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Destinies

Edited by JAMES BAEN

THE SCIENCE FICTION MAGAZINE

COVER STORY:
LOST DORSAI
GORDON R.
DICKSON

ALL NEW!
ORSON SCOTT CARD
DAVID DRAKE
LARRY NIVEN
FREDERIK POHL
JERRY POURNELLE
NORMAN SPINRAD
IAN WATSON



WELCOME

to this the Spring 1980 edition of *Destinies*. As promised, the cover story is a novella of the Dorsai. The question examined is pacifism. The answer, the only possible one for a Dorsai, is hinted at in the title. Another major coup for this issue is the commencement of a new column by Frederik Pohl, *On Predicting the Future*. Instalment #1, "Looking for the Starbow," is an examination of the inspirational processes of science fiction's premier author/editor.

That's not all that's new: Orson Scott Card and Norman Spinrad combine forces in a double-barreled review column, *Books: A Binocular View*. Scott's job is to tread lightly over a large number of titles, attempting in the process to give you some idea as to whether you would be well advised to buy them. Norman is the critic—well, not 'critic' precisely...let's say instead that he takes two or at most three important books and uses them as a philosophical springboard.

You want more? Ok. Keith Henson in *The L-5 Review* tells how and why the U.S. military will probably be the Solar System's first asteroid miner; Larry Niven points an accusing finger at the world's first eco-villain; and G. Harry Stine shows how Einstein may have been at least partly right. Plus we have a message from Mars. And that's only the beginning.

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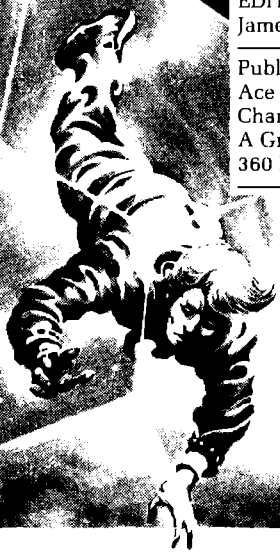
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DESTINIES

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Volume Two, Number One

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Speaking of beginnings, as well as fine contributions from David Drake, Kevin O'Donnell and Ian Watson, *Destinies* #6 presents stories by two brand-new writers: Kevin Christensen and Steve Rasnic Tem. Both offerings are so good they'll make your teeth hurt. More yet? This issue sees the first in an occasional series of Portraits of the Author as Person. The first, "The Plume and the Sword," is an assessment of Gordon R. Dickson. Plus we got one more thing: you want to be a Dorsai? If you'll settle for Irregular status, Jay Kay Klein tells how it can be arranged.

And that brings us to the Summer Edition, *Destinies* #7. The cover story, "Bellerophon," is by none other than the above-mentioned Kevin Christensen. It brings into sharp focus just how mythic and rife with archetypes will be the coming Age of Space. Also, #7 will feature stories and articles by Orson Scott Card, James Gunn, Joe Haldeman, Frederik Pohl, J. E. Pournelle, Norman Spinrad, Joan Vinge, and more. To make a long story short, #7 will be as good as the issue you hold in your hand (believe it or not).

A subscription blank is located directly to your left.

ON PREDICTING THE FUTURE

LOOKING FOR THE STARBOW
by Frederik Pohl

YOU'VE WONDERED WHERE WE
SF WRITERS GET OUR IDEAS?
IT ISN'T A SINGLE EVENT.
IT'S A SORT OF CATALYSIS.

Seven or eight years ago I read an article in the British Interplanetary Society's magazine, *Space-flight*. Before I had even finished it I sat up in bed, crying, "Eureka!" It was a great article. It talked about how the stars would look from an interstellar spaceship in nearly relativistic flight, say, traveling upwards of 60,000 miles a second. The colors of the stars would shift. Stars ahead would change color toward the blue end of the spectrum, stars behind toward the red. And after the color shifts had gone as far as they could go in the visible bands of the rainbow, the stars would go off the end and could be seen no more.

So what you would have, at about a third of the speed of light, would be a ring of stars visible out of your window. They would vary in color from blue to red fore and aft, and would leave only expanding areas of blackness both where you were going and where you had come from. You could call it a "starbow."

It made a pretty picture. The Eureka syndrome occurred as I was thinking about that, and wondering absentmindedly if I could ever use it in a story—and then realized that two or three other ideas that I had had wandering around homeless in my mind for some time, looking for a story to come to rest in, would fit nicely into just such a story. Edward de Bono's conjecture that too many resources hinder problem-solving rather than helping. Gödel's discovery that any written message (even the Encyclopedia Britannica) can be expressed as a single, if very large, number—just by assigning the position of each letter in the message to an ascending series of prime numbers, and expressing which number it was by an exponent from 1 to 26.

You've wondered where we sf writers get our ideas? Well, that's the usual place where I get mine. It isn't a single event. It's a sort of catalysis. An intriguing idea comes along—a bit of scientific lore, or a situation, or

a character—and matches up with some other half-baked notions already floating around in my head. And when they collide, they attain critical mass. I then perceive that, put together, they make an interesting situation that can be carried out to, hopefully, interesting conclusions. That's enough. Then I start typing.

I started typing "The Gold at the Starbow's End" almost as soon as I put *Spaceflight* down. When I was finished with it, I liked it. It didn't win any awards, but it got nominated for most of them. I still do like it, only—

Only it begins to look as though there isn't any starbow.

The other day I opened my mail and saw to my pleasure that there was a letter from my good friend (every sf writer's good friend, because he shares and explains science with us so amiably), Robert L. Forward. It contained a preprint from the *American Journal of Physics*. The paper is called "In search of the 'starbow': The appearance of the starfield from a relativistic spaceship."

John M. McKinley and Paul Doherty, two meddling physicists from Oakland University in Michigan—not content to cure cancer or develop a cheap and harmless substitute for gasoline or do any of the other things scientists *should* do—read my story. They checked out the literature, rethought the question, programmed it all into a computer—and killed off the starbow forever. Or, anyway, until someone else finds a way of saving it. The original authors had, it seems, neglected some fine-detail effects, such as the fact that the stars start out with a variety of colors instead of one. When they instructed the computer to take that into account, it began to print out dull splotches of points in monochrome: "there is no starbow," they conclude. True, they then go on to say, "we regret its demise. We have nothing

so poetic to offer as its replacement, only better physics"—but what's the good of *that*?

Well, that doesn't destroy the story, really. The starbow was only an image, a sort of metaphor, a poetic and colorful touch. But I do miss it.

Especially since, of all the stories I ever wrote, "The Gold at the Starbow's End" has had the most questions raised about its content of factual science.

It is also high among the stories of mine whose science has been based most firmly on actual, if relatively unfamiliar, scientific reports. I don't think that's a coincidence.

When a scientist publishes a paper in *Am. J. Phys.* or any other scientific journal, it is refereed by three or four other competent scientists in his specialty before it is published, and criticized by any scientist who reads it thereafter.

This process is called "peer review." It is one of the hallmarks of the scientific method. It is why you and I can believe in, say, relativity or Gödel's proof even though hardly any of us can follow the mathematics involved. The people who can have checked it out.

Science fiction has its own peer review. It doesn't usually happen before publication, except in those rare cases where an editor knows something about science—or suspects enough to ask somebody who does. It doesn't happen systematically at all, except in a sort of amorphous, mass way in letter columns and fan magazines. But my God, it happens! It has happened to me on any number of stories, and never more than on *The Gold at the Starbow's End*.

First off, I made one flat-headed blunder, and got caught out on it. I had said something about a radio message from Alpha Centauri being received on the big dish at Goldstone in Arizona. Well, everybody knows that Alpha Centauri is never visible from the northern hemisphere. It was impossible. It was also

humiliating because I *knew* that—had even once written an intemperate editorial denouncing writers who did not.

Then Arthur Clarke, taken with the notion of Gödelizing messages, mentioned it to some celebrated scientists. They told him it was silly. So I had to dig out the original paper on the subject and mail it off to Sri Lanka.

I had given one of those Gödel numbers, and incautiously mentioned that it was too large for any computer to write out. Thirty people wrote me at once to say that it wasn't, and at least half a dozen actually programmed computers to write it out. (I keep one of the printouts pinned up on my office wall as a reminder of humility.) I do have a sort of excuse for that one. In the first draft of the story I had a *really* big number, but when I revised it I had a moment's compassion for the typesetters and left off one superscript.

In fact, about the only scientific element in the story not called into question was the starbow itself—and now McKinley and Doherty! It's almost more than a body can bear.

But really it isn't quite. After the stinging subsides, it's almost fun.

One of the best reasons for writing science fiction is the science-fiction audience. They are *smart*. They miss very little. They understand almost anything. It is a constantly stimulating challenge to find something to say that is both new and interesting to them; and when they write in to raise a point that has not occurred to the author it is like having your opponent make an unexpectedly brilliant move in a chess game. True, it may cost you the game. But that's what makes it interesting!

In my pantheon of pleasure, science is about the best spectator sport there is. I spend as much time

with persons practicing science as I can, even if I have to go to scientific meetings to do it.

Attending your average scientific congress is not pure joy. The performers are not chosen for their showmanship. Sometimes their performing styles are dreary. Sometimes worse. Only the superstars have enough chutzpah to read a paper without twenty or thirty slides. Most of the slides contain four or five hundred words of tables in tiny type. You can't possibly make them out from the audience, so they read them to you. This means that they have to crane away from the microphone to see what they're reading. There is a tendency to mumble, anyway, and an even higher tendency to speak in Broken English (sometimes called "the universal language of science"); and they've turned out the room lights; and how do you stay awake? Not to mention the ramblers. Or the ones who clutch the hand mikes to their lips, with a plosive sound like the bombing of Berlin (a performance they're particularly prone to in the process of pronouncing Ps). Not to mention translation—oh, boy, translation! A book could be written on the joys of listening to a sentence by sentence translation, when at every sentence the speaker and the translator have to confer a few seconds semi-audibly on just what the key words mean. I don't want to do that, so I'll just point out that a little of that makes you *eager* for a couple of dull, illegible slides.

But there are gems to be found. And where else are you going to meet people who are *doing* the things we've been reading about all these years?

So I go to scientific meetings and to research centers whenever I can. The last few months were reasonably typical:

January. Sandia, New Mexico. They do two things at Sandia. They design terror weapons for the DoD. (But not in the part I visited—for some reason they

don't encourage tourism in that part of the grounds.) They also are the Department of Energy's chief research facility for testing solar-power designs. That's why I persuade Jack and Blanche Williamson to drive over with me to look into current progress. If there is any article of faith I cling to, it is that fusion power is a fantasy, fossil and fission power is a folly, and solar power is the only really long-term hope we have for a delightful and survivable world. Sandia's showpiece is the Solar Tower Test Facility, a big one-eyed slab sticking up out of the New Mexico desert, looking for all the world like Arthur Clarke's Black Monolith, except for the Cyclops hole in one side where the action takes place. It gets its sunpower from a collecting field of several hundred movable flat mirrors (but when you're talking about solar energy you don't call them "mirrors," you call them "heliostats"). They're testing two generating systems. At the moment they've got a steam boiler at the collection window. When that comes out, a hot-air system will go into that Cyclops eye to generate electricity through a gas turbine. Whichever system wins out will go into the full-scale power plant that PG&E is building in California. Next year when you turn on a light in Los Angeles, a little bit of the power you burn will be solar. There's plenty else at Sandia. Vertical-axis windmills in three sizes—Baby Bear, Momma Bear and the four-story Daddy Bear. The next step in the scale is a commercial installation, probably ten times as big, but so far no one is bidding to build one. Photovoltaic systems, in about a dozen different configurations. Even some research into oil shale. Our guide gives me a piece for a souvenir. Since I've written about it a couple of times I'm glad to see at last what it looks like, and to have a piece. But it's filthy stuff. Leaves a stain like an old dipstick on anything it touches.

March. Jet Propulsion Laboratories, California.

This is where the Jupiter fly-by pictures are coming in. Jack and Blanche Williamson are there again; so is Poul Anderson, Larry Niven, Jerry Pournelle, a whole gathering of the clan. We all ooh and ah at the magnificent close-up color photographs of that little solar system that orbits the Sun a few hundred million miles out. We listen to the hardened JPL scientists doing the same thing: "Gosh, look at the colors around the Great Red Spot." "Jesus, that looks like a volcano!" "My God, a *ring*?" Every nickel I pay in taxes is justified by NASA this day. The universe has been permanently enlarged for me.

March. The International Assembly on Energy Storage, Dubrovnik, Yugoslavia. There are eighty-five people here from nineteen countries, and there are more ways of storing energy than you would believe. Kinetic storage: flywheels, compressed gases. Thermal storage: divided into (a) storing sensible heat (hot water in underground aquifers or crushed rock under a solar home), and (b) storing latent heat, as in fusible salts. Chemical storage: batteries, of course; but also reversible chemical reactions and even biomass. There are storage systems to power a pacemaker or a wristwatch, and big lalumphing monsters to hold the off-peak power from a fifty megawatt generating plant and feed it back when the daily demand curve starts to climb. All I have to do to justify my presence is to give a thirty-minute banquet lecture. The rest of the time I listen. By the time I get on the plane for Rome I have tucked away five interesting future cars and a dozen new dwelling plans to put into stories.

Even if I didn't have crass commercial incentives for going to places like these, I'd do it anyway. When I can't do it in the flesh, I read about it—the magazines, like *Scientific American*, *New Scientist* and *Bulletin of the Atomic Scientists*; the journals, *Triple-A S's Science*, New York Academy's *The Sciences* and above

all the British Interplanetary Society's two publications, the *Journal of the BIS* and the aforementioned *Spaceflight* . . . which brings us back to the starbow. Because that's where I saw the starbow first, along with much, much else.

Forty-some years ago, when I was a teen-aged science-fiction fan with a yearning to be a writer, I used to attend meetings of a thing called the American Rocket Society. The meetings were held in oddly sedate places like lecture rooms in the Natural History museum or in an engineers' club. Their programs were also sedate, if not stultifying, being devoted mainly to reports on thrust comparisons obtained from test-stand firings of a variety of nozzle geometries. Well, somebody had to do all that. But it wasn't real interesting to listen to. The leading lights of the Society were also pretty sedate, Alfred Africano and G. Edward Pendray the most formidable. Africano was an engineer for the New York subways (the kind of engineer who designs, not the one who drives the cars). Pendray had the virtue of being a science-fiction writer, under the truncated name of "Gawain Edwards," but neither he nor anybody else talked science fiction at those meetings. They talked grams of thrust, and that was about it.

Around the same time, across the Atlantic in London, a similar group took its courage in its hands and called itself the British Interplanetary Society. The two groups were very similar in makeup—the Americans had Pendray; the British had Val Cleaver and teen-aged Arthur C. Clarke—but the Americans kept themselves respectable, and the British threw caution to the winds and announced that what they were into was *space travel*, dammit! They even started to design a moon rocket. They published a complete set of plans in 1939; and thirty years later, when somebody actually landed there, the ship that did it bore a

recognizable resemblance to BIS's pre-war designs.

Last year the BIS made another project, this one a design for an *interstellar* ship. It's called "Project Daedalus" and, if precedent is meaningful—well, thirty years from 1978 is 2008. Within the lifetime of a fair number of the readers of this column.

Right now the British Interplanetary Society is having a membership drive, having just expanded into new headquarters and needing more members to support them. (BIS, 27/29 South Lambeth Road, London SW8 1SZ, England.) There's only one thing that stops me from joining now, and that's that I did so a long time ago. And never regretted it. If I had to give up all of my science-related memberships but one, I think BIS is the one I would keep. They're still searching for the starbow, and I think are the likeliest prospects around to find it. (If you join, make them give you a copy of the Daedalus report—and tell them Fred Pohl sent you.)

That still leaves me with my own starbow problem, of course. But maybe not an insoluble one.

When The Magnificent, also known as Lester del Rey, heard about the death of the starbow, he sat down and wrote me up a list of umpteen ingenious ways to salvage the starbow in case I ever expand the story into a book (which I think I might). Or I might just brazen it out. Or—and this is what I really think—somebody, some time, will find out something new that will make it possible again, at least under certain circumstances. That's one of the joys of science. It changes! It zigzags back and forth as it climbs in jagged lightning strokes, and illuminates reality for all of us. With the possible exceptions of eating and sex, not necessarily in that order, I have no appetites that are as much fun to satisfy.

—Frederik Pohl

THE GREEN MARAUDER



by Larry Niven

SAVE THE "ECOLOGY"!

I was tending bar alone that night. The chirpsithra interstellar liner that had left Earth four days earlier had taken most of my customers. The Draco Tavern was nearly empty.

The man at the bar was drinking gin and tonic. Two glig—gray and compact beings, wearing furs in three tones of green—were at a table with a chirpsithra guide. They drank vodka and consommé, no ice, no flavorings. Four farsilshree had their bulky, heavy environment tanks crowded around a bigger table. They smoked smoldering yellow paste through tubes. Every so often I got them another jar of paste.

The man was talkative. I got the idea he was trying to interview the bartender and owner of Earth's foremost multi-species tavern.

"Hey, not me," he protested. "I'm not a reporter. I'm Greg Noyes, with the *Scientific American* TV



show."

"Didn't I see you trying to interview the glig, earlier tonight?"

"Guilty. We're doing a show on the formation of life on Earth. I thought maybe I could check a few things. The gligstith(click)optok—" He said that slowly, but got it right. "—have their own little empire out there, don't they? Earthlike worlds, a couple of hundred. They must know quite a lot about how a world forms an oxygenating atmosphere." He was careful with those polysyllabic words. Not quite sober, then.

"That doesn't mean they want to waste an evening lecturing the natives."

He nodded. "They didn't know anyway. Architects on vacation. They got me talking about my home life. I don't know how they managed that." He pushed his drink away. "I'd better switch to espresso. Why would a thing that *shape* be interested in my sex life? And they kept asking me about territorial imperatives—" He stopped, then turned to see what I was staring at.

