylistic preferences, and so on, and for this sense the book is all the richer. It may in fact be the richest book of the year.

Pohl and Hull bill their book as "A novel with nineteen authors," and here is where it fails. *Tales* is not a novel. The plot is no more than a rudimentary thread that links end to beginning. In between, we have eighteen views of the same event, and after about the twelfth, one begins to scream for something to happen!

Yet, yes, *Tales from the Planet Earth* is worth reading. Buy it. ■

Decision Making Method: 182-110-1
Decision Hinder Method: 370-10-2
Decision of no Consequence: 12-96-40
Enlightenment Index: 23-59 (0002-80)



Bill Warren

OK, suppose certain people are right.
Just because a project was finished
doesn't mean there will never be
any revisions or alterations. . . .

Jerry Oltion

IN THE CREATION SCIENCE LABORATORY

“Free will was probably a bad idea,” He said. He was sitting in His throne, a gigantic gold one which He’d had built during the height of the Byzantine empire, back when they knew how to mix opulence with comfort, and gazing into a computer terminal of twentieth century manufacture. A steady stream of information scrolled past on the screen—statistics for nearly every human activity imaginable.

The screen showed the day’s totals for such things as automobile rentals, book purchases, video games played, sweepstakes winners announced, telephone calls placed from pay phones, number of emergency airplane landings, new scientific and sociological achievements, and a great deal more than that. A great deal more, in fact, than any human brain could have assimilated at all, computer terminal or no. But He was having no problem with the volume of it; only the content seemed to dismay Him.

Gabriel looked up from his harp. “What makes You say that?” he asked.

The Lord spoke a few words and the display froze, blanked out, then returned a single screenful of information:

Decisions favoring mankind:

1.32×10^{12}

Decisions hindering mankind:

3.78×10^{12}

Decisions of no consequence:

2.96×10^{13}

Enlightenment index:

23.54 (DOWN 2.60)

He twisted it around so Gabriel could see. “Definitely a bad idea,” He said. “It’s almost ruined the whole species.”

He twisted the screen back around, then turned it off with a word and leaned

back in the throne to think. He closed His eyes and pulled on His beard while He thought, a habit He had developed over the millennia to help His concentration.

After a time Gabriel said, “It’s better than the alternative. Remember what a dull time predestination was? That’s what drove You to give them free will in the first place.”

The Lord nodded. “That’s true, but if I don’t do something about the direction free will’s taking them, they’ll all go straight to Hell. Literally. Nothing duller than that.” With a shrug He sat up and called on the terminal again. He pulled the keyboard out of its niche and tapped in a few commands, scanning the result as it flowed past.

“I don’t see a single projection that doesn’t require Me to step in and change something. And if I do that, it’ll screw up the whole point behind free will, which was for them to make it on their own.”

Gabriel strummed a chord on his harp. “Hmm. Sounds like You’re stuck all right. So what are You going to do?”

“I don’t know. I hate to admit to failure, but it sure looks like a dead end to Me.” He shrugged, and said in a tired voice, “So, I guess it’s predestination again, then.”

He waved His hand.

Loren Alington watched Jeanne the barmaid weave her way through the crowd toward his table. He thought to himself, as he had for the last three nights, that maybe, just maybe, he might be able to score with her tonight if only he could come up with the right opening line. He tried to think of some-

thing as he watched her approach, but he was still stuck on "Hello" when she set his refilled mug on the table and said, "Dollar."

He dug in his pocket and came up with a fistful of coins, counted out four quarters, and dropped them into her palm. Without a word, she turned and weaved her way back toward the bar. He watched her over the rim of his mug until she disappeared behind the free-standing fireplace in the middle of the floor. He shook his head at his timidity and tilted the glass toward his lips.

He stopped.

Something seemed very strange all of a sudden. He couldn't bring the glass closer to his lips. He thought about that for a moment, in his somewhat drunken state, and came to the realization that it was because he didn't want to. He watched with detachment as his hand lowered the mug back to the table. Without really thinking about it he stood up, went into the bathroom, and splashed cold water on his face. It seemed to clear his thinking a little, but he still felt strange. Not drunk. He was used to that. Something else. He couldn't quite come up with just what, though.

Quite a few people seemed to have had the same idea as Loren had. Four other people came in after him, lining up at the sink instead of the urinals.

He went back to his table, sat down, and looked at his beer. He still didn't want it. In fact, what he really wanted, still in that detached sort of way, was a cup of black coffee. Some unaffected part of his mind felt amazement at that, for he hated the taste of coffee, but he was definitely getting all the signals of wanting some. He told himself that it

was a good idea—he'd need a couple of cups if he wanted to drive home tonight—but that tiny kernel of rationality at the core of his mind was beginning to get worried. This was not normal behavior.

Still, he wanted coffee. He looked up toward the bar to catch Jeanne's attention, and saw her already filling cups at the urn. When she had a full tray she brought it out and began passing out coffee to the patrons. Loren noticed that she was passing it out only to the heavy drinkers.

When she got to him he heard his voice say, "I'll probably need a couple."

Jeanne smiled, which worried Loren even more, and said, "Last one. I'll bring you a refill when it finishes brewing." And as if the smile wasn't abnormal enough, instead of turning and leaving as she would have normally done she set her tray down on the table and sat down in the chair beside Loren. With a napkin she wiped the water off his forehead. "I've noticed you here the last couple nights," she said. "You having problems at home?"

"Work," Loren said automatically. It was as if someone or something else were answering for him. He couldn't control it at all. "I'm a lawyer," he went on. "I'm prosecuting school district three on behalf of the Concerned Citizens for Creation Science. They want to ban the teaching of evolution in public schools."

That much was true. And it was very close to what Loren would have said himself, if he'd had the chance. But he hadn't had the chance. The mysterious force was doing everything for him. He

watched nervously as he—it—took a sip of coffee.

It tasted as bad as he'd remembered. Thank God for that little reassurance.

"So what's the problem?" Jeanne asked.

"We're winning," the mysterious force said. He was glad that it waited until after he had swallowed.

"I don't see how that's a problem."

"It is when you believe in evolution."

Jeanne's eyes lit up in comprehension. "Ah . . . hah. So why don't you quit? Tell them to get another lawyer?"

"That's not professional. A good lawyer should be willing to take either side of any case."

"Even if you don't believe in what you're doing?"

"Even so."

"That's just about the stupidest thing I've ever heard of," Jeanne said. "It makes hypocrisy not only legal but required."

"That's the system."

"So what are you going to do about it?"

So far the conversation had gone almost normally. But at this point, when Loren would have said, "Have another beer," the force in his mind said instead, "Go home and read the Bible, I guess. Maybe there's an answer in there."

Jeanne should have smiled the smile that meant "Boy, are you weird," but instead she said, "That sounds like a good idea, but I don't have a Bible. Mind if I come home with you and read over your shoulder?"

"Disgusting," He muttered under

His breath. He pushed the screen away from Him, the screen which displayed the pertinent details of five billion people's lives. "I might as well be playing solitaire." He held His hands to His forehead and rested His elbows on the arms of His throne. "They're robots. What do I want with five billion robots, even if they do read the Bible?"

Gabriel looked up at the screen which was now facing him.

The Lord raised His head again and rapped a finger against the glass. "Look at that poor bugger," He said. "His only sin was that he was wrong. He didn't evolve. He *could* have; there's nothing wrong with evolution as an idea. I'd have done it that way if I'd thought of it Myself, but I didn't. And because of that I made a robot out of him."

"Well," Gabriel said, "at least he's a happy one. That's better than before."

"That depends on your point of view." the Lord called up the program He had been using earlier and glowered at the figures. He showed them to Gabriel.

Decisions favoring mankind:	0.00
Decisions hindering mankind:	0.00
Decisions of no consequence:	0.00
Enlightenment index:	0.00 (DOWN 23.54)

He shook His head. "It's pointless. At least with free will they came up with some interesting heresies."

He stood up and began to pace the throne room, His robe billowing out behind Him and swirling around with every turn. "I just don't understand what went wrong with free will. It seemed like such a great idea when I had it—just the thing to make humans

amount to something. I *still* say it ought to work, too. They just aren't using it right."

"Some of them are."

The Lord nodded. "True. Some of them are earning their way up here. But the numbers are dropping off, and I don't know why."

"Pornography," Gabriel said.

The Lord looked puzzled until He saw Gabriel's grin. He grinned back. "Sex education," He said.

"Working mothers," Gabriel added.

"Rock and Roll."

"Homosexuality."

"Desegregation."

"Welfare."

It became a chant. Finally, after the Lord trumped Gabriel's "prostitution" with "evolution," they burst into laughter. "Oh Me," the Lord said, shaking his head. "Those poor confused buggers. They don't even have a clue." He sat back in His throne and said, "Maybe I *should* make them evolve. Teach them a lesson. Hah, evolve them all into gay mulatto pornographers and see what they blame it on then."

Gabriel strummed a chord and said, "Hmmm." After a moment he said, "Maybe they're already evolving. Maybe that's the problem. That and Your policy of not interfering."

"How do you figure?"

"Well, the problem is they're gradually growing less and less worthy of Heaven, right? It sounds to me like they're evolving away from whatever ideal state you've got in mind for them."

"Righteousness is a mental thing. Attitudes. That's not subject to evolution."

"Sure it is. Look at the studies they're making on the connection between genetics and crime."

The Lord turned back to the computer and scanned through His library until He found the relevant report, read it, and nodded. "Okay, point taken. So what does My policy of noninterference have to do with it?"

"Think for a minute what makes evolution work. Random mutations bring out the characteristic that you want, and then assuming it's a survival trait it spreads through the gene pool. You're using free will as a means to an end, namely righteousness, so in a sense, free will is the random factor that's supposed to push evolution toward righteousness. But evolution only works when a beneficial mutation spreads throughout the gene pool. Maybe humans aren't evolving into righteous beings because the people who benefited from righteous living aren't part of the gene pool anymore."

"Who are you—oh. Us."

"Right. The way things are set up now, the only reward people get for living a good life is a ticket to Heaven. And once they get here they're out of circulation, but that's when they need to be around the most. Heck, even *before* they get here most of the righteous are celibate. Evolution can't select for righteousness when the righteous genes never make it back into the gene pool."

"An interesting theory, but that doesn't explain why they're evolving the other way. Once they're dead, they're—" The Lord's eyes grew wide. "Lucifer!" He shouted.

"Lucifer?"

"He's been sending agents to Earth

for millennia. *He* doesn't care about interfering. He's polluting the gene pool with the unrighteous. He's been using evolution *against* me! Ooohhh . . . interference be damned; this calls for action."

He turned back to His computer, called on His prognostics program, and hammered furiously at the keyboard. Finally He looked up from the screen, a triumphant glow radiating from His face. "It'll work. It'll take a concentrated effort, but if we get everybody on it right away I think we can repair the damage and get them headed in the right direction again in a couple of generations."

"That quick?"

"All we've got to do is get the righteous genes back into the gene pool. How long should that take?"

Loren was unlocking his apartment when he felt the mysterious presence in his mind quietly fade away. He shook his head and pushed open the door, then looked back at Jeanne, three steps below him on the stairs. She was looking up at him with an expression he recognized. Do I want to go into this guy's apartment? He watched her go through it in a sort of abstract way before she said, "You don't really intend to spend the night reading the Bible, do you?"

"Well," Loren said with a grin, "we don't have to if you don't want to. I'm sure we could find something else to do."

"That's what I thought. No thanks." She turned away.

"Wait."

She descended a couple steps before turning back. "Look, no offense, but something weird's going on here, and I think we'd be better off just forgetting it."

"Why?"

"Because it isn't natural. When I go home with a guy I want it to be *my* idea."

Loren smiled. "You can always change your mind now, and then it *will* be your idea."

She shook her head. "Nice try, but no thanks. Not tonight."


Loren could sense when not to push it. "All right," he said. "At least let me drive you home."

"No. We'd just have to do this all over again when we got to my place. I'll take a taxi."

As if on cue, a taxi pulled around the corner and drew to a stop in front of the apartment building. A woman got out, looked up at Loren, and started up the steps. Jeanne passed her on the way down. Something about the woman seemed odd to Loren, but it took a moment to register what it was: There in the dark, she glowed with a soft light of her own.

And as Jeanne reached the taxi and the driver stepped out to open her door for her, Loren could see that he was glowing faintly too.

The woman on the steps cleared her throat. "Well," she said, "aren't you going to invite me in?" ■



In theory, laws provide a well-defined, clear-cut framework for human actions. In practice, people being people, it's not that simple. . . .

Terry Lee

HIGH POWER

Rob Chilson and William F. Wu

Lee

Mike Koehler sat enthroned in air, surrounded by instruments, tracking smoke and chewing tobacco. "Aha, aha, sneaky little rascals, but I know the scent of the vile weed too well to be deceived." The truck on the back roads of Kentucky, far below, was at least a probable. For two weeks, he had had his eye on a small patch of half-concealed tobacco plants growing around the edges of a glade, where they got sunlight but were hopefully concealed from the Big Eye. That truck had been in the vicinity five times; now it was on its way, he thought, to market.

Mike ruminated for awhile, spat—carefully, as one does in free fall—into an opaque plastic sack full of tissues.

"Take a chance," he said finally, aloud. "Live a little." His instruments couldn't make out what load that truck was carrying, but at the least he could throw a scare into them, if they were guilty.

"Better burn that field, though." They'd be tempted to strip it otherwise and rush a load to market. Mike sighed. "Whatever happened to the good old days last year when they cured their own and you could look for sheds?" Now they sold to middlemen in the cities, who rented warehouses and did the curing.

Then he hesitated. Something didn't feel right.

"That patch isn't very big. And they either carried that load on their backs five, six miles, or . . . Naw. That's two, three pickup loads . . . possible, but not likely. Too much work. Too much possibility of damage to the leaf. And knowing my Kentucky kin, I'd say the first is the more cogent reason."

Turning to his videoscope, he keyed in the coordinates of the field in question and began to scan every glade, however small, in the area. Finally he found it.

"Oh, Kenny," he said, quirked an eyebrow. "How could you? My own flesh and blood—my own kith and kin. I kilt m'first deer on the backside of that ridge. To see it commercialized in this heartless fashion!"

Mike's cousins must have put in fifty acres of tobacco among the pines along the south side of the ridge. Virtually every place where the ground was glimpsed between boughs, Mike's instruments spotted the characteristic signature of the "vile weed." Mike shook his head sadly.

"Gotta defoliate the entire damn ridge."

He put the boundaries of the field into the computer. The Big Eye already knew what it was looking at—it had the coordinates.

TIME? it asked.

The display gave him local or ground time. Mike keyed in 3:05 A.M. local time, which the Big Eye repeated along with Greenwich time to be sure he knew what he wanted. Mike okayed that.

WINDOW?