Three chirpsithra, just coming in. One was in a floating couch with life support equipment attached.

"I thought they all looked alike," he said.

I said, "I've had chirpsithra in here for close to thirty years, but I can't tell them apart. They're all perfect physical specimens, after all, by their own standards. I never saw one like *that*."

I gave him his espresso, then put three sparkers on a tray and went to the chirpsithra table.

Two were exactly like any other chirpsithra: eleven feet tall, dressed in pouched belts and their own salmon-colored exoskeletons, and every much at their ease. The chirps claim to have settled the entire galaxy long ago—meaning the useful planets, the tidally locked oxygen worlds that happen to circle close around cool red-dwarf suns—and they act like the reigning queens of wherever they happen to be.

But the two seemed to defer to the third. She was a foot shorter than they were. Her exoskeleton was as clearly artificial as dentures: alloplastic bone worn on the outside. Tubes ran under the edges from the equipment in her floating couch. Her skin between the plates was more gray than red. Her head turned slowly as I came up. She studied me, bright-eyed with interest.

I asked, "Sparkers?" as if chirpsithra ever ordered anything else.

One of the others said, "Yes, and serve the ethanol mix of your choice to yourself and the other native. Will you join us?"

I waved Noyes over, and he came at the jump. He pulled up one of the floating chairs I keep around to put a human face on a level with a chirpsithra's. I went for another espresso and a Scotch and soda and (catching a soft imperative *hoot* from the farsilshree) a jar of yellow paste. When I returned they were deep in conversation.

"Rick Schumann," Noyes cried, "meet Ftaxanthir and Hrofilliss and Chorrikst. Chorrikst tells me she's nearly two *billion* years old!"

I heard the doubt beneath his exuberance. The chirpsithra could be the greatest liars in the universe, and how would we ever know? Earth didn't even have interstellar probes when the chirps came.

Chorrikst spoke slowly, in a throaty whisper, but her translator box was standard: voice a little flat, pronunciation perfect. "I have circled the galaxy numberless times, and taped the tales of my travels for funds to feed my wanderlust. Much of my life has been spent at the edge of lightspeed, under relativistic time-compression. So you see, I am not nearly so old as all that."

I pulled up another floating chair. "You must have seen wonders beyond counting," I said. Thinking: *My God, a short chirpsithra! Maybe it's true. She's a dif-*

ferent color, too, and her fingers are shorter. Maybe the species has actually changed since she was born!

She nodded slowly. "Life never bores. Always there is change. In the time I have been gone, Saturn's ring has been pulled into separate rings, making it even more magnificent. Tides from the moons? And Earth has changed beyond recognition."

Noyes spilled a little of his coffee. "You were here? When?"

"Earth's air was methane and ammonia and oxides of nitrogen and carbon. The natives had sent messages across interstellar space . . . directing them toward yellow suns, of course, but one of our ships passed through a beam, and so we established contact. We had to wear life support," she rattled on, while Noyes and I sat with our jaws hanging, "and the gear was less comfortable then. Our spaceport was a floating platform, because quakes were frequent and violent. But it was worth it. Their cities—"

Noyes said, "Just a minute. Cities? We've never dug up any trace of, of nonhuman cities?"

Chorrikst looked at him. "After seven hundred and eighty million years, I should think not. Besides, they lived in the offshore shallows in a not very salty ocean. If the quakes spared them, their tools and their cities still deteriorated rapidly. Their lives were short too, but their memories were inherited. Death and change were accepted facts for them, more than for most intelligent species. Their works of philosophy gained great currency among my people, and spread to other species too."

Noyes wrestled with his instinct for tact and good manners, and won. "How? How could anything have evolved that far? The Earth didn't even have any oxygen atmosphere! Life was just getting started, there weren't even trilobites!"

"They had evolved for as long as you have," Chorrikst said with composure. "Life began on Earth one

and a half billion years ago. There were organic chemicals in abundance, from passage of lightning through the reducing atmosphere. Intelligence evolved, and eventually built an impressive civilization. They lived slowly, of course. Their biochemistry was less energetic. Communication was difficult. They were not stupid, only slow. I visited Earth three times, and each time they had made more progress."

Almost against his will, Noyes asked, "What did they look like?"

"Small and soft and fragile, much more so than yourselves. I cannot say they were pretty, but I grew to like them. I would toast them according to your customs," she said. "They wrought beauty in their cities and beauty in their philosophies, and their works are in our libraries still. They will not be forgotten."

She touched her sparker, and so did her younger companions. Current flowed between her two claws, through her nervous system. She said, "Sssss . . ."

I raised my glass, and nudged Noyes with my elbow. We drank to our predecessors. Noyes lowered his cup and asked, "What happened to them?"

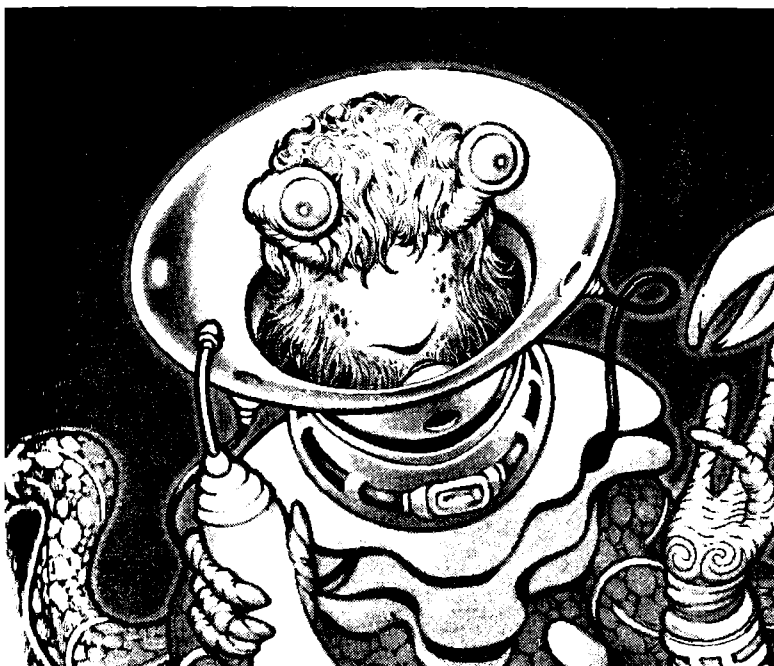
"They sensed world-wide disaster coming," Chor-rikst said, "and they prepared; but they thought it would be quakes. They built cities to float on the ocean surface, and lived underneath. They never noticed the green scum growing in certain tidal pools. By the time they knew the danger, the green scum was everywhere. It used photosynthesis to turn carbon dioxide into oxygen, and the raw oxygen killed whatever it touched, leaving fertilizer to feed the green scum. The world was dying when we learned of the problem, and then what could we do? A photosynthesis-using scum growing beneath a yellow-white star? There was nothing in our libraries that would help. We tried, of course, but we were unable to stop it. The sky had turned an admittedly

lovely transparent blue, and the tide pools were green, and the offshore cities were crumbling before we gave up the fight. There was an attempt to transplant some of the natives to a suitable world; but biorhythm upset made them sterile. I have not been back since, until now."

The depressing silence was broken by Chorrikst herself. "Well, the Earth is greatly changed, and of course your own evolution began with the green plague. I have heard tales of humanity from my companions. Would you tell me something of your lives?"

And we spoke of humankind, but I couldn't seem to find much enthusiasm for it. The anaerobic life that survived the advent of photosynthesis includes gangrene and botulism and not much else. I wondered what Chorrikst would find when next she came, and whether she would have reason to toast our memory.

—Larry Niven







W.D.G.

lost dorsai

by Gordon R. Dickson

Pacifism will always be
a powerful moral force,
even—perhaps especially—
to the Dorsai.

I am Corunna El Man.

I brought the little courier vessel down at last at the spaceport of Nahar City on Ceta, the large world around Tau Ceti. I had made it from the Dorsai in six phase shifts to transport, to the stronghold of Gebel Nahar, our Amanda Morgan—she whom they call the Second Amanda.

Normally I am far too senior in rank to act as a courier pilot. But the situation at Gebel Nahar required a contracts expert at Nahar more swiftly than one could safely be gotten there.

The risks I had taken had not seemed to bother Amanda. That was not surprising, since she was Dorsai. But neither did she talk to me much on the trip; and that was a thing that had come to be, with me, a little unusual.

For things had been different for me after Baunpore. In the massacre there following the siege, when the North Freilanders finally overran the town, they cut up my face for the revenge of it; and they killed Else, for no other reason than that she was my wife. There was nothing left of her then but incandescent gas, and since there could be nothing to come back to, nor any place where she could be remembered, I rejected surgery and chose to wear my scars as a memorial to her.

It was a decision I never regretted. But it was true that with those scars came an alteration in the way other people reacted to me. With some I found that I became almost invisible. But nearly all seemed to relax their natural impulse to keep private their per-

sonal secrets and concerns. It was as if I was like a burnt-out candle in the dark room of their inner selves—a lightless, but safe, companion whose presence reassured them that their privacy was still unbreached. I doubt that Amanda and those I was to meet on this trip to Gebel Nahar would have talked to me as freely as they later did, if I had met them back in the days when I had Else, alive.

The Gebel Nahar is a mountain fortress; and for military reasons Nahar City, near it, has a spaceport capable of handling deep-space ships.

The main lobby of the terminal was small, but high-ceilinged and airy with bright, enormous heavily-framed paintings on all the walls. We stood in the middle of all this: no one looked directly at us, although neither I with my scars, nor Amanda were easy to ignore.

I went over to check with the message desk and found nothing there for us. Coming back, I had to hunt for Amanda, who had stepped away from where I had left her.

“El Man—” her voice said without warning, behind me. “Look!”

Her tone had warned me, even as I turned. I caught sight of her and the painting she was looking at, all in the same moment. It was high up on one of the walls; and she stood just below it, gazing up.

Sunlight through the transparent front wall of the terminal flooded her and the picture, alike. She was in all the natural colors of life—as Else had been—tall, slim, in light blue cloth jacket and short cream-colored skirt, with white-blond hair and that incredible youthfulness that her namesake ancestor, the First Amanda, had also owned. In contrast, the painting was rich in garish pigments, gold leaf and alazarin crimson, the human figures it depicted caught in exaggerated, melodramatic attitudes.

Leto de muerte, the large brass plate below it read.

Hero's Death-Couch, as the title would roughly translate from the bastard, archaic Spanish spoken by the Naharese. It showed a great, golden bed set out on an open plain in the aftermath of the battle. All about were corpses and bandaged officers standing in gilt-encrusted uniforms. The living surrounded the bed and its occupant, the dead Hero, who, powerfully muscled yet emaciated, hideously wounded and stripped to the waist, lay upon a thick pile of velvet cloaks, jewelled weapons, marvellously-wrought tapestries and golden utensils, all of which covered the bed.

The body lay on its back, chin pointing at the sky, face gaunt with the agony of death, still firmly holding by one large hand to its naked chest, the hilt of an oversized and ornate sword, its massive blade darkened with blood. The wounded officers standing about and gazing at the corpse were posed in dramatic attitudes. In the foreground, on the earth beside the bed, a single ordinary soldier in battle-torn uniform, dying, stretched forth one arm in tribute to the dead man.

Amanda looked at me. She did not say anything. In order to live, for two hundred years we on the Dorsai have exported the only commodity we owned—the lives of our generations—to be spent in wars for others' causes. We live with real war; and to those who do that, a painting like this one was close to obscenity.

"So that's how they think here," said Amanda.

I looked sideways and down at her.

"Every culture has its own fantasies," I said. "And this culture's Hispanic, at least in heritage."

"Less than ten per cent of the Naharese population's Hispanic nowadays," she answered. "Besides, this is a caricature of Hispanic attitudes."

She was right. Nahar had originally been colonized by immigrants—Gallegos from the northwest of

Spain who had dreamed of large ranches in a large open Territory. After the first wave, those who came to settle here were of anything but Hispanic ancestry, but still they had adopted the language and ways they found there.

The original ranchers had become enormously rich—for though Ceta was a sparsely populated planet, it was food-poor. The later arrivals swelled the cities of Nahar, and stayed poor—very poor.

"I hope the people I'm to talk to are going to have more than ten per cent of ordinary sense," Amanda said. "This picture makes me wonder if they don't prefer fantasy. If that's the way it is at Gebel Nahar . . ."

She left the sentence unfinished, shook her head, and then smiled at me. The smile lit up her face. It was something different, an inward lighting deeper and greater than those words usually indicate. I had only met her for the first time, three days earlier, and Else was all I had ever or would ever want; but now I could see what people had meant on the Dorsai, when they had said she inherited her great-great-grandmother's abilities to both command others and make them love her.

"No message for us?" she said.

"No—" I began. But then I turned, for out of the corner of my eye I had seen someone approaching us.

The man striding toward us on long legs was a Dorsai. He was big. Not the size of the Graeme twins, Ian and Kensie, who commanded at Gebel Nahar on the Naharese contract; but close to that size and noticeably larger than I was. He wore a Naharese army bandmaster's uniform, with warrant officer tabs at the collar; and he was blond-haired, lean-faced, and no more than in his early twenties. I recognized him as the third son of a neighbor from my own canton of High Island, on the Dorsai. His name was Michael de Sandoval, and little had been heard of

him for six years.

"Sir—Ma'm," he said, stopping in front of us. "Sorry to keep you waiting. There was a problem getting transport."

"Michael," I said. "Have you met Amanda Morgan?"

"No, I haven't." He turned to her. "An honor to meet you ma'm. I suppose you're tired of having everyone say they recognize you from your great-great-grandmother's pictures?"

"Never tire of it," said Amanda cheerfully; and gave him her hand. "But you already know Corunna?"

"The El Man family are High Island neighbors," said Michael. "If you'll come along with me, please? I've already got your luggage in the bus."

"Bus?" I said, as we followed him toward one of the window-wall exits from the terminal.

"The band bus for Third Regiment. It was all I could get."

We emerged on to a small parking pad and Michael de Sandoval led us to a thirty-passenger bus. Inside was only an Exotic in a dark blue robe, white hair and a strangely ageless face, seated in the lounge area at the front of the bus. He stood up as we came in.

"Padma, Outbond to Ceta," said Michael. "Sir, may I introduce Amanda Morgan, Contracts Adjuster, and Corunna El Man, Senior Ship Captain, both from the Dorsai? Captain El Man just brought the Adjuster in by courier."

"Of course, I know about their coming," said Padma.

He did not offer a hand to either of us, nor rise. But, like many of the advanced Exotics I have known, he did not seem to need to. There was a warmth and peace about him that the rest of us were immediately caught up in, and any behavior on his part seemed natural and expected.

We sat down together. Michael ducked into the control compartment, and a moment later, with a soft vibration, the bus lifted from the parking pad.

"It's an honor to meet you, Outbond," said Amanda. "But it's even more of an honor to have you meet us."

Padma smiled slightly.

"I'm afraid I didn't come just to meet you," he said to her. "I had a call to make, and the phones at Gebel Nahar are not as private as I liked. When I heard Michael was coming to get you, I rode along to use the phones in the terminal here."

I could see Amanda signalling me to leave her alone with him. It showed in the way she sat and the angle at which she held her head.

"Excuse me," I told them. "I think I'll go have a word with Michael."

I got up and went forward through the door into the control section, closing it behind me. Michael sat relaxed, one hand on the control rod; and I sat down myself in the copilot's seat.

"How are things at home, sir?" he asked, without turning his head from the sky ahead of us.

"I've only been back this once since you have left, yourself," I said. "But it hasn't changed much. My father died last year."

"I'm sorry to hear that."

"Your father and mother are well—and I hear your brothers are all right, out among the stars," I said. "But, of course, you know that."

"No," he said, still watching the sky ahead. "I haven't heard for quite a while."

A silence threatened.

"How did you happen to end up here?" I asked. It was almost a ritual question between Dorsais away from home.

"I heard about Nahar. I thought I'd take a look at it."

"Did you know it was as fake Hispanic as it is?"

"Not fake," he said. "Something . . . but not that. You know the situation here?"

"No. That's Amanda's job," I said. "I'm just a driver on this trip. Why don't you fill me in?"

"You must know some of it already," he said, "and Ian or Kensie Graeme will be telling you the rest. But in any case El Conde, the titular ruler of Nahar, is only a figurehead. His father was set up with that title by the first Naharese immigrants. They had a dream of starting their own hereditary aristocracy here, but that never really worked. Still, on paper, the Conde's the hereditary sovereign and Commander-in-Chief. But the army's always been drawn from the poor of Nahar and they hate the rich first-immigrants. Now there's a revolution brewing."

"I see," I said. "So the Graeme's contract here is with a government which may be out of power tomorrow. Amanda's got a problem."

"It's everyone's problem," Michael said. "The only reason the army hasn't declared itself for the revolutionaries is because its parts don't work together too well. Coming from the outside, the way you have, the ridiculousness of the locals' attitudes may be what catches your notice first. But actually those attitudes are all the non-rich have, here, outside of a bare existence—this business of the flags, the uniforms, the music, the duels over one wrong glance and the idea of dying for your regiment—or being ready to go at the throat of any other regiment at the drop of a hat."

"But," I said, "what you're describing isn't any practical, working sort of military force."

"No. That's why Kensie and Ian were contracted in here, to turn the local army into something like an actual defensive force. The other principalities around Nahar all have their eyes on the ranchlands, here. Given a normal situation, the Graemes'd al-

ready be making progress—you know Ian's reputation for training troops. But the common soldiers here think of the Graemes as tools of the ranchers. The truth is, I think Kensie and Ian'd be wise to take their loss on the contract and get out."

"If accepting loss and leaving was all there was to it, someone like Amanda wouldn't be needed here," I said. "How about you? What's your position here? You're Dorsai too."

"Am I?" he said to the windshield, in a low voice.