First available, he told it. It came back with tomorrow's date: in less than seven hours' time, the great UV laser would swing from its previous heading and pour its silent, invisible death down on that ridge in Kentucky. Under it, every green thing would die, every leaf fall. The big perennials, the pines in particular, would recover. Not the tobacco.

Animals would be affected only slightly. Anything under those leaves

would get a mild dose, and burning at night would minimize that. Some critics had argued that illicit growers would work at night to avoid observation, and so be exposed to the Big Eye's wrath. Not likely, Mike thought with a grin. *His* kinfolk weren't likely to be up that late unless they were drinking.

The click of the door behind him erased his grin and caused him to set his features noncommittally before turning his light seat around. Yes; Linda Yang and Ralph Enyeart.

"Hi, Mike," said Linda. "You've met Ralph Enyeart, I believe. Ralph, Mike Koehler is our smokey seeker. Got anything going, Mike?"

Mike spat neatly into his bag, said, "Three I'm sure of and four possibles. I rate one a probable. My cousin, likely." He looked at her, withholding his grin with effort.

Linda gave him a faint smile.

Enyeart was not amused. "Are you chewing tobacco?" he demanded.

All humor left the Kentuckian. He stared at Enyeart, nodded wordlessly.

"Where do you get it?"

This time the stare would have daunted anyone but an ideologue. Enyeart's expression changed from impatient self-righteousness to irritated authority.

"I said, where do you get it? From your cousins?"

"None of your damn business, Enyeart."

Enyeart gasped more in surprise than anger. "That's insubordination! Ms. Yang, haven't you explained to this—this *addict* who I am?"

"You told him yourself," Linda said mildly.

"I can't believe this! A member of

the President's Task Force on Drug Abuse treated with insubordination and total lack of respect in a drug investigation—by an addict!"

"Mr. Enyeart!" Linda said sharply. "Have you a warrant?"

"What? Don't be ridiculous—" But Enyeart wasn't entirely a fool. Indeed, Mike thought, absent his ideological predilections, he was quite sharp.

"Oh, you're going to give me the old Bill of Rights run-around," Enyeart sneered.

"Worse than that," Linda told him. "Mr. Enyeart, this isn't a drug investigation, and if it were, you are not empowered to ask questions. My question about the warrant was solely to remind you that no judge would grant you one. You are merely the President's errand boy."

"Technically, of course, you are right. But I am a member of the TFDA, and a single call from me would cause an investigation that would pull this station apart."

"Don't be ridiculous. I merely intervened because I won't have you bullying my men—not that I think you'll get far, trying to bully Mike. If you want to know anything, ask me."

Enyeart stared at her for a long moment. "Very well," he said, visibly assuming patience. "Just where does Koehler get his tobacco?"

"He grows it himself," she snapped. "Here on the station. Which is *quite* within even the highly restrictive laws the United States has seen fit to bridle itself with."

"I get the seeds from m' smokey cousins," Mike said, smiling faintly.

Enyeart glared at him, then trans-

ferred the glare to Linda. "And you trust this addict, whose relatives are admitted tobacco growers, with the delicate task of identifying and destroying illicit crops?"

"Of course. So long as he does his duty, why not?"

"So long as he does it! How about his family—notorious growers—"

"His relatives are two-bit growers who run a few patches here and there. They've never produced more than a few tons of tobacco. And Mike has burned them out four times in the past three years."

"Five times, seven hours from now," said Mike. He turned back to his instruments and initiated another surveillance scan, this time in Tennessee.

"He's not worried about my kinfolk at all," Mike added, glancing back over his shoulder. "It's yours he's exercised about."

Linda Yang nodded.

"Very well," said Enyeart coldly. "I'll be candid. There *is* a good deal of uneasiness about leaving Forcible Orbital Eradication in the hands of a family member of notorious heroin producers from the Golden Triangle."

"Why should there be?" she asked coolly.

Even Enyeart was rather taken aback. "Can we trust you to burn their fields if the law is passed?"

"I have always obeyed orders," she said stonily.

It was a question that had never crossed Mike's mind. Linhua Yang was a daughter of a Chinese Thai family of drug-runners from the Golden Triangle, that southeast Asian region of vague boundaries that had been virtually free

of any government control for years, and maybe forever. The drug barons had paid for her education, having observed that the young girl clerking in their offices was not merely smart, but brilliant. She had joined the U.S. Space Service when it was opened to foreign nationals after the Space Disarmament Treaty.

Ability, diplomatic skills, brilliance—and the fact of her being a non-American—had brought her, still young, to the command of the Big Eye.

The Big Eye had been an experimental solar power transmission device. The Power Station itself had been built to test various methods of getting power safely down from orbit. None had been found acceptable yet; all were found to be dangerous in some degree.

Then came the proposed bill for Orbital Eradication, not merely of American illicit crops, but of those of other nations as well—in one version, without permission from the governments of those nations.

"We're been investigating, trying to find out how your relatives managed to maneuver you into this strategic position," Enyeart said. "Just how did they?"

"They didn't, couldn't have, and wouldn't have bothered," she said flatly. "Mr. Enyeart, you are allegedly not a fool, but your ideology makes you a blind raving maniac. You think they maneuvered me here to thwart any attempt to burn their fields? They would have had to start *maneuvering* me before the Big Eye was built! And what could I do? Refuse to carry out orders—and be replaced by the next shuttle? Poor return on a huge investment."

"I merely repeat the questions being

asked on the ground," he said grudgingly. "It is possible for you to do some subtle sabotage, say, of the Big Eye, that would prevent FOE for a time. Long enough perhaps to save your relatives."

She arched her eyebrows. "Surely you'd simply have it repaired? Any major destruction would cause penalties you couldn't expect me to risk—only ideologues are willing to face the penitentiary for their causes."

Ideologues like him, Mike thought.

"Don't pretend to be naive, Ms. Yang. You are quite well aware of the political forces arrayed against FOE. Any considerable delay might well preclude it. Foreign governments are quite perturbed over it, and any number of fainthearted people would bow to their wishes."

"I should think they are perturbed, Mr. Enyeart," said Linda. "FOE is an act of war. You have only to wonder what would happen if the Big Eye were to be directed upon wheat or rice fields instead of tobacco plants or poppies, to understand why."

"A mere chimera. The U.S. has never attacked anybody unprovoked. As for acts of war, what about the deliberate growth and distribution of lethal drugs in the U.S.? Hardly a friendly act, and often supported by governments who have no reason to love the U.S."

Linda shrugged. "If you want a personal answer from a non-American, I suggest that you start executing politicians and sports, movie, and music stars who are found to be addicted. Your problem is not the availability of drugs, but the acceptance of them. A few executions, coupled with the public whip-

ping of a large number of schoolkids caught using them, would do more than the burning of any number of poppy fields."

Enyeart was too contemptuous to be shocked. "Cruel and unusual punishment, within the meaning of the Constitution," he said. "But I wouldn't expect you to understand, with your Oriental background."

Mike caught his breath, but she only shrugged.

"Care to check out Mr. Koehler's tobacco crop?" she asked.

"No, I'll take your word for it. I must make a call." He swam out without much grace, but efficiently.

Mike turned back to Linda with a whimsical shrug. "Goin' to report on your uncooperative attitude, I expect."

"And possibly yours." She looked at him seriously.

Mike shrugged.

The Big Eye was not a military device, despite its terrible potential. In fact, as Linda Yang had pointed out to Congress early on, the potential was mostly just potential—the first use of the Big Eye offensively would cause it to be blown out of space. It was very large and fragile. Still, many nations were fearful. Nor was America itself immune to the most feared effect—the destruction of crops in the fields.