I had at last touched on what had been going unspoken between us. There was a name for individuals like Michael, back home. They were called "lost Dorsai." The name was not used for those who had chosen to do something other than a military vocation. It was reserved for those of Dorsai heritage who seemed to have chosen their life work, whatever it was, and then—suddenly and without explanation—abandoned it. In Michael's case, as I knew, he had graduated from the Academy with honors; but after graduation he had abruptly withdrawn his name from assignment and left the planet, with no explanation.

"I'm Bandmaster of the Third Naharese Regiment," he said, now. "My regiment likes me. The local people don't class me with the rest of you, generally—" he smiled a little sadly, again, "except that I don't get challenged to duels."

"I see—" I said.

The door to the control compartment opened and Amanda stepped in.

"Well, Corunna," she said, "how about giving me a chance to talk with Michael?"

She smiled past me at him; and he smiled back. Her very presence, with all it implied of home, was plainly warming to him.

"Go ahead," I said, getting up. "I'll go say a word to the Outbond."

"He's worth talking to," Amanda spoke after me as I went.

I stepped out, and rejoined Padma. He was looking out the window, down at the plains area that lay between the city and the small mountain from which Gebel Nahar took its name. Around and beyond that mountain—for the fort-like residence that was Gebel Nahar faced east—the actual, open grazing land of the cattle plains began. Our bus was designed to fly at about tree-top level, but right now we were about three hundred meters up. As I stepped out Padma took his attention from the window.

"Michael's been telling me that a revolution seems to be brewing here in Nahar," I said to him. "That wouldn't be what brings someone like you to Gebel Nahar?"

His hazel eyes were suddenly amused.

"I thought Amanda was the one with the questions," he said.

He sat in perfectly relaxed stillness, his hands loosely together in the lap of his robe, light brown against the dark blue. His face was calm and unreadable. "It's part of the overall pattern of events on this world."

"Just this world?"

He smiled back at me.

"Of course," he said gently, "our Exotic science of ontogenetics deals with the interaction of all known human and natural forces, on all the inhabited worlds. But the situation here in Nahar, and specifically the situation at Gebel Nahar, is primarily a result of local, Cetan forces."

"International planetary politics."

"Yes," he said.

"Which ones are backing the revolutionaries?"

He gazed out the window for a moment without speaking. It was a presumptuous thought on my part to imagine that my strange geas, that made people

want to tell me private things, would work on an Exotic. But for a moment I had had the familiar feeling that he was about to open up to me.

"Actually," he said, "all of the five think they have a hand in it on the side of the revolutionaries. But bad as Nahar is, now, it would be a shambles after a successful revolution, with everybody fighting everybody else for different goals. The other principalities all look for a situation in which they can move in and gain. But you're quite right. International politics is always at work, and it's never simple."

"What's really fueling this situation, then?"

"William," Padma looked directly at me and for the first time I felt the remarkable effect of his hazel eyes. His face held such a calmness that all his expression seemed to be concentrated in those eyes.

"William?" I asked.

"William of Ceta."

"That's right," I said, remembering. "He owns this world, doesn't he?"

"It's not really correct to say he owns it," Padma said. "He controls after a fashion, but only by manipulating the outside conditions such as those the ranchers here have to deal with."

"So he's behind the revolution?"

"Yes."

It was plainly William's involvement that had brought Padma to this backwater section of the planet. The Exotic science of ontogenetics, which was essentially a study of how humans interacted, both as individuals and societies, was something they took very seriously; and William, as one of the movers and shakers of our time would always have his machinations closely watched by them.

"Well, it's nothing to do with us, at any rate," I said, "except as it affects the Graeme's contract."

"I wouldn't be so sure," he said. "William hires a

good many mercenaries, directly and indirectly. It would benefit him if events here could lower the Dorsai reputation and market value."

"I see—" I began; and broke off as the hull of the bus rang suddenly—as if to a sharp blow.

"Down!" I said, pulling Padma to the floor of the vehicle.

"What was it?" he asked, after a moment, but without moving.

"Solid projectile slug. Probably from a heavy hand weapon." I told him. "We've been shot at. Stay down, if you please, Outbond."

I got up myself, staying low, and went into the control compartment. Amanda and Michael both looked around at me, their faces alert.

"Who's out to get us?" I asked Michael.

He shook his head.

"Here in Nahar," he said, "it could be anybody. The revolutionaries, or simply someone who doesn't like



the Dorsai; or someone who doesn't like Exotics—or me. It could be someone drunk, drugged, or just in a macho mood."

"—who also has a military hand weapon."

"There's that," Michael said. "But everyone in Nahar is armed; and most of them, legitimately or not, own military weapons. Anyway, we're almost down."

I looked out. The interlocked mass of buildings that was Gebel Nahar was sprawled halfway down from the top of the small mountain. In the tropical sunlight, it looked like a resort hotel. The only difference was that each terrace terminated in a wall, and the lowest of the walls were solid fortifications, with heavy weapons.

"What's the other side like?" I asked.

"Mountaineering cliff—there's heavy weapon emplacements cut out of the rock there, too, and reached by tunnels going clear through the mountain," Michael answered. "The ranchers spared no expense. They and their families might all have to hole up here, one day."

But a few moments later we were on the poured concrete surface of a vehicle pool. The parking area was abnormally silent.

"I don't know what's happened—" said Michael.

A voice shouting brought our heads around. A moment later a soldier wearing an energy sidearm, but dressed in the green and red Naharese army uniform with band tabs, burst into sight and slid to a halt, panting before us.

"Sir—" he wheezed, in the local dialect of archaic Spanish.

We waited for him to get his breath; after a second, he tried again.

"They've deserted, sir!" he said to Michael, trying to pull himself to attention. "They've gone—all the regiments, everybody!"

"When?" asked Michael.

"Two hours past. It was all planned. Certainly, it was planned! In each group, at the same time, a man stood up. He said that now was the time to desert, to show the *ricones* where the army stood. They all marched out, with their flags, their guns, everything. Look!"

He turned and pointed outwards. It was possible to see, from this as from any of the other levels, straight out for miles over the plains. Looking now, we saw tiny, occasional twinkles of reflected sunlight, seemingly right on the horizon.

"They are camped out there."

"Everyone's gone?" Michael's words in Spanish brought the soldier's eyes back to him.

"All but us. The soldiers of your band, sir. We are the Conde's Elite Guard, now."

"Where are the two Dorsai Commanders?"

"In their offices, sir."

"I'll have to go to them right away," said Michael to the rest of us. "Outbond, will you wait in your quarters, or will you come along with us?"

"I'll come," said Padma.

The five of us went across the parking area, between the crowded vehicles and into a maze of corridors. Through these we found our way finally to a large suite of offices, where the outward wall of each room was all window. We found Kensie and Ian Graeme together in one of the inner offices, standing talking before a massive desk large enough to serve as a conference table for a half-dozen people.

They turned as we came in—and once again I was hit by the curious illusion that I usually experienced on meeting these two.

In my own mind I had always laid it to the fact that in spite of their size—and either one is nearly a head taller than I am—they are so evenly proportioned physically that from a distance it is easy to take them

for not much more than ordinary height. Then, having unconsciously underestimated them, you or someone else whose size you know approaches them; and it is that individual who seems to shrink as he, she, or you get close. If it is you, you are directly aware of the change. But if it is someone else, you can still seem to shrink, along with that other person. To feel yourself become smaller that way is a strange sensation, even if it is entirely subjective.

In this case, the measuring element turned out to be Amanda, who ran to the two brothers the minute we entered the room. Her homestead, Fal Morgan, was the one closest to the Graeme home of Foralie and the three of them had grown up together. She was not a small woman, but by the time she had reached them and was hugging Kensie, she seemed to have become not only tiny, but fragile; and suddenly—again, as it always does—the room seemed to orient itself about the two Graemes.

I followed her and held out my hand to the first one I reached, who was Ian.

"Corunna!" he said. His large hand wrapped around mine. His face—so different, yet so like, to his twin brother's—looked down into mine. Only it was not a physical difference, for all its powerful effect on the eye. Literally, it was that Ian was lightless, and all the bright element that might have been in him was instead in his brother, so that Kensie radiated double the human normal amount of sunny warmth. Dark and light. Night and day. Brother and brother.

And yet, there was a closeness between them of a kind that I have never seen in any other two human beings.

"Do you go back right away?" Ian was asking me. "Or will you be staying to take Amanda?"

"I can stay," I said. "Can I be of use here?"

"Yes," Ian said. "You and I should talk. Just a minute, though—"

He turned to greet Amanda in his turn and tell Michael to check and see if the Conde was available for a visit. Michael went out with the soldier who had met us at the vehicle pool. It seemed that Michael and his bandsmen, plus a handful of servants and the Conde himself, added up to the total present population of Gebel Nahar, outside of those in this room. The ramparts were designed to be defended by a handful of people, if necessary; but we had barely more than a handful in the forty members of the regimental band Michael had led, and they were evidently untrained in anything but marching.

We left Kensie with Amanda and Padma. Ian led me into an adjoining office, waved me to a chair, and took one himself.

His arms lay relaxed upon the arms of the chair, his massive hands loosely curved about the ends of those chair arms. There was, as there always had been, something utterly lonely but utterly invincible about Ian. Most non-Dorsais seem to draw a noticeable comfort from having a Dorsai around in times of physical danger, as if they assumed that any one of us would know the right thing to do and so do it. It may sound fanciful, but I have to say that in somewhat the same way as the non-Dorsai reacted to the Dorsai, so did most of the Dorsai I've known always react to Ian.

"It'll take them two days to settle in out there," Ian said now, nodding at the window wall, beyond which lay the nearly invisible encampments on the plain. "After that, they'll either have to move against us, or they'll start fighting among themselves. That means we can expect to be overrun in two days."

"Unless what?" I asked. He looked back at me.

"There's always an unless," I said.

"Unless Amanda can find us an honorable way out of the situation," he said. "As it now stands, there doesn't seem to be any way out. Our only hope is that she can find something in the contract or the situa-

tion that the rest of us have overlooked."

"Isn't there anything you think she might be able to use?" I asked.

"No," he said. "It's a hope against hope. An honor problem."

"What makes it so sensitive that you need an Adjuster from home?" I asked.

"William. You know him, of course. But how much do you know about the situation in Nahar?"

I repeated what I had picked up from Michael and Padma.

"Nothing else?" he asked.

"I haven't had time to find out anything else."

"William . . ." he said. "It's my fault we're into this, rather than Kensie's. I'm the strategist, he's the tactician on this contract. The large picture was my job, and I didn't look far enough."

"If there were things the Naharese government didn't tell you, then there's your out, right there."

"Oh, the contract's challengeable, all right," Ian said. He smiled. I know there are those who like to believe that he never smiles; and that notion is nonsense. But his smile is like all the rest of him. "It isn't the information they held back that's trapped us, it's this matter of honor. Not just our personal honor—the reputation and honor of all Dorsai. They've got us in a position where whether we stay and die or go and live, it'll tarnish the planetary reputation."

I frowned at him.

"How can they do that?"

"Partly," said Ian, "because William's an extremely able strategist himself. Partly, because it didn't occur to me or Kensie that we were getting into a three-party rather than a two-party agreement."

"I don't follow you."

"The type of country the original settlers tried to set up here," he said "was something that could only exist under uncrowded, near-pioneering conditions.

After that, the semi-feudal notion of open plains and large individual holdings of land got to be impractical, on the international level of this world. Of course, the first settlers, those Gallegos from Galicia in northwest Spain, saw that coming from the start. That was why they built this place we're setting in."

His smile came again.

"But that was back when they were only trying to delay the inevitable," he said. "Sometime in more recent years they evidently decided to come to terms with it."

"Bargain with the neighbor countries?"

"Bargain with the rest of Ceta," he said. "Which is William—for all practical purposes."

"There again, if they had an agreement with William that they didn't tell you about," I said, "you've every excuse to void the contract."

"Their deal with William isn't a written, or even a spoken contract," Ian answered. "What the ranchers did was let him know that he could have the control he wanted here in Nahar if he'd meet their terms."

"And what did they want in exchange?"

"A guarantee that their life style and this pocket culture they'd developed would be maintained and protected."

He looked under his dark brows at me.

"I see," I said. "How did they think William could do that?"

"They didn't know. But they didn't worry about it. They just let the fact be known to William that if they got what they wanted they'd stop fighting his attempts to control Nahar directly. That's why there's no other contract we can cite as an excuse to break this one."

"It sounds like William. If I know him," I said, "he'd even enjoy engineering whatever situation was needed to keep this country fifty years behind the times. But you still haven't explained this business of

your being trapped here, not by the contract, but by the general honor of the Dorsai."

Ian nodded.

"William's taken care of both things," he said. "His plan was for the Naharese to hire Dorsai to make their army a working unit. Then his revolutionary agents would cause a revolt of that army. Then he could step in with his own non-Dorsai officers to control the situation and bring order back to Nahar."

"I see," I said.

"He then would mediate the matter," Ian went on, "the revolutionary people would be handed some limited say in the government—under his control, of course—and the ranchers would give up their absolute authority but little of anything else."

"So," I said, thoughtfully, "what he's after is to show that his military people can do things Dorsai can't?"

"That's it," said Ian. "We command the price we do now only because military experts like ourselves are in limited supply. If they want Dorsai results—military situations dealt with at either no cost or a minimum cost, in life and materiel—they have to hire Dorsai. That's as it stands now. But if it looks like others can do the same job as well or better, our price has to go down, and our world will begin to starve."

"It'd take some years for the Dorsai to starve. In that time we could live down the results of this, maybe."

"But it goes farther than that. William isn't the first to dream of being able to hire all the Dorsai and use them as a personal force to dominate the other worlds. We've never considered allowing that yet. But if William can depress our price below what we need to keep the Dorsai free and independent, then he can offer us survival wages, available from him alone, and we'll have no choice but to accept."

"Then you've got no choice, yourself," I said.

"You've got to break this contract, no matter what it costs."

"I'm afraid not," he answered. "The cost looks right now to be the one we can't afford to pay. You'll understand when you see El Conde—"

The door opened and Amanda herself looked in.

"It seems some local people calling themselves the Governors have just arrived—" Her tone was humorous, but every line of her body spoke of serious concern. "Evidently, I'm supposed to go and talk with them right away. Are you coming, Ian?"

"Kensie is all you'll need," Ian said. "We've trained them to realize that they don't necessarily get both of us on deck every time they whistle. You'll find it's just another step in the dance, anyway—there's nothing to be done with them."

"All right," she said, and went out.

"Sure you don't want to be there?" I asked him.

"No need." He got up. "Come along, then. It's important you understand the situation here thoroughly. If Kensie and myself should both be knocked out, Amanda would only have you to help her handle things. I wanted you to meet the Conde de Nahar. I've been waiting to hear from Michael as to whether the old man's receiving, right now, but we won't wait any longer. Let's go see how old the gentleman is."

He led the way out of the room. We left the suite of offices and began to travel the corridors of Gebel Nahar once more. Twice we took lift tubes and once we rode a motorized strip down one long corridor; but at the end Ian pushed open a door and we stepped into what was obviously the orderly room fronting a barracks section.

The soldier bandsman seated behind the desk there came to his feet immediately at the sight of us.

"Sirs!" he said, in Spanish.

"I ordered Mr. de Sandoval to find out for me if the

Conde would receive Captain El Man here, and myself," Ian said in the same language. "Do you know where the Bandmaster is now?"

"No, sir. He has not come back. Sir—it is not always possible to contact the Conde quickly—"

"I'm aware of that," said Ian. "Rest easy. Mr. de Sandoval's due back here shortly, then?"

"Yes, sir. Any minute now. Would the sirs care to wait in the Bandmaster's office?"

"Yes," said Ian.

The orderly turned to usher us through a farther entrance into a larger room, very orderly and with a clean desk, filing cabinets and with its walls hung with musical instruments.

Most of these were ones I had never seen before. There was one that looked like an early Scottish bagpipe. It had only a single drone, some seventy centimeters long, and a chanter about half that length. Another was obviously a keyed bugle of some sort, but with most of its central body length wrapped with red cord ending in dependent tassels. I moved about the walls, examining each as I came to it, while Ian took a chair and watched me. I came back at length to the deprived bagpipe.

"Can you play this?" I asked Ian.

"I'm not a piper," said Ian. "I can blow a bit, of course—but I've never played anything but regular highland pipes. You'd better ask Michael if you want a demonstration. Apparently, he plays everything—and plays it well."

I turned away from the walls and took a seat, myself.

"What do you think?" asked Ian. I was gazing around the office.

I looked back at him and saw his gaze curiously upon me.

"It's . . . strange," I said.

And the room was strange. Just as there are subtle

characteristics by which one born to the Dorsai will recognize another, so there are small signals about the office of anyone on military duty and from that world. So, Michael de Sandoval's office was unmistakably the office of a Dorsai. But, at the same time, it owned a strange difference from any other Dorsai's office.

"He's got these musical instruments displayed as if they were fighting tools," I said, "and no weapons visible."

Ian nodded. If Michael had chosen to hang a banner from one of the walls testifying to the fact that he would absolutely refuse to lay his hands upon a weapon, he could not have announced himself more plainly to Ian and myself.

"It seems to be a strong point with him," I said. "I wonder what happened?"

"His business, of course," said Ian.

"Yes," I said.

But the discovery hit me hard—because suddenly I identified what I had felt in young Michael from the first moment I had met him, here on Ceta. It was pain, a deep and abiding pain; and you cannot have known someone since he was in childhood and not be moved by that sort of pain.

The orderly stuck his head into the room.

"Sirs," he said, "the Bandmaster comes."

"Thank you," said Ian.

A moment later, Michael came in. "Sorry to keep you waiting—" he began.

"Perfectly all right," Ian said. "The Conde made you wait?"

"Yes sir."

"Well, is he available now?"

"Yes sir. You're both most welcome."

"Good." Ian stood up and so did I. "Amanda Morgan is seeing the Governors, at the moment. You might keep yourself available for her."

"I'll be right here," said Michael. "Sir—I wanted to apologize for my orderly's making excuses about my not being here when you came—my men have been told not to—"

"It's all right, Michael," said Ian. "You'd be an unusual Dorsai if they didn't try to protect you."