In shape, the Big Eye resembled an eyeball: a huge plastic balloon, one half aluminized, the other transparent. A wisp of gas pressure maintained its shape; a flimsy framework around it maintained its position, looking directly into the eye of the Sun. At the focal point—outside the eyeball itself—was

a concave mirror, tilted aside, focused in turn on the much smaller ball that was the butt end of a giant gas laser aimed at Earth.

There were technologically better systems than the gas laser, and certainly better systems than the mirror. However, there were no systems that cost less for the output, or were so easy to repair. The station could replace the big mirror in twenty-four hours with spares on hand, and the gas laser was much easier to repair than, say, a broken solid-state laser would have been. Moreover, the sheer unmilitary vulnerability of the mirror and of the fragile gas laser was one of the selling points. It helped to assure others that America would not commit any crimes.

Technically, the Big Eye was in violation of the Space Disarmament Treaty, but other technical violations had been orbited by virtually every nation in space, and no other violation was as large, obvious, and vulnerable as this. So America had so far gotten away with it. Yet no other violation had the potential for terror that the Big Eye had. Hence, she supposed, part of the reason for foreigner Linda Yang's appointment as Director of the Power Station.

In the next booth, Linda could hear Mike Koehler talking to one of his raffish relatives—kinsmen, in his dialect.

"Kenny, boy, been out to Rocky Ridge lately? Nearly put one over on me, you did. Caught on last night . . ."

Ralph Enyeart was muttering into his phone from the other side.

"So that truck was a blind, huh? Well, laugh it up, then. I more than got back on Rocky Ridge . . . Oh, don't give me that! Rocky Ridge was you all

right, Kenny boy. Who else knows that country like that, except me? Come on, now . . ."

On her own phone, Goh Si Bok—meaning "Uncle Goh," though he was not really her uncle by blood—smiled at her and spoke Cantonese with his heavy Thai accent. She understood both, yet customarily used putunghua, the official mandarin Chinese, in giving her name; her life had always been multilingual and dialectical.

Goh Si Bok's Thai was better than his Cantonese, but he liked showing off. "Ah, Linhua, good to see you! And how go things so far above us all? Have we told you recently how proud you have made all your family? And the rest of us too, of course."

"Thank you, Uncle. Yes, you have often told me of your pride in me. Things here are going well enough. I'm having a bit of a problem with a man from Earth, though."

"Ralph Enyeart, President's Task Force on Drug Abuse, there to make sure you will actually burn us out when Congress passes the law for Forcible Eradication. Will they give warning, do you think?"

Linda confessed she didn't know. "I haven't studied the U.S. Constitution the way I did math and engineering," she said. "I know it is Congress alone that can declare war, but of course the U.S. has often fought without declaring war. Right now, I suppose Congress is merely delegating this power. . . ."

Goh Si Bok's round face, puffy and spotted with age, looked at her solemnly. "I asked our lawyer, M. Boulanger, about the war declaring power of the U.S. Constitutional law is a spe-

cially even for American lawyers, so he must look it up." He glanced aside. "Just a moment."

Mike was still laughing with his cousin. Ralph Enyeart had quit muttering to his colleagues in Washington and was gone.

Linda waited patiently. Past Goh Si Bok's head, she could see out a window onto terraced rice paddies—somewhere in northwestern Thailand, she guessed, though national borders were easily lost in the wilds of the Triangle. The Golden Triangle was so named because it circumscribed the conjunction of three different countries in an ideal poppy-growing climate—hence the reference to wealth, flowing in as illegal narcotics flowed out. Linda had never been able to find her native village on a map, and wasn't certain just which nation it was in. Presumably her uncles knew. Must remember to ask them; she'd been meaning to do so for some time.

Goh Si Bok's face returned to the screen, tense and decisive. "Linhua? Bad news. Just in from Washington. The FOE bill has been decisively voted down."

One tray in hydroponics was devoted to recreation, mostly marijuana. Mike Koehler's tobacco plants were here as well. He cured the leaves in a supply closet. Linda herself did not use even marijuana, but approved of its use by the Power Station's personnel. Americans were often stupid, but had flashes of brilliance. If it were not permitted, the men would be brewing alcohol, maybe even distilling it.

Mike was examining his plants care-

fully. After a moment, he began snick-ing off leaves one at a time.

The whole Power Station was in free fall, so the trays were actually plastic troughs filled with porous plastic foam. They were echeloned vertically, like bleacher seats, and every tray had another upside down under it—both bulk-heads "above" and "below" glowed. It was a confusing place to Earthers.

"How long have you been an addict?" she asked him.

Mike glanced around. "Since I was a wee little lad, in them tobacco fields back home."

"I suppose the criminalization of tobacco was a big blow to your family, and its way of life."

He looked at her, squinting, half-laughing. "My family? No way! We're a shiftless bunch of ne'er-do-wells, scratchin' around the fringes of the law, always have been. Never raised tobacco when it was legal—took too big an investment, and you dealt with a virtual monopoly, backed by the government. Too official for the likes of us."

Linda knew it was Mike's boast that he had put himself through college by bootlegging, and suspected there was some truth to it.

"But tobacco growers generally?"

"Aw, I doubt they suffered much—certainly not as much as they yelled they did. They'd been used to security and Uncle Sam's hand on their shoulder. They all switched to marijuana quick enough."

Linda nodded. One of the first brands of marijuana out had been named, with what passed in America for wit, "Alcatraz Gold."

Mike sampled one of his green leaves, nodded.

"I suppose you used to be a smoker."

"Of course. Chewin's a filthy habit, but I admit it's less dangerous to others. Seems even funnier to me to see these dudes drinkin' their mary jane as tea, though."

"I wish they wouldn't drink so much."

The THC from marijuana persisted in the body for weeks, but in space, drinking alcohol could not be permitted at all. On the Power Station, many of the crew did suit work in vacuum every day. The drop in pressure would tip a man over the edge from tiddly to drunk.

"So what's botherin' you, little lady? If the Director will forgive the informality."

American informality had shocked her at first. Now, it was what she had come to like most about American culture.

"Bad news for Ralph Enyeart," she said, smiling faintly with grim humor. "Forcible Orbital Eradication has just been voted down by Congress. It never made it out of committee."

"Enyeart will be frantic," Mike said, grinning hugely. "Can't say as I'm sorry; I never could figure why they'd virtually ask Russia or somebody to blow our cozy little station out of orbit. I suppose it's because none of them are up here."

"Enyeart *is* in orbit, and it hasn't changed his attitude. Self-righteous, stupid—"

"Idiotlogue," said Mike. "Ideologue driven stupid, not crazy, by his beliefs. I guess your family, that Enyeart was so insulting about, must be feeling real good about now."

"No, they hated it. They were hoping for FOE."

He turned and stared at her. "What?"

She smiled patiently at his surprise. "Well, of course. The U.S. might at any time get permission for Orbital Eradication from the Burmese, Thai, and Laotian governments. If those governments were cooperating with each other and the U.S. in the war against narcotics, the Triangle would be in real trouble. But if America ever started burning other peoples' crops without permission of their governments, the Big Eye would soon be shut down, if not blown up, in the backlash. Forcible eradication would never recover, and the Triangle could go on as usual. They're betting one crop against a hundred."

"Now, that makes sense. My kin-folks, though, they'd never be able to think that far ahead." Mike shook his head, closed the sack into which he had been putting his leaves. "They're really just a bunch of small-timers compared to your kin, always keepin' one eye out for the local law and begging for a hint from me anytime we're in touch."

Linda nodded, partly to herself.

Mike glanced at her sidelong. "Purely for the satisfaction of m' own curiosity, if the Director wouldn't mind. . . ."

"What is it?"

"Are your kin really as independent as I once heard in the news? Virtual dictators up in the jungle?"

She nodded, smiling again in spite of her own burden. "It is rough, mountainous, undeveloped terrain. The seats of government are a long way off and, as a matter of fact, they receive consid-

erable benefits by looking the other way when my uncles wish it."

"'They'—you mean the governments themselves or individual officials?"

"Both. Payoffs for individuals and a tremendous inflow of foreign cash for the economies."

He shook his head, impressed.

"My uncles are like the warlords in China during the 1920s; in fact, one clan is a direct descendant of a Chinese general of that generation. I have always been their prized adopted niece, but . . . I know them for what they are. Oh, they have done many good things, bringing in doctors and tractors, and educating deserving people like me. Still, they are tyrants, and the people only benefit, or suffer, at their whim. Ultimately, my uncles must go."

Mike nodded, silent.

"I don't suppose your—relatives have ever asked you to do anything wrong," Linda said emptily.

He looked at her. "Never. What did your folks want you to do?"

"To burn them out, of course."

"Director?"

Linda looked toward the door.

The Safety Officer braced herself smoothly, then turned till her attitude matched Linda's at her desk, but facing her—at right angles to the door—and saluted.

Linda's eyebrows raised at the formality. "Yes, Ms. Simms?" She said, with equal formality.

"Lin—I mean, Director Yang—Enyeart—the TFDA man—he's gone out to inspect the Big Eye."

"I thought that was scheduled for tomorrow. There's no problem, is there?"

"Uh—no, ma'am. The Eye is not being realigned until the day after tomorrow. But he went alone!"

"Don't safety regulations mean anything around here?" Linda said, irritated. "How did he manage that?"

"He pulled rank on the traffic control officer. Monaghan is a good man, but that TFDA stuff scared him."

"Understandable." Linda thought for a moment. The long cable ride out to the Big Eye was not dangerous, since the Sun wasn't flaring. Once at the Eye, Enyeart might be in several kinds of danger, but these were the same dangers that existed within the Power Station proper. Primarily those of free fall.

Linda grimaced. There were times when she appreciated the tyrannical power of her "uncles." "All we can really do is call him and quote Safety regs at him. Who's at the Eye at the moment?"

"No one, ma'am. Regular inspection was yesterday; we realign day after tomorrow. No glitches or other problems in operation, so—"

"Right, right. Dismissed."

Later Linda condemned herself for not making the immediate connection, but she was concerned over her "uncles'" demands. Goh Si Bok had become quite insistent, reminding her of how much she owed them.

Even now, she had never had anything but kindness from them, never a harsh word. Yet it was coming clear to Linhua "Linda" Yang that she could never go home again. Never again would she know the sunlight and monsoons of her native land, the feeling of

belonging among her own people, whose languages she spoke, among whom she knew her place. . . .

The ache was too deep for tears, but she would survive. She had sketched a possible future: become an American citizen—her tour in space would make that simple—marry that very eligible and pleasantly crazy Mr. Li, forget the past. Yet contemplating it now gave her no emotion.

So she had gone to see Mike Koehler. Of the forty-odd people on the Station, he alone could understand. He alone had family on the other side. Nor had she ever had the slightest doubt of him. He'd burn out illicit crops, raffish family or not.

Thinking of him now, she struggled out of the frozen state and called him. "Mike? Enyeart has gone to inspect the Big Eye. Simms, the Safety, says it's all right, though he went alone. Is that correct? You're not doing anything that'd put him in danger, are you?"

"Nothing. There's not much I could do. Matter of fact, the Eye is running on its program now. I'm so far ahead of execution that I can take a day off if I feel like it."

"Does that include day after tomorrow? We're realigning—"

"Right, that includes down-time for the mirror. By the way, what's Enyeart got in mind, specifically? He seems to have come up here and messed around with the 'scope.'"

"Just finding out how it works, I suppose," she said dubiously.

"When was he in? He could've just asked you—"

"Must've been while I was phoning.

Alcott was doing her laundry and Jackson was servicing the antenna drive."

"Probably not important; Enyeart is conscientious. Main thing is, he's in no particular danger."

She broke the connection, then thought, no, Enyeart was phoning while Mike and I were. Then she realized he must have quit first. Goh Si Bok was urging her to burn the Golden Triangle, in defiance of Congress. And who, she asked herself, was Enyeart talking to—and about what?

She unstrapped and left her office.

Who else but one of his colleagues, about the FOE bill?

She was already halfway to the lock by the time she consciously came to this conclusion, and then thought furiously. Alert the Station? What if she was wrong? This was a grave charge to make.

Bring along someone to help? But whom? The Station had some slack, but everyone was kept busy. Pull someone off another task on a suspicion?

Likely he just wants to be alone with his disappointment, Linda thought, struggling into her suit.

"Linda Yang, going out to the Big Eye; we have a 'man alone' there," she said crisply to traffic control. "Notify the Safety Officer."

The airlock was no bigger than a closet—a large, suit-shaped closet. By the time she had closed the door, most of the air had been pushed out; the pumps soon took out most of the remainder, and the spill valve wasted the rest to the outside. Linda followed it.

She was inside a loose cage in the hard, high, bare openness of space. Earth loomed huge off to one side. The

Big Eye, looking very much like a dispassionate eye, stared past her from near the Earth's limb. The laser's pencil, pointing Earthward from off to one side, was an afterthought. From her feet, a wide ribbon trailed off toward the Eye, becoming a mere thread.

Racked inside of the cage were trolleys. Linda snapped her safety line, fastened one of the trolleys to her shoulder connects, and gingerly stepped outside the cage. This was always a nervous moment—the stars were far below—then she had clamped the trolley's wheels over the ribbon. Unclipping her safety line, she pulled the trolley controls down and twisted the handlebar, for all the world like a motorcycle rider.

And she was off, through what Dunsany in her *Literature of Space* course had once called, "the unreverberate blackness of the abyss."

Mike Koehler was studying Northern California, not the best tobacco country, though he often spotted fields. California ran more to hemp and poppies. The proposed bill for foreign Forcible Orbital Eradication had caused a number of enterprising types to start planting early, expecting a sharp rise in the price of foreign commodities.

But he was thinking of the Koehlers of Kentucky. What might cousin Ken and Uncle Albert be planning next? And why hadn't he caught his brother Tice Andrew green-handed recently? He knew T.A. too well to believe him innocent.

Last time he'd been down to Earth, T.A. 'd asked him hundreds of questions about the Big Eye, or rather, about the surveillance instruments that guided it. Hmm. And he'd been rather noncom-

mittal about what he'd been doing. Driving a dump truck for a quarry, hey?

Mike grinned, then wondered what Linda's kinfolk were like. Not nearly so tolerant as his own, he suspected.

He stretched. No point in doing more; he was running ahead of the Big Eye's ability to burn. The control section had a scope pointed at the Eye. As he stretched, Mike glanced at this, noted someone spinning out along the ribbon toward the Eye, looking like a spider.

Linda?

He called traffic control and confirmed that guess.

For a moment, Mike wondered if she had given in to her family's desires and was out to deflect the Eye. There were manual controls there, a safety feature in case there should develop a glitch or the computer breakdown. Certainly she couldn't do it from here without his knowing.

Oh, yeah, Enyeart was out there, alone. Needed looking after.