"Still—" said Michael.

"Still," said Ian, "I know they've trained only as bandsmen. They may be line troops at the moment—all the line troops we've got to hold this place with—but I'm not expecting miracles."

"Well," said Michael. "Thank you, Commander."

We went out. Once more Ian led me through a maze of corridors and lifts.

"How many of his bandsmen decided to stay with him when the regiments moved out?" I asked as we went.

"All of them," said Ian.

"And no one else stayed?"

Ian looked at me with a glint of humor.

"You have to remember," he said, "Michael did graduate from the Academy, after all."

A final short distance down a wide corridor brought us to a massive pair of double doors. Ian touched a visitor's button on the right-hand door and spoke to an annunciator panel in Spanish.

"Commander Ian Graeme and Captain El Man are here with permission to see the Conde."

There was the pause of a moment and then one of the doors opened to show us another of Michael's bandsmen.

"Be pleased to come in, sirs," he said.

"Thank you," Ian said as we walked past. "Where's the Conde's majordomo?"

"He's gone, sir. Also the other servants."

"I see."

The room we had just been let into was a wide foyer filled with enormous and magnificently-kept furni-

ture but lacking windows. The bandsman led us through two more rooms like it, into a third, finally window-walled room. A stick-thin old man dressed in black was standing with the help of a silver-headed cane, before the center of the window area.

The soldier slipped out of the room. Ian led me to the old man.

"El Conde," he said Spanish, "may I introduce Captain Corunna El Man? Captain, you have the honor of meeting El Conde de Nahar, Macias Francisco Ramón Manuel Valentin y Compostela y Abente."

"You are welcome, Captain El Man," said the Conde. He spoke a more correct, if more archaic, Spanish than that of the other Naharese I had so far met; and his voice was the thin remnant of what once must have been a remarkable bass. "We will sit down now, if you please. If my age produces a weakness, it is that it is wearisome to stand for any length of time."

We settled ourselves in heavy, overstuffed chairs with massively padded arms—more like thrones than chairs.

"Captain El Man," said Ian, "has brought Amanda Morgan here to discuss the present situation with the Governors. She's talking to them now."

"I have not met . . ." the Conde hesitated over her name, "Amanda Morgan."

"She is one of our experts."

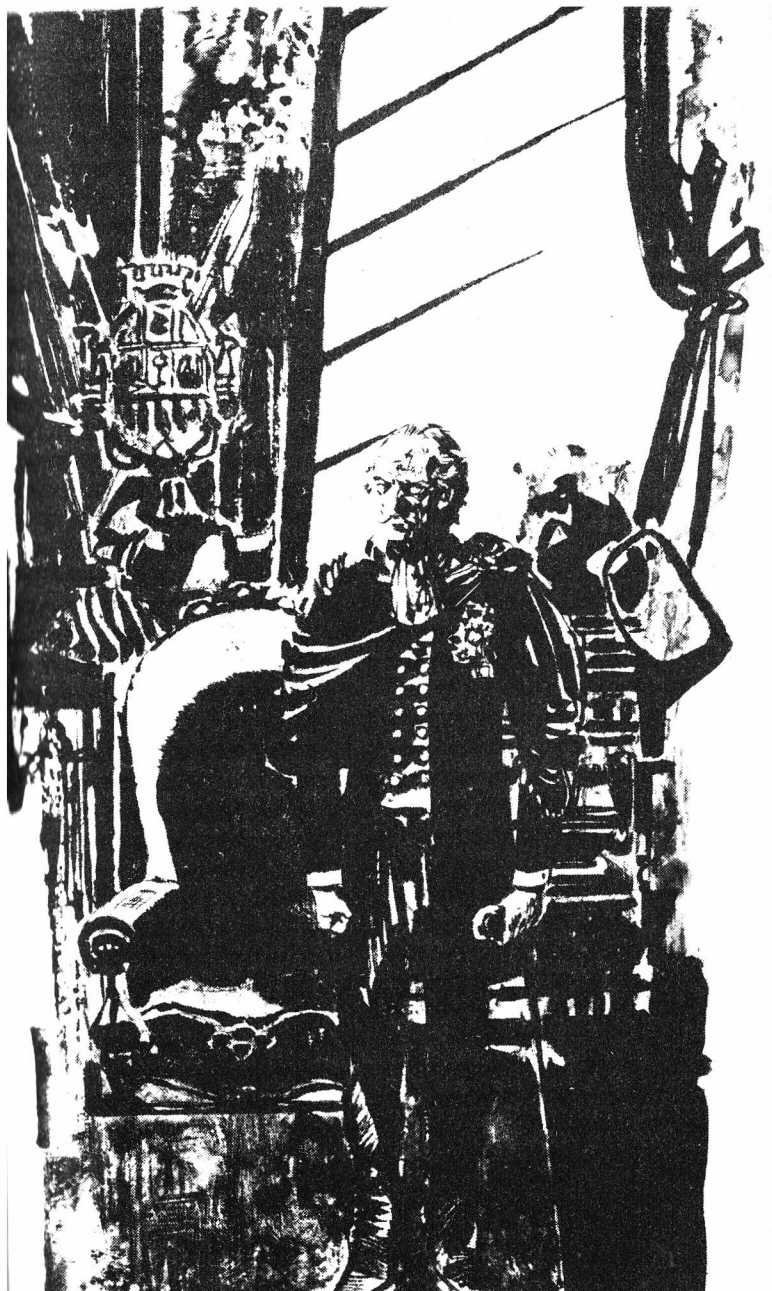
"I would like to meet her."

"She's looking forward to meeting you."

"Possibly this evening? I would have liked to have had all of you to dinner, but my servants have gone."

"I just learned that," said Ian.

"They may go," said the Conde. "They will not be allowed to return. Nor will the regiments who have deserted their duty be allowed to return to my armed forces."



"With the Conde's indulgence," said Ian, "we don't yet know all their reasons for leaving. Perhaps some leniency is justified."

"I can think of none." The Conde's back was as erect as a flagstaff and his dark eyes did not waver. "But, if you think so, I can reserve judgment momentarily."

"We'd appreciate that," Ian said.

"You are very lenient." The Conde looked at me. His voice took on an unexpected timbre. "Captain, has the Commander here told you? Those deserters out there—" he flicked a finger toward the window and the plains beyond, "under the instigation of people calling themselves revolutionaries, have threatened to take over Gebel Nahar. If they dare to come here, I and what few loyal servants remain will resist. To the death!"

"The Governors—" Ian began.

"The Governors have nothing to say in the matter!" the Conde turned fiercely on him. "Once, their fathers and grandfathers chose my father to be El Conde. I inherited that title and while I live, I will be El Conde. I will remain, I will fight—alone if need be—as long as I am able. But I will retreat, never! I will compromise, *never!*"

He continued to talk for some minutes; but although his words changed, the message of them remained the same. He would not give an inch to anyone who wished to change the governmental system in Nahar. He would never yield, in spite of reason or the overwhelming odds against him.

After a while he ran down. He apologized graciously for his emotion, but not for his attitude; and after a few minutes more of meaninglessly polite conversation on the history of Gebel Nahar itself, let us leave.

"So you see part of our problem," said Ian to me when we were alone again, walking back to his of-

fices. "We can't just abandon him."

We went a little distance together in silence.

"Part of that problem," I said, "seems to lie in the difference between our idea of honor, and theirs. Did you ever read Calderon's poem about the Mayor of Zalamea?"

"I don't think so. Calderon?"

"Pedro Calderon de la Barca, seventeenth century Spanish poet. He wrote a poem called *El Alcalde de Zalamea*."

I gave him the lines of which he had reminded me.

*Al Rey la hacienda y la vida
Se ha de dar; pero el honor
Es patrimonio del alma
Y el alma sólo es de Dios.*

"—*Fortune and life we owe to the King,*" murmured Ian, "*but honor is patrimony of the soul and the soul belongs to God alone.*" I see what you mean."

I started to say something, then decided it was too much effort. I was aware of Ian glancing sideways at me as we went.

"When did you eat last?" he asked.

"I don't remember," I said. "But I don't particularly need food right now."

"You need sleep, then," said Ian, "I'm not surprised, after the way you made it here from the Dorsai."

"Yes," I said.

Now that I had admitted to tiredness, it was an effort even to think. For those who have never navigated between the stars, it is easy to forget the implications of the fact that danger increases rapidly with the distance moved in a single shift—beyond a certain safe amount of light-years. For three days I had had no more than catnaps between periods of calculation. I was numb with a fatigue I had held at bay until this moment with the body adrenalin.

The bandsman supplied by Ian showed me at last

to my suite. It consisted of three window-walled rooms, each with a door in it to let me out onto a small balcony running the length of this particular level. The balcony was divided into areas for each suite by tall plants in pots at each division point.

I checked balcony and suite, locked the doors, and slept.

It was sometime after dark when I awoke, suddenly, to the sound of the call chime at the front door of my suite.

I reached over and keyed on the annunciator circuit.

"Yes?" I said. "Who is it?"

"Michael de Sandoval," said Michael's voice, "can I come in?"

I touched the stud that unlocked the corridor door in the adjoining sitting room. It swung open, letting in a knife-blade sharp swath of light I could see through the doorway to my bedroom. I was on my feet and moving to meet him in the sitting room as the door closed behind him.

"What is it?" I asked.

"The ventilating system's gone out on this level," he said; and I realized that the air in the suite was now perfectly motionless—motionless and beginning to be a little warm and stuffy.

"I wanted to check the quarters of everyone on this level," Michael said. "I'd suggest I open the door to the balcony for you, sir."

"Thanks," I said. "What was the situation with the servants? Were they revolutionary sympathizers, too?"

"Not necessarily." He unlocked the door and propped it open to the night air, which came coolly and sweetly through the aperture. "They just didn't want their throats cut along with the Conde's, when the army stormed its way back in here."

"I see," I said.

"Yes." He came back to me in the center of the sitting room.

"What time is it?" I asked. "I've been sleeping as if I was under drugs."

"A little before midnight."

I sat down in one of the chairs of the unlighted sitting room. The glow of the soft exterior lights spaced at ten meter intervals along the balcony came dimly through the window wall.

"Sit for a moment," I said. "Tell me. How did Amanda do with the Governors?"

I barely saw the shrug of his shoulders in the gloom.

"There was nothing much to be done with them," he said. "They wanted reassurances that Ian and Kensie could handle the situation. Effectively, it was all choreographed."

"They've left, then?"

"That's right. They asked for guarantees for the safety of the Conde. Both Ian and Kensie told them that there was no such thing as a guarantee; but we'd protect the Conde, of course, with every means at our disposal. Then they left."

"It sounds," I said, "as if Amanda could have saved her time and effort."

"No. She said she wanted to get the feel of them," he leaned forward. "You know, she's something to write home about. She says there's no question that there's a way out—it's just that finding it in the next twenty-four to thirty-six hours is asking a lot."

"I see," I said. "Is there anything I can do? Would you like me to spell you on the duty officer bit?"

"You're to rest, Ian says. He'll need you tomorrow. I'm getting along fine with my duties." He moved toward the front door of the suite. "Good night."

"Good night," I said.

He went out, the knife of light from the corridor briefly cutting across the carpeting of my sitting

room again and vanishing as the door latched behind him.

I stayed where I was, enjoying the night breeze through the propped-open door. I may have dozed. At any rate I came to, suddenly, to the sound of voices from the balcony. Not from my portion of the balcony, but from the portion next to it, beyond my bedroom window to the left.

". . . yes," a voice was saying. Ian had been in my mind; and for a second I thought I was hearing him speak. But it was Kensie.

"I don't know . . ." It was Amanda's voice answering, a troubled voice.

"Time goes by quickly," Kensie said. "Look at us. It was just yesterday we were in school together."

"I know," she said, "you're talking about it being time to settle down. But maybe I never will."

"How sure are you of that?"

"Not sure, of course." Her voice changed as if she had moved some little distance from him.

"Then you could take the idea of settling down under consideration."

"No," she said. "I know I don't want to do that."

Her voice changed again, as if she had turned and come back to him. "Maybe I'm ghost-ridden, Kensie. Maybe it's the old spirit of the first Amanda that's ruling out the ordinary things for me."

"She married—three times."

"But her husbands weren't important to her, that way. She really belonged to everyone, not just to her husbands and children. Don't you understand? I think that's the way it's going to have to be for me, too."

He said nothing. After a long moment she spoke again, and her voice was lowered, and drastically altered.

"Kensie! Is it that important?"

His voice was lightly humorous, but the words



came a fraction more slowly than they had before.

"It seems to be."

"But it's something we both just fell into, as children. It was just an assumption on both our parts. Since then, we've grown up. You've changed. I've changed."

"Yes."

"You don't need me. Kensie, you don't need *me*—" her voice was soft. "Everybody loves you."

"Could I trade?" The humorous tone persisted. "Everybody for you?"

"Kensie, don't!"

"You ask a lot," he said; and now the humor was gone, but there was still nothing in the way he spoke that reproached her. "I'd probably find it easier to stop breathing."

There was another silence.

"Why can't you see? I don't have any choice," she said. "We're both what we are, and stuck with what we are."

"Yes," he said.

The silence, this time, lasted. But they did not move. My ear was now sensitized. They had been standing apart, and they stayed standing apart.

"Yes," he said again, finally—and this time it was a long, slow yes, a tired yes. "Life moves. And all of us move with it, whether we like it or not."

She moved to him, now.

"You're exhausted," she said. "Get some rest. Things'll look different in the daylight."

"That sometimes happens." The humor was back, but there was effort behind it. "Not that I believe it, in this case."

They went back inside.

I sat where I was, wide awake. There had been no way for me to get up and get away from their conversation without letting them know I was there. I still had the ugly feeling that I had been intruding where I should not have been.

There was no point in moving now. I sat where I was, so concerned with my own feelings that I did not pay close attention to the sounds around me. A small noise in my own entrance to the balcony area alerted me; and I looked up to see a dark silhouette in the doorway.

"You heard," Amanda's voice said.

"Yes," I told her. "I happened to be sitting here when you came out on the balcony. There was no chance to shut the door or move."

"It's all right," she came in. "No, don't turn on the light."

I dropped the hand I had lifted toward the control studs in the arm of my chair. With the illumination from the balcony behind her, she could see me better than I could see her. She sat down in the chair Michael had occupied a short while before.

"I told myself I'd step over and see if you were sleeping," she said. "Ian has a lot of work for you tomorrow. But I think I was really hoping to find you awake."

"I don't want to intrude," I said.

"If I reach out and haul you in by the scruff of the neck, are you intruding? I'm the one who's thinking of intruding—of intruding my problems on you."

"That's not necessarily an intrusion," I said.

"I hoped you'd feel that way," she said. "I need to have all my mind on what I'm doing here and personal matters have ended up getting in the way."

She paused.

"You don't really mind people spilling all over you?"

"No," I said.

"I thought so. I had the feeling you wouldn't. Do you think of Else much?"

"When other things aren't on my mind."

"I wish I'd known her."

"She was someone to know."

"Yes. Knowing someone else is what makes the difference. The trouble is, often we don't know. Or we don't know until too late." She paused. "I suppose you think, after what you heard just now, that I'm talking about Kensie?"

"Aren't you?"

"No. Kensie and Ian—the Graemes are so close to us Morgans that we might as well all be related. You don't usually fall in love with a relative when you're young. The kind of person you imagine falling in love with is someone strange and exciting—someone from fifty light years away."

"I don't know about that," I said. "Else was a neighbor and I think I grew up being in love with her."

"I'm sorry." Her silhouette shifted a little in the darkness. "I'm really just talking about myself. When I was younger, I just assumed I'd wind up with Kensie, that I'd have to have something wrong with me not to want someone like him."

"And you've got something wrong with you?" I said.

"Yes," she said. "That's it. I grew up, that's the trouble."

"Everybody does."

"I don't mean I grew up physically. I mean, I ma-

tured. We live a long time, we Morgans, and I suppose we're slower growing up than most. Did you ever have a wild animal as a pet as a child?"

"Several," I said.

"Then you've run into what I'm talking about. While it's young, it's cuddly and tame; but when it grows up, the day comes when it bites or slashes at you without warning. People talk about that being part of their wild nature. But it isn't. Humans change the same way. You grow up. Then the day comes when someone tries to play with you and you aren't in a playing mood—and you react with '*Back off! What I want is just as important as what you want!*' And all at once, the time of your being young and cuddly is over, forever."

"Of course," I said. "That happens to all of us."

"But to us—to us Dorsai—it happens too late!" she said. "That's the cruel part of it. Or rather, we start life too early. By the age of seventeen we have to be out and working like an adult, either at home or on some other world. We're pitchforked into adulthood. There's never any time to take stock, to realize what it's going to turn us into. We don't realize we aren't cubs any more until one day we slash or bite someone without warning; and then we know we've changed. But it's too late then for us to adjust to the change in the other person because we've already been trapped by our own change."

She stopped. I sat, waiting. From my experience with this sort of thing since Else died, I knew that I no longer needed to talk. She would carry the conversation, herself.

"No, it wasn't Kensie I was talking about when I first came in here and said the trouble is you don't know someone else until too late. It's Ian."

"Ian?" I echoed.

"Yes," she said. "When I was young, I didn't understand Ian. I do now. Then, I thought he was simply

solid all the way through, like a piece of wood. But he's not. Everything you can see in Kensie is there in Ian, only there's no light to see it by. Now I know. And now it's too late."

"Too late?" I said. "He's not married, is he?"

"Married? Not yet. But you didn't know? Look at the picture on his desk. Her name's Leah. She's on Earth. He met her there, four years ago. But that's not what I mean. I mean—it's too late for me. I've got the curse of the first Amanda. I'm born to belong to a lot of people, first; and to any single person, second. As much as I'd give for Ian, that equation would sooner or later put even him in second place for me. I can't do that to him.

"Maybe Ian'd be willing to agree to those terms."

She did not answer for a second. Then I heard a slow intake of breath from the darker darkness that was her.