Mike started to leave, hesitated, looked back at the Big Eye. The little spider was now invisible, entering the inconspicuous bubble attached to the laser. . . .

Enyeart naturally hadn't pumped down the lock. Linda hit the spill valve. Air hissed silently out around her; she gripped the cage's bars with both hands, but felt hardly a thing. A plume of air, barely visible, nearly vanished. She pushed the door open a crack.

In a moment she was inside the laser's control bubble.

This was a big room with three catwalked tiers of controls for the laser and banks of instruments for checking it out;

it was crisscrossed with hand-walk cables. She scanned it, removing her helmet and gauntlets.

Floating at a catwalk across from her was Ralph Enyeart, bulky in his space suit, helmet and gauntlets off, working slowly and meticulously at the attitude controls.

No doubt his first action had been to disconnect the relay from the Station. Mike would not even notice that. South-east Asia was in range at the moment. Enyeart could carry out his plan before she could bring help.

Linda grasped one of the cables that spanned the bubble's interior and pulled herself along it hand over hand in three hasty pulls, then waited.

Enyeart glanced around and saw her, halfway to the catwalk. "Yang!"

"Enyeart," she said dryly.

"Come to stop me? I knew you'd protect those piratical relatives of yours!"

"Not at all. In fact, they called and asked me to burn them out, themselves." Linda adjusted her attitude.

"Ha!" Enyeart turned back to the board, moving more frantically now. He grunted in relief, banged down on the Execute button, and turned to face her, panting too much to exhibit triumph.

Linda still drifted slowly. "You're just playing into their hands," she said, more calmly than she felt.

"No matter. The world isn't going to weep over a few criminals losing their crops!" Enyeart was still not triumphant.

At last. Linda's feet approached the catwalk. She rolled up into a ball for the impact with the board beyond. "They'll be angry," she said. "Much of the world hates America and couldn't

care less if it burns itself up with drugs—"

Enyeart was looking past her toward the videoscope, behind her as she rebounded from the board. "Too late now," he said.

She was flying at him head first. Enyeart was nearly twice her size and far stronger. But she was skilled in free fall, and had the short, compact body type of a gymnast. He braced himself to receive her, arms outstretched to fend her off, foot against the guardrail.

At the last moment Linda seized the rail with one hand and gripped sharply, spinning, her momentum transferred to her small feet. They crashed through Enyeart's guard and thumped into his chest. He flopped backward, but grabbed the rail. His momentum nearly wrenched his arm out and flung his back painfully into the rail, despite the protection of his tanks.

Despite the evident pain, he pulled on the tortured arm, whipped himself around, and launched toward her. Linda flung up her feet, awaiting him; at the last moment, as he grabbed for them, she jerked them back. Before he could recover and grasp the rail, she had muscled herself over the rail and to the empty space outside. His Earth-trained reflexes took a moment to recover from the shock. Linda snagged him as he went by, and, bracing herself, heaved him off into the distance. In a moment, she was over the rail and at the board.

What she wanted was to break escape from the current sequence. The so-called manual was of course a computer.

COMMAND. EXECUTE.

PLEASE ENTER PASSWORD.

56550VCH/TBDGVY. EXECUTE.

COMMAND SYSTEM OPEN.

@@X—

Enyeart collided with her. He grabbed at her head, tearing at her ear. She kicked, floundered, jerked her elbow into his ribs. His clumsy blows didn't get through her suit, either.

Don't hit. Grab and throw. She tried, but the tussle ended when time ran out, with Linda forced against the rail, both of them panting. Her cancel command remained incomplete on the board. Enyeart twisted his head the other way, to look at the videoscope. She, too, saw the laser track on, following relentlessly the path ordained, across the jungled hills of Southeast Asia.

A small crowd awaited them at the lock. Nobody said anything, but Simms and a big fellow called Barnes took Enyeart in charge. He shrugged contemptuously. Linda made for the communications room to report, with everyone following her. The route led through the station's major public space, near the docking airlocks. More station personnel waited here, silent.

Mike Koehler was at the main communicator, dockside, the one the Station used for press conferences. In the other screen were a dozen reporters.

"Here she is now!" cried Mike. "Tell the audience, Director Yang—you've arrested Ralph Enyeart of the President's Task Force on Drug Abuse?"

"He placed himself under my authority when the laser completed its run," she said expressionlessly.

"Ms. Yang! We understand you battled with Mr. Enyeart," called one of the reporters. "Were you hurt in any way?"

She ignored him. "Look, Mike, what's going on here?"

"You're quite the heroine, Linda. All Earth wants to know about your stand."

"Ms. Yang! Is it true your relatives in the Golden Triangle attempted to persuade you to cooperate with Mr. Enyeart?" Another reporter.

Linda glared at Mike, furious. "How did that get out?"

"Simms and I became suspicious. She has the override authority to study the recordings of calls to and from—"

"And you released private information?" She demanded.

Her anger subsided a little at the devil-may-care grin on his face. "Yes, we did."

"Ms. Yang! Is it true—"

"Director Yang! Why did you—"

Linda went to the communicator. "One statement, then I must go. Mr. Enyeart has attempted to contravene the Space Disarmament Treaty out of a sincerely held belief that one single interest of the American public takes precedence over all the others, and over all interests of all the people of all other nations."

Enyeart, stung, came forward to defend himself, and Linda backed away to make her escape.

Mike stopped her. "Uh—Linda—sorry we didn't have time to tell you—and we wanted to see Enyeart's face—"

"Well?"

"Enyeart hasn't done anything. As soon as I saw you head for the laser, I realized that he was up to something, so I deflected the focusing mirror from the Big Eye to the laser's receiver. It tracked, but wasn't putting out a thing."

Despite free fall, Linda's knees al-

most buckled. "Good—and yet, I don't know. Since he's done no real harm, he's now a hero. You've probably saved FOE, at least as a future possibility."

"That was in my mind. But if burning the Golden Triangle would have forever ended the possibility, why didn't you let him go ahead?"

"Because that is *their* way. Enyheart went outside the law to end them; they would have gone outside the law to protect themselves. In the end, as I have said, my uncles must go. But it must be done in accordance with the law."

Mike spoke with quiet concern. "Think they'll put out a contract on you?"

She was first taken aback, then amused. "Oh, no, it merely means that I can never go home again. I have ceased to be their *si jet nuey*."

Goh Si Bok called within three hours, smiling ruefully.

"What shall we do with you, Linhua? Eh?"

"Goh Si Bok—"

"The irony has amused us all. The word has gone around the globe that we asked to have our own fields burned out. Some of our harshest critics are beginning to speak well of us. Yet my niece has disappointed me."

Startled, and yet somehow not surprised, Linhua watched Goh Si Bok's wistful countenance as he shook his head at her. She had heard only pride in his voice. She caught her breath, and turned away. The affinity between her family and Koehler's raffish kin in the hills of Kentucky was a sudden revelation.

Her eyes shining, Linda turned back to ask Goh Si Bok what country home was in. ■

● Let's not be too quick to blame the human race for everything. A great many species of animals became extinct before man ever appeared on Earth.

Will Cuppy, 1941

(Submitted by G. Harry Stine)

brass tacks

Dear Mr. Schmidt:

Last weekend I finally obtained a copy of the July 1986 issue of *Analog* and started reading it. To my great surprise and fascination, I discovered Mr. Rick Cook's "The Long Stern Chase," the first half representing the documentation of the cursorial hunter hypothesis. Its basis in hairlessness, bipedalism and perspiration is something we are most familiar with; I was most pleased to see it cited.