"Would you suggest something like that to Ian if our positions were reversed?"

"I didn't suggest it," I said. "I mentioned it."

Another pause.

"You're right," she said. "I know what I want and what I'm afraid of in myself, and it seems to me so obvious I keep thinking everyone else must know too."

She stood up.

"Thank you, Corunna," she said.

"I've done nothing," I said.

"Thank you, anyway. Good night. Sleep if you can."

She stepped out through the door; and through the window wall I watched her, very erect, pass to my left until she walked out of my sight beyond the sitting room wall.

I went back to bed, not really expecting to fall asleep again easily. But I dropped off and slept like a dead man.

When I woke it was morning and my bedside phone was chiming. I flicked it on and Michael looked at me out of the screen.

"I'm sending a man up with maps of the interior of Gebel Nahar," he said, "so you can find your way around. Breakfast's available in the General Staff Lounge, if you're ready."

"Thanks," I told him.

I got up and was ready when his bandsman arrived; and the bandsman showed me to the General Staff Lounge. Ian was the only other there and he was just finishing his meal.

"Sit down," he said.

I sat.

"I'm assuming we'll be defending this place in twenty-four hours or so," he said. "I'd like you to familiarize yourself with its defenses, particularly the first line of walls and its weapons, so that you can either direct the men working them, or take over the general defense."

"What have you got in mind for a general defense?" I asked.

"We've got just about enough of Michael's troops to man that first wall and have a handful in reserve," he said. "Most of them have never touched anything but a handweapon in their life, but we've got to use them to fight with the emplaced energy weapons against foot attack up the slope. I'd like you to drill them on the weapons. Get breakfast in you; and I'll tell you how I expect the regiments to attack and what we might do when they try it."

He went on talking while my food came and I ate. Boiled down, his expectations were of a series of infantry wave attacks up the slope until the first wall was overrun. He planned a defense of the first wall until the last safe moment, then destruction of the emplaced weapons, and a quick retreat to the second wall with its weapons—and so, step by step, retreat-

ing up the terraces. It was essentially the sort of defense that Gebel Nahar had been designed for by its builders.

The problem would be in getting absolutely green troops like the Naharese bandsmen to retreat cool-headedly. If they could not, then the first wave over the ramparts could reduce their numbers to the point where there would not be enough of them to make any worthwhile defense of the second terrace, to say nothing of the third, the fourth, and so on, and still have men left for a final stand within the top three levels.

Given an equal number of veteran, properly trained troops, to say nothing of Dorsai-trained ones, we might even have held Gebel Nahar in that fashion and inflicted enough casualties to eventually make them pull back. But the most we could hope to do with what we had was inflict a maximum of damage while losing.

I finished eating and got up to go.

"Where's Amanda?" I asked.

"She's working with Padma," Ian said.

"I didn't know Exotics took sides."

"He's not," Ian said. "He's just making—his knowledge available. That's standard Exotic practice as you know as well as I do. He and Amanda are still hunting some political angle."

"What do you think their chances are?"

Ian shook his head.

"But," he said, shuffling together the papers he had spread out before him on the lounge table, "of course, where they're looking is a far ways out, beyond the areas of strategy I know. We can hope."

He got up, holding his papers and went out; I to Michael's office, he to his own.

Michael was not in his office. The orderly directed me to the first wall; and I found him there, already drilling his men on the emplaced weapons. I worked

with them for most of the morning and then we stopped, because his untrained troops were exhausted and beginning to make mistakes simply out of fatigue.

Michael sent them to lunch. He and I went back to his office and had sandwiches and coffee brought in by his orderly.

"What about this?" I asked, after we were done, getting up and going to the wall where the archaic-looking bagpipe hung. "I asked Ian about it, but he said he'd only played highland pipes; and that if I wanted a demonstration, to ask you."

Michael looked up from his seat behind his desk.

"That's a *gaita gallega*," he said. "Or, to be correct, it's a local imitation of the *gaita gallega* you can still find back on Earth. It's a perfectly playable instrument to anyone who's familiar with the highland pipes. Ian could have played it."

"He seemed to think you could play it better," I said.

"Well . . ." Michael grinned again. "Perhaps, a bit. Do you really want to hear it?" he asked.

"Yes, I would."

He took it down from the wall.

"We'll have to step outside," he said.

We went back out on to the first terrace. He swung the pipe up in his arms, the long single drone resting on his left shoulder and pointing up into the air behind him. He took the mouthpiece between his lips and laid his fingers across the holes of the chanter. Then he blew up the bag and began to play.

Michael played something Scottish and standard—*The Flowers of the Forest*, I think—pacing slowly up and down. Then, abruptly he swung around and stepped out, playing something entirely different.

I wish there were words in me to describe it. It was anything but Scottish. It was hispanic, right down to

its backbones—a wild, barbaric, musically ornate challenge that heated the blood in my veins.

He finished at last with a sort of dying wail as he swung the deflating bag down from his shoulder. He looked drawn and old.

“What was that?” I demanded.

“It’s got a polite name for polite company,” he said. “But nobody uses it. The Naharese call it *Su Madre*.”

“*Your Mother?*” I echoed. Then, of course, it hit me. The Spanish language has a number of elaborate and poetically insulting curses to throw at your enemy about his ancestry; and the words *su madre* are found in most of them.

“Yes,” said Michael. “It’s what you play when you’re daring the enemy to come out and fight. It accuses him of being less than a man in all the senses of that phrase—and the Naharese love it.”

He sat down on the rampart suddenly, like someone very tired and discouraged.

“And they like me,” he said, “My bandsmen, my regiment—they like me.”

“Usually,” I said, “men like their Dorsai officers.”

“That’s not what I mean.” He was still staring at the wall. “I’ve made no secret here of the fact I won’t touch a weapon. They’ve all known it from the day I signed on.”

“I see,” I said. “So that’s it.”

He looked up at me, abruptly.

“Do you know how they react to cowards—as they consider them—in this splinter culture? They show their manhood by knocking them around here. But they don’t touch me. They don’t even challenge me to duels, as I said.”

“They don’t believe you,” I said.

“That’s it.” His face was almost savage. “Why not?”

“Because you only say you won’t use a weapon,” I told him bluntly. “In body language and every other

language you speak, you broadcast just the opposite information—that you're so good none of them who'd challenge you would stand a chance. You could not only defeat someone like that, you could make him look foolish. The message is in the very way you walk and talk. How else could it be?"

"That's not true!" he got suddenly to his feet, holding the gaita. "I live what I believe in—"

He stopped.

"Maybe we'd better get back to work," I said.

"No!" The word burst out of him. "I want to tell someone. I want someone to . . ."

He broke off. He had been about to say "someone to understand . . ." but I could not help him. There is something in me that tells me when to speak and when not to.

And now I was being held silent.

He struggled with himself for a few seconds, and then calm seemed to flow over him.

"No," he said, as if talking to himself, "what people think doesn't matter. But we're not likely to live through this and I want to know how you react."

He looked at me.

"I've got to know how they'd take it, back home," he said, "if I could explain it to them. And your family is like mine, from the same canton, the same neighborhood, the same sort of ancestry . . ."

"Did it occur to you you might not owe anyone an explanation?" I said. "When your parents raised you, they only paid back the debt they owed their parents for raising them. If you've any obligation it's to the Dorsai in general, to bring in interstellar exchange credits. And you've done that by becoming bandmaster here. Anything beyond that's your own private business."

It was quite true. The vital currency between worlds was not wealth, but work credits. The inhabited worlds trade special skills, packaged in

human individuals; and the exchange credits earned by a Dorsai on Newton enables the Dorsai to hire a geophysicist from Newton—or a physician from Kultis. Michael had been earning such credits ever since he had come here. True, he might have earned these at a higher rate if he had chosen work as a mercenary combat officer; but the credits he did earn as bandmaster more than justified the expense of his education and training.

"I'm not talking about that—" he began.

"No," I said, "you're talking about a point of obligation and honor not very different from what the Naharese use."

He stood for a second, absorbing that.

"You're telling me," he said "you don't want to listen."

"Now," I said, "you really are talking like a Naharese."

"Yes," he said, suddenly weary. "Would you sit down?"

He gestured to the rampart and sat down himself.

"Do you know I'm a happy man?" he demanded. "I really am. I've got everything I could want. I've got a military job I like. I'm in touch with all the things that I grew up thinking made the kind of life one of my family ought to have. I'm better at what I do than anyone else they can find—and I've got my other love, music, as my main duty. My men like me.

I nodded, watching him.

"But then there's this other part . . ." His hands closed on the gaita's bag, and there was a faint sound from the drone.

"Your refusal to fight?"

"Yes." He got up and began to pace, holding the instrument, talking jerkily. "This feeling against hurting anything . . . I've had it as long as I've had the other—all the dreams I made up as a boy from the stories I heard. When I was young it didn't matter

that the feeling and the dreams hit head on. It just always happened that, in my visions, the battles I won were always bloodless. No one ever got hurt. I didn't worry about any conflict, then. It was something that would take care of itself later. But what was in me didn't change. It was there with me all the time, not changing."

"No normal person likes the actual fighting and killing," I said. "What sets our people off by ourselves is that often we *can* win without having dead bodies piled all over the place. Our way justifies itself by saving employers money; but also it gets us away from the essential brutality of combat and keeps us human. Remember what Cletus says about that? He hated killing just as much."

"But he could do it when he had to," Michael looked at me with a face drawn tight. "So can you. Or Ian. Or Kensie."

That was true, of course. I could not deny it.

"You see," said Michael, "that's the difference between life and at the Academy. In life, sooner or later, you get to the killing part. When I graduated and faced going out as a fighting officer, I finally had to decide. And I did. I won't hurt anyone—even to save my own life, I think. But at the same time I'm bred and born a soldier. I don't want any other life, I can't conceive of any other; and I love it."

He broke off, and stood, staring out at the flashes of light from the camp of the deserted regiments.

"Well, there it is," he said.

"Yes," I said.

He turned to look at me.

"Will you tell my family that?" he asked. "If you should get home and I don't?"

"All right," I said. "But we're not dead, yet."

He grinned, unexpectedly—a sad grin.

"I know," he said. "It's just that I've had this on my conscience for a long time. You don't mind?"

"Of course not."

He hefted the gaita in his hands.

"My men will be back out here in about fifteen minutes," he said. "I can carry on the drilling myself, if you've got other things you want to do."

I looked at him a little narrowly.

"What you're trying to tell me," I said, "is that they'll learn faster if I'm not around."

"Something like that." He laughed. "They're used to me; but you make them self-conscious."

"Whatever works," I said. "I'll go and see what else Ian can find for me to do."

I turned and went to the door that would let me back into the interior of Gebel Nahar.

"Thank you again," he called after me. I waved at him and went inside.

I found my way back to Ian's office. He was not there, so I went looking, and found Kensie with his desk covered with large scale printouts of terrain maps.



"Ian?" he said. "No, I don't know. But he ought to be back soon. I'll have some work for you tonight. I want to mine the approach slope. Michael's bandsmen can do the actual work; but you and I are going to need to go out first and make a sweep to pick up any observers the regiments have sent. Then, later, before dawn I'd like to do a scout of their camp and get some hard ideas as to how many of them there are, what they have to attack with, and so on. . ."

"Fine," I said. "I'm slept up. Call me when you want."

"You could try asking Amanda if she knows where Ian is."

Amanda and Padma were in a conference room two doors down from Kensie's office, seated at one end of a table covered with text printouts and an activated display screen. Amanda was studying the screen and they looked up as I came in. But while Padma's eyes were sharp, Amanda's were abstract.

"I'll come," Padma said to me before I could speak.

He got up and came to me, stepping into the outside room and shutting the door behind him.

"I'm trying to find Ian."

"I don't know where he'd be just now," said Padma.

I nodded toward the door he had just shut.

"It's getting rather late, isn't it," I asked, "for Amanda to hope to turn up some sort of legal solution?"

"Not necessarily." Next to the window wall of the outer office were several armchairs. "Why don't we sit down there? If he comes in from the corridor, he's got to go through this office, and if he comes out on the terrace of this level, we can see him through the window."

We went over and took chairs.

"It's not exact, actually, to say that there's a legal way of handling this situation that Amanda's looking for.

"You might get a better word picture if you said what Amanda is searching for is a *social* solution to the situation."

"I see," I said. "This morning Ian talked about Amanda saying that there always was a solution, but the problem here was to find it in so short a time. Did I hear that correctly?"

"There's always any number of solutions," Padma said. "The problem is to find the one you'd prefer. Once they happen, of course, they become history—"

He smiled at me.

"—And history, so far, is something we can't change. But changing what's about to happen simply requires getting to the base of the forces involved in time. What takes time is identifying the forces, finding what pressures are possible and where to apply them."

"And we don't have time."

"No," he said. "In fact, you don't."

I looked squarely at him.

"In that case, shouldn't you be thinking of leaving, yourself?" I said. "Aren't you too valuable to get your throat cut by some battle-drunk soldier?"

"I'd like to think so," he said. "But we think the value of studying people as closely as possible at times like this is important enough to take priority over everything else."

"People? You can't mean us who are here. Who then? William?" I said. "The Conde? Someone in the revolutionary camp?"

Padma shook his head.

"All of you, one way or another, have a hand in shaping history. But who shapes it largely, and who only a little is something I can't tell you. The science of ontogenetics isn't that sure. As to whom I may be studying, I study everyone."

It was a gentle, but impenetrable, shield he set up.

"Maybe you can explain how Amanda or you go about looking for a solution?" I said.

"It's a matter of looking for the base of the existing forces at work—"

"The ranchers—and William?"

He nodded.

"Particularly William—since he's the prime mover. To get results, William or anyone else had to set up a structure of cause and effect, operating through individuals. For anyone else to control the forces already set to work, it's necessary to find where that structure is vulnerable to cross-pressures and arrange for those to operate—again through individuals."

"And Amanda hasn't found a weak point yet?"

"Of course she has. Several." He frowned at me, but with a touch of humor. "But none that can be implemented between now and sometime tomorrow, if the regiments attack Gebel Nahar then."

I had a strange sensation. As if a gate was slowly but inexorably being closed in my face.

"It seems to me," I said, "the easiest thing to change would be the position of the Conde. If he'd just agree to come to terms with the regiments, the whole thing would collapse."

"Obvious solutions are usually not the easiest," Padma said. "Stop and think. Do you really think the Conde would change his mind?"

"No. You're right," I said. "He's a Naharese. More than that, he's honestly an hispanic. *El honor* forbids that he yield to soldiers threatening to destroy him."

"But tell me," said Padma, watching me. "Even if *el honor* was satisfied, would he want to treat with the rebels?"

I shook my head.

"No," I said. "You're right again. This is the great moment of his life, the chance for him to substantiate that paper title of his, to make it real. This way he can

prove to himself he's a real aristocrat. He'd give his life—in fact, he can hardly wait to give his life—to prove that."

There was a little silence.

"So you see," said Padma. "And what other ways can you see a solution being found?"

"Ian and Kensie could void the contract. But they won't. No responsible officer from our world would risk giving the Dorsai the sort of bad name that could give, and neither of those two brothers would abandon the Conde as long as he insisted on fighting."

"What other ways, then?"

"I can't think of any," I said. "I'm out of suggestions—which is probably why I was never considered for anything like Amanda's job, in the first place."

"As a matter of fact, there are a number of other possible solutions," Padma said softly. "There's the possibility of bringing counter economic pressure upon William. There's also the possibility of bringing social and economic pressure upon the ranchers; and there's the possibility of disrupting the control of the revolutionaries who've come in from outside Nahar to run this rebellion. But none of these solutions can very easily be made to work in the short time we've got."

"In fact, there's no solution that can be made to work in time," I said.

Padma shook his head.

"No. If we could stop the clock at this second and take the equivalent of some months to study the situation, we'd undoubtedly find not only one, but several solutions. What's lacking isn't time to act, since that's merely something specified for the solution. What's lacking is time in which to find the solution that will work in the time there is to act."

"So you mean," I said, "that we're to sit here tomorrow and face the attack of six thousand line sol-

diers, all the time knowing there's a way in which that attack doesn't have to happen, if only we had the sense to find it?"

"The sense—and the time," said Padma. "But you're right."

The door I had sensed closing had just closed. It was unbelievable. I am Dorsai. The words "*Abandon hope . . .*" have no emotional reality for me. But there was no shadow of a doubt that this was what Padma was telling me.

PART TWO

"I see," I said. "Well, I find I don't accept it that easily."

"No." Padma's gaze was level and cooling upon me. "Neither does Amanda. Neither does Ian or Kensie. Nor, I suspect, even Michael. But then, you're all Dorsai."

I said nothing.

"In any case," Padma went on. "None of you are being called on to merely accept it. Amanda's still at work. So is Ian, so are all the rest of you. I didn't mean to sneer at the reflexes of your culture. I envy you—a great many people envy you—that inability to give in. My point is that the fact we know there's an answer makes no difference."

"True enough," I said—and at that moment we were interrupted.

"Padma?" It was the general office annunciator speaking from the walls around us with Amanda's voice.

Padma got to his feet.

"I've got to go," he said.

He went out. I sat where I was, held by that odd little melancholy that had caught me up at moments

all through my life. It is not a serious thing, just a touch of loneliness and sadness at the fact that life is measured; and there are only so many things that can be accomplished, try how you may.

Ian's return woke me out of it.

I got up.

"Corunna!" he said, and led the way into his private office. "How's the training going?"

"As you'd expect," I said. "I left Michael alone with them, at his suggestion. He thinks they might learn faster without my presence to distract them."

"Possible," said Ian.

He stepped to the window wall and looked out.

"They don't seem to be doing badly," he said.

He was still on his feet, of course, and I was standing next to his desk. I looked at it now, and found the cube holding the image Amanda had talked about. The woman pictured there was obviously not Dorsai, but there was something not unlike our people about her. She was strong-boned and dark-haired, the hair sweeping down to her shoulders, longer than most Dorsais out in the field would have worn it, but not long according to the styles of Earth.