However, on completing the article, I was disappointed that the idea of hominoids as cursorial hunters was attributed to Bill Vaughn. The energetic approach to this issue, specifically its "proof" by association with hairlessness, sweating and a number of breathing and biomechanical aspects (not mentioned in the article) was, to my knowledge, first published by Mr. David Carrier in 1984.

His article, entitled "The Energetic Paradox of Human Running and Hominid Evolution," appeared in *Current Anthropology*, Volume 25, pages 483-495.

Mr. Carrier is a student in this department, although the work is entirely his own. However, I was able to watch its inception and have been pleased at its recognition, for instance, by a long article in the *New Scientist* (get reference from DRC). Those in the academic research enterprise get few rewards beyond the recognition of their ideas. Consequently, I would appreciate your publishing this correction. For that matter, some of your readers may wish to consult Mr. Carrier's interesting exposition in the original.

With kind regards and my thanks for your attention.

CARL GANS

Ann Arbor, MI

The author replies. . . .

One of the joys of hanging around with Analog readers is that you're exposed to an incredible variety of knowledge. One of the problems is keeping straight who should get credit for what.

Until I read this letter, I wasn't aware that the cursorial hunter hypothesis had ever been presented formally and I certainly do not mean to slight David Carrier. I wish I had had his excellent paper when I was developing the article.

However I would like to point out that I did not attribute the idea to Bill Vaughn. I simply said he was the one who suggested it to me. Where Bill got the notion I don't know. RICK COOK

Dear Mr. Schmidt,

Rick Cook's guest editorial made some excellent points about meta-causality, witch hunts, the shoddy treatment of the space shuttle program by our Congress, and the inherent dangers of spaceflight. I don't agree, however, with his characterization of the investigation of the *Challenger* disaster as a witch hunt.

At first, most people seemed to believe—and accept!—that the *Challenger* accident was the inevitable result of an admittedly hazardous undertaking, as Mr. Cook obviously believes. The Rogers Commission seemed to share that point of view, concentrating upon the flaw in the booster O-ring design but refusing to investigate the human flaws that were also involved. It took what Mr. Cook calls “an orgy of acrimony, back-biting, finger-pointing, accusations, and trial by journalism,” as distasteful as it may have been, to bring out the truth.

It's become clear that the death of the S.S. *Challenger* and her crew was far from inevitable. There's abundant evidence that top managers in NASA and

some shuttle contractors knew of the real potential for catastrophic failure of the booster O-ring well before the *Challenger* blew up, and even before the first shuttle ever left the launch pad. They knew that the chance of failure in flight was unacceptably high but deliberately and consistently underestimated the hazard, at times by simply fudging the figures. They knew that cold weather aggravated the problem, yet pushed for a launch on a day far colder than ever before experienced by the vehicle, over the strenuous objections of their own experts.

The real cause of the *Challenger* disaster, then, was bureaucratic bushwah and gross negligence by managers, not just a tragic twist of fate. The latter is forgivable; the former is not. I don't see that public relations are so important that such incompetence should be allowed to cripple our space program. There is strong public support for space exploration and I believe that it would be even stronger if NASA would stop apologizing for using the public's money and politicians would (sigh!) grow some backbone. We should find out how and why this tragedy was allowed to happen, no matter whose toes get stepped on, and make damned sure it doesn't happen again.

PAUL J. MARTOS

R.R. 2, Box 177E
Michigan City, IN 46360

Dear Mr. Schmidt:

Let me respond to your question in response to the letter from John R. Ledbetter, Jr., in the Mid-December 1986 issue. Your question (with a comment) was, “What do you recommend as an alternative to believing that problems can be solved? A healthy skepticism toward the value of any particular attempted solution is one thing, but the

kind of attitude that says that in general we *can't* solve problems is self-defeating." I recommend believing that a problem can be solved only to any desired degree of accuracy. Let us at once give up the idea that any major problem can be solved absolutely; but allow that it can be solved to the degree that we think worthwhile. There may be a trade-off here; solving one problem may add to others. Heisenberg's principle applies. In physics, the more you determine a particle's velocity, the harder you make it to determine its position, and vice versa. If you want to know both, you know both with something less than absolute accuracy. In social problems, the more government intervention is used to solve one problem, the more stress is put on society to lead to another. That doesn't mean that partial solutions or (90% or 99% or 99.99%) aren't beneficial.

(FATHER) RAYMOND L. HOLLY

West Frankfort, IL

Dear Dr. Schmidt,

I read your article in the Mid-December *Analog* with great interest. A few years ago, before I retired, I spent two years investigating the problem of recycling with a view to cleaning up a particularly beautiful part of Nova Scotia. (Isn't it astonishing how years of work can be summed up in a few sentences?)

The difficulty with recycling is one of technology, not desire, on the part of citizens. Take newsprint as an example. Carbon-based print is impossible to remove fully without destroying the paper. So recycled newsprint is grey, not white. In addition multi-colored printing gives a brown tinge to the grey. So recycled newsprint pulp is only good for packing egg cartons, for example, and even then looks dingy. One day's

reclaimed newsprint makes an awful lot of egg cartons; there's no market for the rest.

The same thing happens with glass or plastics. Multi-colored originals produce unpleasantly colored reclaimed product. Again there's a limited market for the stuff.

Scrap metals can be refined fairly easily if people take the trouble to do some initial sorting but the "nuisance garbage"—paper, plastic, and glass—needs intensive research to restore it to a white or clear color. Paper can be burned quite efficiently, but these days it is mixed with so much plastic, metal, and chemical substances that it is dangerous to incinerate it except under very special (and expensive) conditions.

Garbage is a very serious problem; surely we can afford to spend enough money on research to ensure that recycled material can be restored to its original condition or ban treatments which make material unusable?

DAVID S. DOW

Nova Scotia, Canada

Actually, it may already be farther along than you realize. I've seen some very good recycled papers, for instance.

Dear Mr. Schmidt:

Concerning your space editorial:

In the early forties the state required my parents to buy me a "health" textbook which emphatically assured me that "sanitary land fill" was the only acceptable way to dispose of refuse. I believed every word of it, but my parents hadn't had the benefit of reading about all the horrible results of not using a bulldozer to mash your garbage and it was a long way to the nearest dump, so we continued to recycle our refuse, which we regarded not as "solid waste," but as "junk," "trash," "papers," and "garbage."

Junk was generally big enough to dispose of one item at a time; often, one could find somebody with a use for it.

We put trash into two old oil drums behind the house, one for metal and one for glass. We cut the ends out of tin cans and stepped on them before putting them into the barrel; now and again Dad would tamp down the glass barrel, using a sledge hammer as if it were an overweight potato masher. Sooner or later some high school students would hold a scrap drive and carry off the barrels. The scrap shortage engendered by the early forties had vanished by the end of the fifties, but scrap drives continued. I recall hearing someone asking a scrap drive participant if the latest drive had been a waste of time; the participant replied that indeed the money paid for a truckload of tin cans was less than the trouble and expense of hauling it "but people were so glad to get rid of the stuff that nearly everybody gave us five or ten dollars." Plainly it would have been a very short step to an enterprising scrap dealer offering, for a reasonable fee, to bring his truck around once or twice a year—were it not that local governments haul trash away for "free."

We took papers out into the back yard and burned them. Our neighbors' children were all grown and they had nobody to watch a trash fire, so they tied their papers into bundles and kept them in neat stacks until somebody held a paper drive.