I looked back at Ian. His face was turned toward the wall beyond which Amanda would be working with Padma at this moment. I noticed a tiredness about him. Not that it showed anywhere specifically in the lines on his face. He was, as always, like a mountain of granite, untouchable. But the way he stood spoke of a fatigue—perhaps one of the spirit rather than of the body.

"I just heard about Leah," I nodded at the image cube.

He turned.

"Leah? Oh, yes." His own eyes went to the cube and away again. "Yes, she's Earth. I'll be going to get her after this is over. We'll be married in two months."

"That soon?" I grinned at him. "I hadn't even heard

you'd fallen in love."

"Love?" he echoed. His eyes were still on me, but their attention had gone away again. "No, it was years ago . . ."

His attention focused, suddenly. He was back with me. "Sit down," he said. "Have you talked to Kensie?"

"Just a little while ago."

"He's got a couple of runs outside the walls he'd like your hand with, tonight after dark's well settled in."

"He told me about them," I said. "A sweep of the slope in front to clear it before laying mines, and a scout of the regimental camp before tomorrow."

"That's right," Ian said.

"Do you have any solid figures on how many they'll have?"

"Regimental rolls," said Ian, "give us over five thousand of all ranks. Fifty-two hundred and some. But something like this invariably attracts a number of Naharese who scent the chance for personal glory. Then there're perhaps seven or eight hundred honest revolutionaries in Nahar, plus a hundred or so agents provocateurs from outside."

"In something like this, we can discount the civilians?"

Ian nodded.

"How many of the actual soldiers'll have had any actual combat experience?" I asked.

"Combat experience here," Ian said, "means a border clash with the armed forces of the surrounding principalities. Maybe one in ten of the line soldiers has had that. On the other hand, every Naharese male has dreamed of a moment like this."

"So they'll all come on hard with the first attack," I said.

"That's as I see it," said Ian, "and Kensie agrees. I'm glad to hear it's your thought, too. If we can throw

them back even once, some won't come again. And so on. They won't lose heart as a group, but each setback will take the heart out of some, and we'll work them finally down to the hard core that's serious about being willing to die, if only they can reach us."

"Yes," I said, "how many do you think?"

"That's the problem," said Ian, calmly. "At the very least, there's going to be one in fifty we'll have to kill to stop. Even if half of those are already out of it by the time we get down to it, that's sixty left; and we've got to figure thirty percent casualties ourselves—Man to man, on the attackers making it over the walls, the bandsmen that're left will be lucky to take care of an equal number of attackers. Padma, of course, doesn't exist in our defensive table. That leaves you, me, Kensie, Michael, and Amanda to handle about thirty bodies. Are you in condition?"

I grinned.

"That's good," said Ian. "I forgot to figure that scar-face of yours. Be sure to smile like that when they come at you. It ought to slow them down for a couple of seconds at least, and we'll need all the help we can get."

I laughed.

"If Michael doesn't want you, how about working with Kensie?"

"Fine," I said.

Kensie looked up from his printouts when he saw me again.

"Find him?" he asked.

"Yes. He suggested you could use me."

"I can. Join me."

We worked together the rest of the afternoon. What Kensie needed to know was what the ground was like meter by meter from the front walls on out over perhaps a couple of hundred meters of plain beyond. Given that knowledge, it would be possible to make reasonable estimates as to how a foot attack might

develop, how many attackers we might be likely to have on a front, and on which parts of that front, they might be expected to fall behind their fellows during a rush.

The Naharese terrain maps had never been made with such detailed information in mind. Kensie had spent most of the day before taking pictures of three-meter square segments of the ground, using the watch cameras built into the ramparts. With these pictures as reference, we now proceeded to make notes on blown up versions of the clumsy Naharese maps.

It took us the rest of the afternoon. We knocked off, with the job done, finally, about the dinner hour.

We found no one else at dinner but Ian. Michael was still teaching his bandsmen to be fighting troops; and Amanda was still with Padma.

"You'd both probably better get an hour of sleep," Ian said. "We might be able to pick up an hour or two more of rest just before dawn, but there's no counting on it."

"Yes," said Kensie. "You might sleep some, yourself."

Brother looked at brother. They knew each other so well that neither bothered to discuss the matter further. It had been discussed silently in that one momentary exchange of glances, and now they were concerned with other things.

As it turned out, I got a full three hours of sleep. It was just after ten o'clock when Kensie and I came out from Gebel Nahar. Michael led us, with our face and hands blackened, along a passage that would let us out into the night a good fifty meters beyond the wall.

"How did you know about this?" I asked. "If there's more secret ways like this, and the regiments know about them—"

"There aren't and they don't," said Michael. "This is a private secret of the Conde's. His father had it

built thirty-eight years ago. Our Conde told me about it when he heard the regiments had deserted."

I nodded. There was plainly a sympathy and a friendship between Michael and the old Conde that I had not had time to ask about. Perhaps it had come of their each being the only one of their kind in Gebel Nahar.

We reached the end of the passage and a short ladder leading up to a circular metal hatch. Michael turned out the light and we were suddenly in absolute darkness. I heard him cranking something well-oiled. Above us the hatch lifted to show starlit sky.

"Go ahead," Michael whispered. "Keep your heads down. The bushes that hide this spot have thorns."

We went up; I led, as being the more expendable. I heard Kensie come up and the hatch closed behind us. Michael was to open it again in two hours and fourteen minutes.

Kensie touched my shoulder. I looked and saw his hand held up, silhouetted against the stars. He made the hand signal for *move out*, and disappeared. I turned away to move off in the opposite direction, staying close to the ground.

I worked to the right as Kensie was working left. It was all sand, gravel and low brush, most with thorns or burrs. The night wind blew, cooling me under a sky where no clouds hid the stars.

The light of a moon would have been welcome, but Ceta has none. After fifteen minutes I came to the first of nine positions in my area that we had marked as possible locations for watchers from the enemy camp. Picking such positions is simple reasoning. Anyone but the best trained of observers, given the job of watching something like the Gebel Nahar, from which no action is really expected to develop, finds the hours long; and with the animal instinct in him he drifts automatically to the most comfortable or sheltered location from which to do his watching.

But there was no one at the first of the positions I came to. I moved on.

It was just about this time that I began to be aware of a change in the way I was feeling. The exercise, the adjustment of my body to the darkness and the night temperature, had begun to have their effects. I was no longer physically self-conscious. Instead, I was beginning to enjoy the action.

Old habits and reflexes had awakened in me. I flowed over the ground, now, not an intruder in the night of Nahar, but part of it. There was an excitement to it, a feeling of naturalness and rightness in my quiet search through this dim-lit land. I felt not only at home there, but as if in some measure I owned the night. The wind, the scents, the sounds I heard, all entered into me; and I recognized suddenly that I had moved completely beyond an awareness of myself as a physical body separate from what surrounded me. I was now pure observer, with the keen involvement that a wild animal feels in the world he moved through.

Then a sense of duty came and hauled me back to my obligations. I finished my sweep. There were no observers at all, either at any of the likely positions Kensie and I had picked out or anywhere else in the area I had covered. Unbelievable as it seemed from a military standpoint, the regiments had not bothered to keep even a token watch on us.

I returned to the location of the tunnel-end, and met Kensie there. His hand-signal showed that he had also found his area deserted. There was no reason why Michael's men should not be moved out as soon as possible and put to work laying the mines.

Michael opened the hatch at the scheduled time and we went down the ladder by feel in the darkness. With the hatch once more closed overhead, the light came on again.

"What did you find?" Michael asked, as we stood squinting in the glare.

"Nothing," said Kensie. "It seems they're ignoring us. You've got the mines ready to go?"

"Yes," said Michael. "If it's safe out there, do you want to send the men out by one of the regular gates? I promised the Conde to keep the secret of this tunnel."

"Absolutely," said Kensie. "In any case, the less people who know about this sort of way in and out of a place like Gebel Nahar, the better. Let's go back inside and get things organized."

We went. Back in Kensie's office, we were joined by Amanda. We sat around in a circle and Kensie and I reported on what we had found.

"I haven't waked the men yet," said Michael, when we were done. "They needed all the sleep they can get. I'll call the orderly and wake them now. We can be at work in half an hour; and except for my rotating them in by groups for food and rest breaks, we can work straight through the night. We ought to have all the mines placed by a little before dawn."

"Good," said Ian.

I sat watching him, and the others. My sensations, outside of having become one with the night, had left my senses keyed to an abnormally sharp pitch.

They were all deadly tired—each in his or her own way, very tired, with a personal, inner exhaustion that had finally been exposed by the physical tiredness to which the present situation had brought all of them except me. It seemed what that physical tiredness had accomplished had been to strip away the polite covering that before had hidden the private exhaustion; and it was now plain on every one of them.

". . . Then there's no reason for the rest of us to waste any more time," Ian was saying. "Amanda, you

and I'd better dress and equip for that scout of their camp. Knife and sidearm, only."

His words brought me suddenly out of my separate awareness.

"You and Amanda?" I said. "I thought it was Kensie and I, Michael and Amanda who were going to take a look at the camp?"

"It was," said Ian. "One of the Governors who came in to talk to us yesterday is on his way in by personal aircraft. He wants to talk to Kensie again, privately—he won't talk to anyone else."

"Some kind of a deal in the offing?"

"Possibly," said Kensie. "We can't count on it, though, so we go ahead. On the other hand we can't ignore the chance. So I'll stay and Ian will go."

"We could do it with three," I said.

"Not as well as it could be done by four," said Ian. "That's a good sized camp to get into and look over in a hurry. If anyone but Dorsai could be trusted to get in and out without being seen, I'd be glad to take half a dozen more. It's not like most military camps, where there's a single overall headquarters area. We're going to have to check the headquarters of each regiment; and there're six of them."

I nodded.

"You'd better get something to eat, Corunna," Ian went on. "We could be out until dawn."

It was good advice. When I came back from eating, the other three were already in Ian's office. On his right thigh Michael was wearing a knife—which was after all, more tool than weapon—but no sidearms, and I noticed Ian did not object. With her hands and face blacked, wearing the black stocking cap, overalls and boots, Amanda looked taller and more square-shouldered.

"All right," said Ian, "we'll go by field experience. I'll take two of the six regiments—the two in the

center. Michael, because he's more recently from his Academy training and because he knows these people, will take two regiments—the two on the left wing that includes the far left one that's his own Third Regiment. You'll take the Second Regiment, Corunna, and Amanda will take the Fourth."

"It's unlucky you and Michael can't take regiments adjoining each other," I said. "That'd give you a chance to work together. You might need that with two regiments each to cover."

"Ian needs to see the Fifth Regiment for himself, if possible," Michael said. "That's the Guard Regiment, the one with the best arms. My regiment is a traditional enemy of the Guard Regiment, so the two have deliberately been separated as far as possible—that's why the Guards are in the middle and my Third's on the wing."

"Anything else? Then we should go," said Ian.

We went out by the same tunnel, leaving the hatch propped a little open against our return. Once out we spread apart at ten meter intervals and began to jog toward the lights of the regimental camp, in the distance.

We were an hour coming up on it. We began to hear it some distance off. It did not sound like a military camp on the eve of battle half so much as it did a large open-air party.

The camp was laid out in a crescent. The center of each regimental area was made up of the usual beehive-shaped buildings of blown bubble-plastic that could be erected so easily on the spot. Behind and between these were tents of all types and sizes. There was steady traffic between these tents and the plastic buildings.

We stopped a hundred meters out, opposite the center of the crescent and checked off.

"All back here in forty minutes," Ian said.

We checked chronometers and split up, going in. My target, the Second Regiment, was between Ian's two regiments and Michael's two; and it was a section that had few tents, these seeming to cluster most thickly either toward the center of the camp or out on both wings. I slipped between the first line of buildings, moving from shadow to shadow.

It was foolishly easy. Effectively, the people moving between the buildings and among the tents had neither eyes nor ears for what was not directly under their nose. Getting about unseen under such conditions boils down simply to the fact that you move quietly—which means moving all of you in a single rhythm, including your breathing; and that, when you stop, you become utterly still—which means relaxing completely in whatever bodily position you have stopped in.

Breathing is the key to both, of course, as we learn back home in childhood games even before school age. Move in rhythm and stop utterly, and you can sometimes stand in plain sight without being observed.

A quick circuit of my area told me all we needed to know about this particular regiment. Most of the soldiers were between late twenties and early forties, in age. Under other conditions this might have meant a force of veterans. In this case, it indicated the opposite, time-servers who liked the uniform, the relatively easy work, and the authority. I found a few field energy weapons—light, three-man pieces that were not only out-of-date, but impractical in open territory, like that before Gebel Nahar. The heavier weapons on the ramparts would be able to take out such as these almost as soon as the rebels could try to put them into action, and long before they could do any real damage to the heavy defensive walls.

The hand weapons varied from the best of newer

energy guns, cone rifles and needle guns—in the hands of the soldiers—to ancient and modern hunting tools and slug-throwing sport pieces—carried by those in civilian clothing. Civilian and military hand weapons alike, however, had one thing in common that surprised me, in the light of everything else I saw—they were clean, well-cared for, and handled with respect.

I decided I had found out as much as necessary about this part of the camp. I headed back to the first row of plastic structures and the darkness of the plains beyond, having to detour slightly to avoid a drunken brawl that had spilled out of one of the buildings into the space between it and the next.

It was on this detour that I became conscious of someone quietly moving parallel to me. Since it was on the side given to Michael to investigate, I guessed it was he. I went to look, and found him.

I've got something to show you, he hand signalled me. Are you done, here?

Yes, I told him.

Come on, then.

He led me to one of the larger plastic buildings in the territory of the second regiment. The curving sides of such structures are not difficult to climb quietly. He led me to the top and a small hole torn there.

I looked in and saw six men with the collar rabs of Regimental Commanders at a table, apparently having sometime since finished a meal. Their conversation was just below comprehension level. I could hear their words, but not understand them.

But I could watch the way they spoke and tell how they were reacting to each other. There were a great many tensions around that table. There was no open argument, but they looked at each other in ways next to open challenges and the rumble of their voices

bristled with the electricity of controlled angers.

I felt my shoulder tapped, and took my attention from the hole. It took a few seconds to adjust to the darkness, but when I did, I could see Michael again talking with his hands.

Look at the youngest Commander—the one with the very black mustache. That's the Commander of my regiment.

I looked, and lifted my gaze briefly to nod.

Now look across the table and as far down from him as possible. You see the somewhat heavy Commander with the gray sideburns and the lips that almost pout?

I looked, raised my head and nodded again.

That's the Commander of the Guard Regiment. He and my Commander are beginning to wear on each other. If not, they'd be seated side by side and pretending friendship. It's almost as tense with the junior officers, if you know the signs to look for. Can you guess what's triggered it off?

No, I told him, but I suppose you do.

I've been watching for some time. They had the maps out earlier. The position of each regiment in the line of battle, tomorrow. They've agreed, but no one's happy with the decision.

I nodded.

I wanted you to see it for yourself. They're all ready to go at each other's throats. Maybe Amanda can find something in that she can use. I brought you here because I was hoping you'll support me in suggesting she come and see this for herself.

I nodded again. The brittle emotions below had been obvious, even to me, the moment I had first looked through the hole.

We slipped quietly back down the curve of the building to the ground and moved out together toward the rendezvous point. Ian and Amanda were already there; and we stood together, looking back at

the activity in the encampment as we compared notes.

"I called Captain El Man in to look at something I'd found," Michael said. "In my alternate area, there was a meeting going on between the regimental commanders—"

The sound of a shot from someone's antique explosive firearm cut him short. We all turned toward the encampment; and saw a lean figure wearing a white shirt brilliantly reflective in the lights, running toward us, while a gang of men poured out of one of the tents, stared about, and then started in pursuit.

The one they chased was running directly for us, in his obvious desire to get away from the camp. It was obvious that, with his eyes still dilated from the lights of the camp, and staring at black-dressed figures like ours, he was completely unable to see us.

We dropped flat into the sparse grass of the plain. But he still came straight for us. Another shot sounded.

The fugitive had all the open Naharese plain into which to run. He came toward us instead as if drawn on a cable. We lay still. Unless he actually stepped on one of us, there was a chance he could run right through us and not know we were there.

He did not step on one of us, but he did trip over Michael, stagger on a step, check, and glance down to see what had interrupted his flight. He looked directly at Amanda, and stopped, staring down in astonishment. A second later, he had started to swing around to face his pursuers, his mouth open to shout.

He was obviously about to betray our presence, and Amanda did exactly the correct thing—even if it produced the least desirable results. She uncoiled from the ground like a spring released from tension, one fist taking the fugitive in the adam's apple to cut off

his cry and the other going into him just under the breastbone to take the wind out of him and put him down without killing him. But the incredible bad luck of that moment was still with us.

As she took the man down, another shot sounded from the pursuers, clearly aimed at the now-stationary target of the fugitive—and Amanda went down with him.

She was up again in a second.

"Fine—I'm fine," she said. "Let's go!"

We went, off into the darkness at the same trot at which we had come. Until we were aware of specific pursuit there was no point in burning our reserves of energy. We moved steadily back toward Gebel Nahar, while the pursuers reached the fugitive, surrounded him, got him on his feet and talking.

By that time we could see them flashing around the lights some had been carrying, searching for us. But we were well away and drawing farther off every second. No pursuit developed.

"Too bad," said Ian, as the sound and lights of the camp dwindled behind us. "But no great harm done. What happened to you, 'Manda?"

She did not answer. Instead, she went down again, stumbling and dropping abruptly. In a second we were all back around her.

She was plainly having trouble breathing.

"Sorry . . ." she whispered.

Ian was already cutting away the clothing over her left shoulder.

"Not much blood," he said.

The tone of his voice said he was angry with her. So was I. It was entirely possible that she might have killed herself by trying to run with a wound that should not have been excited by that kind of treatment. She had acted instinctively to hide the fact that she had been hit, so that the rest of us would not

hesitate in getting away. It was not hard to understand the impulse that had made her do it—but she should not have.

“Corunna,” said Ian, “this is more in your line.”

He was right. As a captain, I was the closest thing to a physician aboard my ship. I moved in and checked the wound as best I could. In the faint starlight it showed as a small patch of darkness against a pale patch of exposed flesh. I felt it with my fingers and put my cheek down against it.

“Small caliber slug,” I said. Ian breathed out harshly. He had already deduced that much. “Not a sucking wound. High up, just below the collarbone. No immediate pneumothorax, but the chest cavity’ll be filling with blood. Are you very short of breath, Amanda? Don’t talk, just nod or shake your head.”

She nodded.

“How do you feel. Dizzy? Faint?”

She nodded again. Her skin was clammy to my touch.

“Going into shock,” I said.

I put my ear to her chest again.

“Right,” I said. “The lung on this side’s not filling with air. She can’t run. We’ll need to carry her.”

“I’ll do that,” said Ian. He was still angry, but trying to control it. “How fast do we have to get her back, do you think?”

“Her condition ought to stay the same for a couple of hours,” I said. “Looks like no large blood vessels were hit; and the smaller vessels tend to be self-sealing. But the pleural cavity on this side’s been filling up with blood and she’s collapsed a lung. That’s why she’s having trouble breathing. No blood around her mouth, so it probably didn’t nick an airway going through . . .”

I felt around behind her shoulder.

“It didn’t go through. If there’re MASH med-mech

units back at Gebel Nahar and we get her back in the next two hours, she should be all right—if we carry her."

Ian scooped her into his arms. He stood up.

"Head down," I said.

"Right," he answered and put her over one shoulder in a fireman's carry. "No, wait—we'll need some padding."

Michael and I took off our jerseys and made a pad for his other shoulder. He transferred her to that shoulder, with her head hanging down his back. I sympathized with her. Even with the padding, it was not a comfortable way to travel; and her wound and shortness of breath would make it a great deal worse.

"Try it at a slow walk, first," I said.

"I'll try it. But we can't go slow walk all the way," said Ian. "It's nearly three clicks from where we are now."

He was right, of course. To walk her back over three kilometers would take too long. We started off, and he gradually increased his pace until we were moving smoothly but briskly.

"How are you?" he asked her, over his shoulder.

"She nodded," I reported, from my position behind him.

"Good," he said, and began to jog.

We travelled. She did not speak; and, as far as I could tell, she did not lose consciousness once on that long, jolting ride. Ian forged ahead, like something made of gears and shafts rather than ordinary flesh, his gaze on the lights of Gebel Nahar, far off across the plain.

There is something that happens under those conditions where the choice is either to count the seconds, or disregard time altogether. In the end we all—and I think Amanda, too—went off a little way from ordinary time, and did not come back to it until we were at the entrance to the Conde's secret tunnel, leading back under the walls of Gebel Nahar.

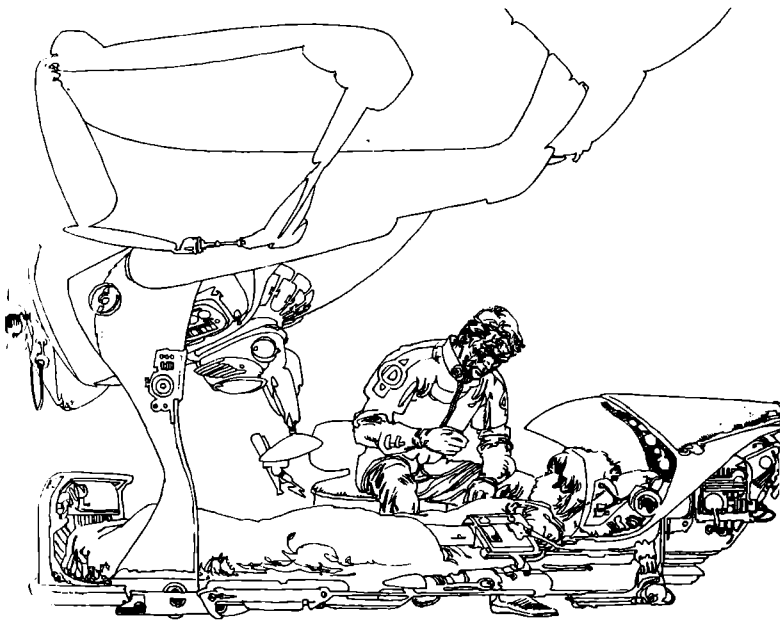
By the time I got Amanda laid out in the medical section she looked very bad indeed and was only semi-conscious. Luckily, the medical section had everything necessary. I was able to find a portable unit that could be rigged for bed rest—vacuum pump, power unit, drainage bag. It was a matter of inserting a tube between Amanda's lung and chest wall—and this I left to the med-mech—so that the unit could exhaust the blood from the pleural space into which it had drained.

It was also necessary to rig a unit to supply her with reconstituted whole blood while this draining process was going on. I finally got her fixed up and left her to rest—she was in no shape to do much else.

I went off to the offices to find Ian and Kensie with my report on Amanda's treatment and my estimate of her condition.

"She shouldn't do anything for the next few days, I take it," said Ian when I was done.

"That's right," I said.



"There ought to be some way we could get her out of here, to safety and a regular hospital," said Kensie.

"How?" I asked. "It's almost dawn. The Naharese would zero in on any vehicle that tried to leave, by ground or air."

Kensie nodded soberly.

"They should be starting to move now," said Ian, "if this dawn was to be the attack moment."

He turned to the window, and Kensie and I turned with him. Dawn was just breaking.

"After all their parties last night, they may not get going until noon," I said.

"I don't think they'll be that late," said Ian, absently. He had taken me seriously. "At any rate, it gives us a little more time. Are you going to have to stay with Amanda?"

"I'll want to look in on her from time to time—in fact, I'm going back down now," I said. "I just came up to tell you how she is. But in between visits, I can be useful."

"Good," said Ian. "As soon as you've had another look at her, why don't you go see if you can help Michael? He's been saying he's got his doubts about those bandsmen of his."

"All right." I went out.

When I got back to the medical section, Amanda was asleep. I was going to leave, when she woke and recognized me.

"Corunna," she said, "how am I?"

"You're fine," I said. "All you need now is to get a lot of sleep and do a good job of healing."

Her head moved restlessly on the pillow.

"Better if that slug had been more on target."

I looked down at her.

"According to what I've heard about you," I said, "you of all people ought to know that when you're in a hospital bed it's not the best time in the world to be

worrying over things."

She started to speak, interrupted herself to cough, and was silent for a little time until the pain of the tube, rubbing inside her with the disturbance of her coughing, subsided.

"No," she said. "I can't *want* to die. But the situation's impossible; and every way out of it is impossible, for all three of us. Just like our situation here in Gebel Nahar."

"Kensie and Ian are able to make up their own minds."

"It's not a matter of making up minds. It's a matter of impossibilities."

"Well," I said, "is there anything you can do about that?"

"I ought to be able to."

"Ought to, maybe, but can you?"

She breathed shallowly. Slowly she shook her head.

"Then let it go. Leave it alone," I said. "I'll be back to check on you from time to time. Wait and see what develops."

"How can I wait?" she said. "I'm afraid of myself. Afraid I might throw everything overboard and do what I want most—and so ruin everyone."

"You won't do that."

"I might."

"You're exhausted," I told her. "You're in pain. Stop trying to think. I'll be back in an hour or two to check on you. Until then, rest!"

I went out, in search of Michael and found him in the supply section. He was going from supply bin to supply bin, checking the contents of each and testing the automated delivery system of each to make sure it was working.

The overhead lights were very bright, and their illumination reflected off solid concrete walls painted a utilitarian, flat white. I watched his face as

he worked. There was no doubt about it. He looked much more tired, much leaner, and older than he had appeared to me only a few days before when he had met Amanda and me at the spaceport terminal of Nahar City. But the work he had been doing and what he had gone through could not alone have cut him down so visibly, at his age.

He finished checking the last of the delivery systems and the last of the bins. He turned away.

"Ian tells me you're concerned over your bandsmen," I said.

His mouth thinned and straightened.

"Yes," he said. There was a little pause, and then he added: "You can't blame them. If they'd been real soldier types they would have been in one of the line companies. There's security, but no chance for promotion in a band."

"On the other hand," I said, "they stayed."

"Well . . ." He sat down a little heavily on a short stack of boxes and waved me to another, "so far it hasn't cost them anything but some hard work. And they've been paid off in excitement. Excitement—drama—is what most Naharese live for; and die for, for that matter, if the drama is big enough."

"You don't think they'll fight when the time comes?"

"I don't know." His face was bleak again. "I only know I can't blame them—I can't, of all people—if they don't."

"Your attitude's a matter of conviction."

"Maybe theirs is, too. You never know enough to make a real comparison."

"True," I said. "But I still think that if they don't fight, it'll be for somewhat lesser reasons than yours."

He shook his head slowly.

"Maybe I'm wrong, all wrong." His tone was almost bitter. "But I can't get outside myself to look at

it. I only know I'm afraid."

"Afraid?" I looked at him. "Of fighting?"

"I wish it was of fighting," he laughed, briefly. "No, what I'm afraid of is that I don't have the will *not* to fight. I'm afraid at the last moment it'll all come back, those early dreams and all the training; and I'll find myself killing, even though I'll know it won't make any difference in the end and that the Naharese will take Gebel Nahar, anyway."

"I don't think it'd be Gebel Nahar you'd be fighting for," I said slowly. "I think it'd be out of a natural, normal instinct to stay alive yourself as long as you can—or to help protect those who are fighting alongside you."

"Yes," he said. His nostrils flared as he drew in an unhappy breath. "The rest of you. That's what I won't be able to stand. It's too deep in me. I might be able to let myself be killed. But can I stand there when they start to kill someone else—like Amanda, and she already wounded?"

He and I walked back to his offices in silence. When we arrived, there was a message for me, to call Ian. I did.

"The Naharese still haven't started to move," he said. "They're so unprofessional I'm beginning to think we can get Padma, at least, away from here. He can take one of the small vehicles and fly out to Nahar City. My guess is that once they see he's an Exotic, they'll simply wave him on."

"It could be," I said.

"I'd like you to go and put that point to him," said Ian. "He seems to want to stay, but he may listen if you make him see that by staying here, he simply increases the load of responsibility on the rest of us. I'd like to order him out but I don't have the authority."

"All right," I said. "I'll go talk to him right now. Where is he?"

"In his quarters."

I found Padma's suite and spoke to him.

"I see," he said. "Did Ian or Kensie ask you to talk to me, or is this the result of an impulse of your own?"

"Ian asked me," I said. "The Naharese are dealying their attack. Once they see you're an Exotic—"

His smile interrupted me.

"I have my duty, too. In this instance, it's to gather information for Mara and Kultis." His smile broadened. "Also, there's the matter of my own temperament. Watching a situation like the one here is fascinating. I wouldn't leave if I could. In short, I'm as chained here as the rest of you."

I shook my head at him.

"It's a fine argument," I said. "But, if you'll forgive me, a little hard to believe."

"In what way?"

"I'm sorry," I told him, "but I don't seem to be able to give any real faith to the idea that you're being held here by patterns that are essentially the same as mine, for instance."

"Not the same," he said. "Equivalent. The fact others can't match you Dorsai in your own area doesn't mean others don't have equal areas in which equal commitments apply."

"With identical results?"

"With comparable results—could I ask you to sit down?" Padma said mildly. "I'm getting a stiff neck looking up at you."

I sat down facing him.

"For example," he said. "In the Dorsai ethic, you and the others here have something that directly justifies your natural human hunger to do things for great purposes. The Naharese here have no equivalent ethic; but they feel the hunger just the same. So they invent their own customs, their *leto de muerte* concepts. But can you Dorsais, of all people, deny that their concepts can lead them to as true a heroism, or

as true a keeping of faith as your ethic leads you to?"

"Of course I can't deny it," I said. "But the Dorsai can at least be counted on to perform as expected. Can the Naharese? You sound a little like Michael when you get on the subject of these people. All right, stay if you want. I think I'd better leave now, before you talk me into going out and offering to surrender before they even get here."

He laughed. I left.

It was time again for me to check Amanda. I went to the medical section. But she was honestly asleep now. Apparently she had been able to put her personal concerns aside enough so that she could exercise a little of the basic physiological control we are all taught from birth. I left her sleeping.

It was a shock to see the sun as high in the sky as it was, when I emerged once more, on to the first terrace. The sky was almost perfectly clear and there was a small, steady breeze. The day would be hot. Ian and Kensie were each at one end of the terrace, looking through watch cameras at the Naharese front.

Michael, the only other person in sight, was also at a watch camera. I went to him.

"They're on the move," he said, stepping back from the watch camera. I looked into its rectangular viewing screen, bright with the daylight scene it showed. He was right. The regiments had finally formed for the attack and were now coming toward us at the pace of a slow walk.

I could see their flags spaced along the front of the crescent formation and whipping in the breeze. The Guard regiment was still in the center and Michael's Third Regiment on the right wing. Behind the wings I could see the darker swarms that were the volunteers and the revolutionaries.

The attacking force had already covered a third of the distance to us. I stepped away from the screen and all at once the front I looked at became a thin line

with little bright flashes of reflected sunlight and touches of color, still distant.

"Another thirty or forty minutes," said Michael.

I looked at him. The clear daylight showed him pale and wire-tense. He looked as if he had been whittled down—nothing but nerves were left. He was not wearing weapons.

The rifles woke me to something I had noted but not focused upon. The bays with the fixed weapons were empty.

"Where're your bandsmen?" I asked Michael.

He gazed at me.

"They've gone," he said.

"Gone?"

"Decamped. Deserted, if you want to use that word."

I stared at him.

"You mean they've joined—"

"No, no." He broke in on me. "They haven't gone over to the enemy. They just decided to save their own skins. I told you—you remember, I told you they might. You can't blame them. They're not Dorsai; and staying here meant death."

"If Gebel Nahar is overrun," I said.

"Can you believe it won't be?"

"It's become hard to," I said, "now that there's just us. But there's always a chance as long as anyone's left to fight. At Baunpore, I saw men and women firing from hospital beds, when the North Freilanders broke in."

I should not have said it. I saw the shadow cross his eyes and knew he had taken my reference to Baunpore personally, as if I had been comparing his present weaponless state with the last efforts of the defenders I had seen then.

"That's a general observation only—" I began.

"It's not what you accuse me of, it's what I accuse myself of," he said in a low voice looking at the

regiments.

There was nothing more I could say. We both knew that without his forty men we could not even make a pretense of holding the first terrace. There were just too few of us, and too many of them, to stop them from coming over the top.

"They're probably hiding just out beyond the walls," he said. "If we do manage to hold out for a day or two, there's a slight chance they might trickle back—"

He broke off, staring past me. I turned and saw Amanda.

How she had managed it by herself, I do not know. But she had gotten up and strapped the portable drainage unit on to her. It was not heavy, or much bigger than a thick book; and it was designed for wearing by an ambulatory patient; but it must have been hell for her to rig it by herself with that tube rubbing inside her at every deep breath.

Now she was here, looking as if she might collapse at any time, but on her feet with the unit slung from her right shoulder and strapped to her right side. She had a sidearm clipped to her left thigh, over the cloth of the hospital gown; and the gown itself was ripped up the center so that she could walk in it.

"What the hell are you doing?" I said. "Get back to bed!"

"Corunna—" she gave me the most level and unyielding stare I had ever encountered. "Don't give me orders. I rank you."

I blinked at her. It was true I had been asked to be her driver for the trip here, and in a sense that put me under her orders. But for her to presume to tell a Captain of a full flight of fighting ships, with an edge of half a dozen years in seniority and experience that in a combat situation like this she ranked him—it was raving nonsense. I opened my mouth to explode—and found myself breaking into laughter, instead. The

situation was too ridiculous.

But, obviously she was out here on the terrace to stay; and obviously, I was not going to make any real issue of it under the circumstances. We both understood what was going on. Which did not change the fact that she should not have been on her feet. Like Ian out on the plain, and in spite of having been forced to see the humorous side of it, I was still angry with her.

"Next time you're wounded, better hope I'm not your medico," I told her. "What can you do up here, anyway?"

"I can be with the rest of you," she said.

I closed my mouth again. There was no arguing with that answer. Out of the corner of my eyes I saw Kensie and Ian approaching. They looked down at her but said nothing, and we all turned to look again out across the plain.

We stood together, the four of us, looking at the slow, ponderous advance upon us. All my life I had been plagued by an awareness of the ridiculous. What mad god had decided that an army should march against a handful—and that the handful should not only stand to be marched upon, but should prepare to fight back? But then the sense of the ridiculousness passed.

With that, I passed into the final stage that always came on me before battle. It was as if I stepped down into a place of private quiet. What was coming would come, and I would meet it when it came. I was aware of Kensie, Ian, Michael and Amanda standing around me, and aware that they were experiencing much the same feelings. Something like telepathy flowed between us, binding us together. In all my life's experience there has been nothing like that feeling of unity, and I have noticed that those who have once felt it never forget it. It is as it is, as it always has been, and we who are there at that moment are together.

Against that togetherness, odds do not matter.

There was a faint scuff of a foot on the terrace floor, and Michael was gone. I looked at the others, and the thought was unspoken between us. He had gone to put on his weapons. We turned and saw the Naharese now close enough so that they were recognizable as individual figures. They were almost close enough for their approach to be heard.

We moved forward to the parapet of the terraces and stood watching. The day-breeze, strengthening, blew in our faces. There was time now to appreciate the sunlight, the not-yet-hot temperature of the day and the moving air. Another few hundred meters and they would be within the range of our emplaced weapons. Until then, there was nothing urgent to be done.

The door opened behind us. I turned, but it was not Michael. It was Padma, supporting El Conde, who was coming out to us with the help of a silver-headed walking stick. Padma helped him out to the parapet, and for a second he ignored us, looking instead at the oncoming troops. Then he turned to us.

"Gentlemen and lady," he said in Spanish, "I will join you."