Garbage was thrown into the chicken yard or a bean field; if you had no chickens, you used your neighbors'. I have succumbed to the trash service that I'm forced to pay for whether I use it or not, but I draw the line at storing stinking garbage in plastic bags. Lacking chickens, I run a compost heap. I found two metal things—perhaps discarded basement-window wells—that could be bolted

together to make an open-bottom cylinder about two feet high and four feet across. I hid this in the windbreak and throw my garbage into it. The garbage rots as fast as I throw it in, so the container never fills up. Since it is scattered over such a wide area, the surface dries out at once and the stuff never stinks, just as a pile of autumn leaves never stinks. I imagine that a larger family would be compelled to throw in a shovelful of dirt now and again and that would cause the garbage-level to rise, but by the time it reached the top the bottom layers would be pure dirt and could be used again. Recycled dirt would probably be more efficient at suppressing smell than fresh dirt, because it is more active. I do know dirt works, because in the winter I collect the garbage indoors in a plastic garbage pail and keep a smaller pail of dirt to cover it with. Even when I threw in a quart of spoiled tomatoes (and not even rotten meat smells as bad as spoiled tomatoes) the amount of dirt it took to smother the smell was barely enough to hide the tomatoes from view.

You are reflecting that this method wouldn't work for apartment buildings, where one tenant's slovenliness would offend his neighbors more than himself. Reflect further that if you have *enough* pure garbage, it's valuable and can be sold to (or at least accepted by) a fertilizer manufacturer. There is also a clever gadget called a garbage-grinder which sends your garbage down the sewer lines for reclamation at the sewage plant. True, the stuff is too toxic to use as fertilizer now, but if "sanitary land fills" had not been so handy to dispose of the sludge in, would we have been so cheerful about letting people use the sewers to dump heavy metals? In brief, someone with a great deal of garbage to dispose of is going to think of

something—if you don't step in and take the responsibility away from him.

To take a specific example of refuse, I use packaged cat litter. I've got three cats, two of them adolescent, and I use a lot of cat litter. There are two types available in the local markets: a clay type that I have to sack up and take down to the end of the lane, and a "green" type that permits me to dump the box onto the compost heap. The clay type is cheap enough to compensate for the extra trouble, but if I had to pay a small fee for each sack I carry down the lane, the green litter wouldn't look so expensive.

In sum, I think that we have a space shortage because the citizens are being bribed to use it up as quickly as possible.

Postscript: While I was writing this letter the garbage men came and went without my second sack of trash. I wasn't expecting them anywhere near this early. The old-timers tell me that the private trash collector that the town forced out of business came at predictable times and never, never mangled the cans.

JOY BEESON

Voorheesville, NY

I've been getting some sad chuckles out of watching New Yorkers (whose dumps runneth over) fiercely resisting the idea of recycling, many insisting the whole idea is "impractical." It's especially amusing upon returning from a trip to the Pacific Northwest, where it's been flourishing for years. . . .

Dear Sir,

As an *Analog* subscriber for many years, two trends in your editorial policy

disturb me. The first is the four-month delay between the time an article is written and the time it reaches me. As a former daily newspaper editor I find it impossible to believe that in this computerized age you couldn't find a more timely way to publish *Analog*.

The other trend is in nearly abandoning the short story in favor of serialized novels, novellas and novelettes. Though your December issue carries a banner which screams "192 pages," only 22 of those pages (plus 3 pages of illustrations) are given to short stories. It hurts me to think of how many good short stories you must reject, to make room for, say, *The Smoke Ring*, which I will be able to buy in paperback sometime later this year. Let the book publishers have the novels—and let *Analog* encourage well-written short stories and timely science fact articles.

HOWARD STATEMAN

Menlo Park, CA

Actually, neither of these problems is a recent trend. Both the lead time in publication and the relative numbers of shorter and longer stories have been approximately what they now are for at least as long as I can remember (which is quite a while). I agree that a shorter lead time would be nice, and magazines like the news weeklies demonstrate that they are possible—but they're economically impractical for magazines with the kind of circulation and amounts of advertising science fiction magazines now have. And I wish it were true that a lot of good short stories had to be rejected to make room for a serial, but the fact is that really good short stories are very difficult to write and therefore in chronically short supply. New writers, take note! ■

a calendar of
analog
upcoming events

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 2708X, Melbourne, Vic. 3001 Australia.

3 - 6 September 1987

CACTUSCON (North American SF Conference) at Hilton, Hyatt Regency, Heritage, San Carlos, 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.

18 - 20 September

San Antonio Fantasy Fair (Media and comic book-oriented show) at San Antonio, Texas. Tickets—\$15 until 1 September, \$20 at the door. Info: Bulldog Productions, Box 820488, Dallas TX 75382. (214) 349-3367.

18 - 20 September

MOSCON IX (Idaho SF conference) at Cavanaugh's Motor Inn, Moscow, Idaho. Guest of Honor—Jack Williamson; Artist Guest of Honor—Steve Gallacci, Fan Guest of Honor—Lorna Toolis. Registration—\$16 until 1 September, \$18 thereafter. Info: Moscon IX, Box 8521, Moscow ID 83843.

21 -26 September

WRITERS WORKSHOP with Algis Budrys (follows Moscon IX) at Cavanaugh's Motor Inn, Moscow, Idaho. Registration—\$150. Info: Moscow Moffia Pro Writers Workshop, 621 East F Street, Moscow ID 83843. (208) 882-3672.

2 - 4 October

DRAGON CON 87 (Gaming-oriented conference) at Pierremont Plaza Hotel, Atlanta, Ga. Guests—Michael Moorcock, Brian Herbert, Robert Asprin, Lynn Abbey. Registration—\$25 until 15 September. Info: Dragon Con 87, Box 148, Clarkston GA 30021.

2 - 4 October

CONTRADICTION SEVEN (Western NY SF conference) at Ramada Inn, Niagara Falls, N.Y. Guest of Honor—Anne McCaffrey, Fan Guest of Honor—Mike Glicksohn. Registration—\$16 until 12 September, \$20 thereafter. Info: Contradiction, Box 2043, Newmarket Station, Niagara Falls NY 14301.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.



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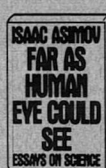
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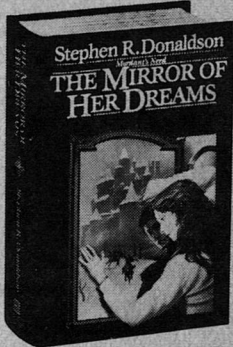
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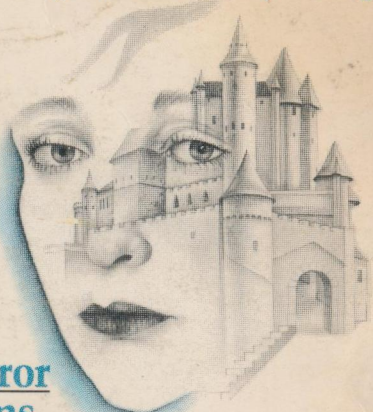
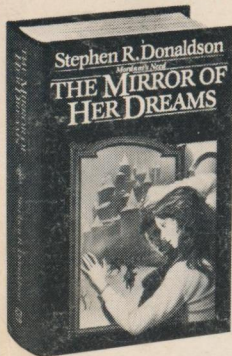
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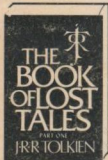


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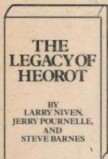
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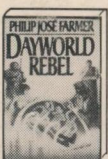
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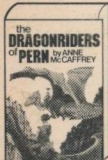
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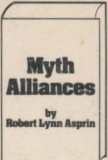
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