"We're honored," Ian answered him in the same tongue. "Would you care to sit down?"

"Thank you, no. I will stand. You may go about your duties."

He leaned on the cane, watching across the parapet. We stepped back away from him, and Padma spoke in a low voice.

"I'm sure he won't be in the way," Padma said. "But he wanted to be here, and there was no one but me left to help him."

"It's all right," said Kensie. "But what about you?"

"I'd like to stay, too," said Padma.

Ian nodded. A harsh sound came from the throat of the count, and we looked at him. He was rigid as some

ancient dry spearshaft, staring out at the approaching soldiers, his face carved with the lines of fury and scorn.

"What is it?" Amanda asked.

I had been as baffled as the rest. Then a faint sound came to my ear. The regiments were at last close enough to be heard; and what we were hearing were their bugle calls as faint snatches of melody on the breeze. We could barely hear it, but I recognized it, as El Conde already had.

"They're playing the *te guello*," I said. "Announcing 'no quarter'."

The *te guello* is a promise to cut the throat of anyone opposing. Amanda's eyebrows rose.

"For us?" she said. "What good do they think that'll do?"

"They may think Michael's bandsmen are still with us," I said. "But probably they're doing it just because it's always done."

The others listened for a second. The *te guello* is an effectively chilling piece of music; but, as Amanda had implied, it was a little beside the point to play it to Dorsai.

"Where's Michael?" she asked now.

I looked around. It was a good question. If he had indeed gone for weapons, he should have been back out on the terrace sometime since. But there was no sign of him.

"I don't know," I said.

"They've stopped their portable weapons," Kensie said, "and they're setting them up to fire. Completely out of effective range, against walls like this."

"We'd probably be better down behind the armor of our own emplacements," said Ian. "They can't hurt the walls but they might get lucky and hurt some of us."

He turned to El Conde.

"If you'd care to step down into one of the weapon

emplacements, sir—" he said.

El Conde shook his head.

Ian nodded. He looked at Padma.

"Of course," said Padma. "I'll come in with one of you—unless I can be useful in some other way?"

"No," said Ian. A shouting from the approaching soldiers turned him and the rest of us once more toward the plain.

The front line of the attackers had broken into a run toward us. They were only a hundred meters or so now from the foot of the slope leading to the walls of Gebel Nahar. Whether it had been decided that they should attack from that distance, or—more likely—someone had been carried away and started forward early, did not matter. The attack had begun.

For a moment, this development had given us a temporary respite. With their own soldiers flooding out ahead, it would be difficult for those behind to fire at Gebel Nahar without killing their own men. It was the sort of small happening that can sometimes be turned to an advantage—but, as I stared out at the plain, I had no idea of what we might do that would make any real difference to the battle's outcome.

"Look!" called Amanda.

The shouting of the soldiers had stopped, suddenly. The front line of the attackers was trying to slow down against the pressure of those behind. The attack was halting as more and more of them checked and stared at the slope.

What was happening there was that the lid of El Conde's private exit from Gebel Nahar was rising. To the Naharese military it must have looked as if some secret weapon was about to unveil itself on the slope—and it would have been this that had caused them to have sudden doubts and dig in their heels. They were still two or three hundred meters from the tunnel, and the first line of attackers, trapped by those behind them, were sitting ducks for whatever

field-class weapon might elevate itself through this unexpected opening and zero in on them.

But of course no such weapon came out. Instead, what emerged was a head wearing a regimental cap, with what looked like a stick tilted back by its right ear . . . and slowly, up on to the level of the ground, and out to face them all came Michael.

He was without weapons. But he was dressed in his full parade regimentals as band officer; and the *gaita gallega* was resting in his arms. He stepped on to the slope and began to march down it toward the Naharese.

The silence was deadly; and into that silence, striking up, came the sound of the *gaita gallega*. Clear and strong it came to us; and clearly it reached as well to the now-silent and motionless ranks of the Naharese. He was playing *Su Madre*.

He went forward at a march step, shoulders level, the instrument held securely in his arms; and his playing went before him, throwing its challenge directly into their faces. A single figure marching against three thousand.

From where I stood, I had a slight angle on him; and with the magnification of the watch camera, I could get just a glimpse of his face from the side and behind. He looked peaceful and intent. He marched as if on parade, with the intentness of a good musician in performance, and all the time *Su Madre* was calling and mocking at the armed regiments before him.

I touched the camera to make it give me a closeup look at the men in the Naharese force. They stood as if paralyzed. They were saying nothing, doing nothing, only watching Michael come toward them as if he meant to march right through them. All along their front, they were stopped and watching.

But their inaction was something that could not last. As I watched, they began to stir. Michael was

between us and them, and the incredible voice of the bagpipe came almost loudly to our ears. But rising behind this, we now began to hear a sound like the growl of some enormous beast.

I looked in the screen. The regiments were still not advancing, but none of the figures I now saw as I panned down the front were standing frozen with shock. In the middle of the crescent formation, the soldiers of the Guard Regiment, who held a feud with Michael's Third, were shaking weapons at him.

All along the line, the front boiled. They had all seen that Michael was unarmed. For a few moments this held them in check. They threatened, but did not fire. But I could feel the fury building in them.

I wanted to shout at Michael to turn and come back. He had broken the momentum of their attack and thrown them into confusion. With troops like these they would not take up their advance where they had halted it. Their senior officers would pull them back and reform them. A breathing space had been gained. It could be some hours before they would be able to mount a second attack; and in that time internal tensions or any number of developments might help us further. Michael still had them between his thumb and forefinger. If he turned his back on them now, their inaction might well hold until he was back in safety.

But there was no way I could reach him and he went steadily forward, scorning them with his music, taunting them for attacking in their numbers an opponent so much less than themselves.

Still the Naharese soldiery only shook their weapons and shouted insults at him; but now, in by the Third Regiment there were uniformed figures beginning to wave Michael back. I moved the view of the screen further along that wing and saw civilians from the following swarm of volunteers and revolutionaries, who were shoving their way to the

front, kneeling down and putting weapons to their shoulder.

The Third Regiment soldiers were pushing these others back and jerking their weapons away. Fights had begun to break out; but on that wing those who wished to fire on Michael were being held back. It was plain the Third Regiment was torn now between the attack on Gebel Nahar and its impulse to protect their former bandmaster in his act of outrageous bravery. Still, I saw in the screen one civilian with a starved and furious face, who had literally to be held on the ground by three of the Third Regiment before he could be stopped from firing.

A sudden suspicion passed through me. I swung the screen's view to the opposite wing, and saw there the same situation. There, volunteers and civilian revolutionaries were trying to stop Michael with their weapons; and on this wing, also, the soldiers were trying to check those who attempted to shoot Michael. But here, the effort to prevent that firing was scattered and ineffective.

I saw a number of weapons of all types leveled at Michael. No sound could reach me, but it was clear that death was finally in the air around Michael.

I switched the view back to him. For a moment he continued to march as if some invisible armor was protecting him. Then he stumbled, caught himself, went forward, and fell.

For a second time—for a moment only—the voice of the attackers stopped, cut off as if a multitude of invisible hands had been clapped over the mouths of those there. I lifted the view on the screen from the fallen shape of Michael and saw soldiers and civilians alike standing motionless, staring at him, as if they could not believe that he had at last been brought down.

Then, on the wing opposite to the Third Regiment, the civilians firing began to dance and wave their

weapons in the air—and suddenly the whole formation seemed to collapse inward, as the soldiers of the Third Regiment charged across at the rejoicing civilians, and the Guard Regiment swirled out to oppose them. The fighting spread as individual attacked individual. In a moment they were all embroiled. A wild mob without direction or purpose except to kill whoever was closest, took the place of the military formation that had existed only five minutes before.

As the fighting became general, the tight mass of bodies spread out like butter melting; and the struggle extended over a larger and larger area, until at last it covered even the place where Michael had fallen. Amanda turned away from the parapet and I caught her as she staggered. I held her upright and she leaned heavily against me.

"I have to lie down, I guess," she murmured.

I led her towards the door and the bed that was waiting for her. Ian, Kensie and Padma followed, leaving only El Conde, leaning on his silver headed stick and staring at what was taking place on the plain, his face lighted with the fierce satisfaction of a hawk perched above the body of its kill.

It was twilight before all the fighting had ceased; and, with the dark, there began to be heard the small sounds of the annunciator chimes at the main gate. One by one Michael's bandsmen began to slip back to us in Gebel Nahar. With their return, Ian, Kensie and I were able to stop taking turns at standing watch, as we had up until then. But it was not until after midnight that we felt it was safe to leave long enough to go out and recover Michael's body.

Amanda insisted on going with us. There was no reason to argue against her coming with us and a good deal of reason in favor of it. She was responding very well to the drainage unit and a further eight hours of sleep had rebuilt her strength to a remarkable degree. Also, she was the one who had suggested

we take Michael's body back to the Dorsai for burial.

The cost of travel between the worlds was such that few individuals could afford it; and few Dorsai who died in the course of their duties off-planet had their bodies returned for internment in native soil. But we had adequate space to carry Michael's body with us in the courier vessel; and it was Amanda's point that Michael had solved the problem by his action—something for which the Dorsai world in general owed him a debt. Both Padma and El Conde had agreed, after what had happened today, that the Naharese would not be brought back to the idea of revolution again for some time. William's machinations had fallen through. Ian and Kensie could now either make it their choice to stay and execute their contract, or legitimately withdraw from it for the reason that they had been faced with situations beyond their control.

In the end, all of us except Padma went out to look



for Michael's body, leaving the returned bandsmen to stand duty. It was full night by the time we emerged once more on to the plain through the secret exit.

"El Conde will have to have another of these made for him," said Kensie, as we came out under the star-brilliant sky. "This one is more a national monument than a secret, now."

The night was like the one before, when Kensie and I had made our sweep in search of observers from the other side. But this time we were looking only for the dead; and that was all we found.

During the afternoon all the merely wounded had been taken away by their friends; but there were bodies to be seen as we moved out to the spot where we had seen Michael go down, but not many of them. It had been possible to mark the location exactly using the surveying equipment built into the watch cameras. But the bodies were not many. The fighting had been more a weaponed brawl than a battle. Which did not alter the fact that those who had died were dead. They would not come to life again, any more than Michael would. A small night breeze touched our faces from time to time as we walked. It was too soon after the fighting for the odors of death to have taken possession of the battlefield. For the present moment under the stars the scene we saw, including the dead bodies, had all the neatness and antiseptic quality of a stage setting.

We came to the place where Michael's body should have been, but it was gone. Ian switched on a pocket lamp; and he, with Kensie, squatted to examine the ground. I waited with Amanda. Ian and Kensie were the experienced field officers, with Hunter Team practice. I could spend several hours looking to see what they would take in at a glance.

After a few minutes they stood up again and Ian switched off the lamp. There were a few seconds while our eyes readjusted, and then the plain became

real around us once more, replacing the black wall of darkness that the lamplight had instantly created.

"He was here, all right," Kensie said. "Evidently quite a crowd came to carry his body off someplace else. It'll be easy enough to follow the way they went."

We followed the trail of scuffed earth and broken vegetation left by the footwear of those who had carried away Michael's body. The track they had left was plain enough so that I myself had no trouble picking it out, even by starlight, as we went along at a walk. It led further away from Gebel Nahar, toward where the center of the Naharese formation had been when the general fighting broke out; and as we went, bodies became more numerous. Eventually, at a spot which must have been close to where the Guard Regiment had stood, we found Michael.

The mound on which his body lay was visible as a dark mass in the starlight, well before we reached it. But it was only when Ian switched on his pocket lamp again that we saw its true identity and purpose. It was a pile nearly a meter in height and a good two meters long and broad. Most of what made it up was clothes; but there were many other things mixed in with the cloth items—belts and ornamental chains, ancient weapons, so old that they must have been heirlooms, bits of personal jewelry, even shoes and boots.

But, as I say, the greater part of what made it up was clothing—in particular uniform jackets or shirts, although a fair number of detached sleeves or collars bearing insignia of rank had evidently been deliberately torn off by their owners and added as separate items.

On top of all this, lying on his back with his dead face turned toward the stars, was Michael. I did not need an interpretation of what I was seeing here, after my earlier look at the painting in the Nahar City

Spaceport Terminal. Michael lay not with a sword, but with the *gaita gallega* held to his chest; and beneath him was the *leto de muerte*—the real *leto de muerte*, made up of everything that those who had seen him there that day, and who had fought for and against him after it was too late, considered the most valuable thing they could give from what was in their possession at the time.

Each had given the best he could, to build up a bed of state for the dead hero—a bed of triumph, actually, for in winning here Michael had won everything, according to their rules and their ways. After the supreme victory of his courage, as they saw it, there was nothing left for them but the offering of tribute; their possessions or their lives.

We stood, we three, looking at it all in silence. Finally, Kensie spoke.

"Do you still want to take him home?"

"No," said Amanda. The word was almost a sigh from her, and she stood looking at the dead Michael. "No. This is his home, now."

We went back to Gebel Nahar, leaving the corpse of Michael with his honor guard of the other dead around him.

The next day Amanda and I left Gebel Nahar to return to the Dorsai. Kensie and Ian had decided to complete their contract; and it looked as if they should be able to do so without difficulty. With dawn, individual soldiers of the regiments had begun pouring back into Gebel Nahar, asking to be accepted once more into their duties. They were eager to please, and for Naharese, remarkably subdued.

Padma was also leaving. He rode into the spaceport with us, as did Kensie and Ian, who had come along to see us off. In the terminal, we stopped to look once more at the *leto de muerte* painting.

"Now I understand," said Amanda, after a moment. She turned from the painting and lightly

touched both Ian and Kensie who were standing on either side of her.

"We'll be back," she said, and led the two of them off.

I was left with Padma.

"Understand?" I said to him. "The *leto de muerte* concept?"

"No," said Padma, softly. "I think she meant that now she understands what Michael came to understand, and how it applies to her. How it applies to everyone, including me and you."

I felt coldness on the back of my neck.

"To me?" I said.

"You have lost part of your protection, the armor of your sorrow and loss," he answered. "To a certain extent, when you let yourself become concerned with Michael's problem, you let someone else in to touch you again."

I looked at him, a little grimly.

"You think so?" I put the matter aside. "I've got to get out and start the checkover on the ship. Why don't you come along? When Amanda and the others come back and don't find us here, they'll know where to look."

Padma shook his head.

"I'm afraid I'd better say goodbye now," he replied. "There are other urgencies that have been demanding my attention for some time and I've put them aside for this. Now, it's time to pay them some attention. So I'll say goodbye now; and you can give my farewells to the others."

"Goodby, then," I said.

As when we had met, he did not offer me his hand; but the warmth of him struck through to me; and for the first time I faced the possibility that perhaps he was right. That Michael, or he, or Amanda—or perhaps the whole affair—had either worn thin a spot, or chipped off a piece, of that shell that had

closed around me when I watched them kill Else.

"Perhaps we'll run into each other again," I said.

"With people like ourselves," he said, "it's very likely."

He smiled once more, turned and went.

I crossed the terminal to the Security Section, identified myself and went out to the courier ship. It was no more than half an hour's work to run the checkover—these special vessels are practically self-monitoring. When I finished the others had still not yet appeared. I was about to go in search of them when Amanda pulled herself through the open entrance port and closed it behind her.

"Where's Kensie and Ian?" I asked.

"They were paged. The Board of Governors showed up at Gebel Nahar, without warning. They both had to hurry back for a full-dress confrontation. I told them I'd say goodby to you for them."

"All right. Padma sends his farewells by me to the rest of you."

She laughed and sat down in the copilot's seat beside me.

"I'll have to write Ian and Kensie to pass Padma's on," she said. "Are we ready to lift?"

"As soon as we're cleared for it. That port sealed?"

She nodded. I reached out to the instrument bank before me, keyed Traffic Control and asked to be put in sequence for liftoff. Then I gave my attention to the matter of warming the bird to life.

Thirty-five minutes later we lifted, and another ten minutes after that saw us safely clear of the atmosphere. I headed out for the legally requisite number of planetary diameters before making the first phase shift. Then, finally, with mind and hands free, I was able to turn my attention again to Amanda.

She was lost in thought, gazing deep into the pinpoint fires of the visible stars in the navigation screen above the instrument bank. I watched her without

speaking for a moment, thinking again that Padma had possibly been right. Earlier, even when she had spoken to me in the dark of my room of how she felt about Ian, I had touched nothing of her. But now, I could feel the life in her as she sat beside me.

She must have sensed my eyes on her, because she roused from her private consultation with the stars and looked over.

"Something on your mind?" she asked.

"No," I said. "Or rather, yes. I didn't really follow your thinking, back in the terminal when we were looking at the painting and you said that now you understood."

"You didn't?" She watched me for a fraction of a second. "I meant that now I understood what Michael had."

"Padma said he thought you'd meant you understood how it applied to you—and to everyone."

She did not answer for a second.

"You're wondering about me—and Ian and Kensie," she said.

"It's not important what I wonder," I said.

"Yes, it is. After all, I dumped the whole matter in your lap in the first place, without warning. It's going to be all right. They'll finish up their contract here and then Ian will go to Earth for Leah. They'll be married and she'll settle in Foralie."

"And Kensie?"

"Kensie." She smiled sadly. "Kensie'll go in . . . in his own way."

"And you?"

"I'll go mine." She looked at me very much as Padma had looked at me, as we stood below the painting. "That's what I meant when I said I'd understood. In the end the only way is to be what you are and do what you must. If you do that, everything works. Michael found that out."

"And threw his life away putting it into practice."



"No," she said, swiftly. "He threw nothing away. There were only two things he wanted. One was to be the Dorsai he was born to be and the other was never to use a weapon; and it seemed he could have either one but not the other. Only, he was true to both and it worked. In the end, he was Dorsai and unarmed—and by being both he stopped an army."

Her eyes held me so powerfully that I could not look away.

"He went his way and found his life," she said, "and my answer is to go mine. Ian, his. Kensie, his; and—"

She broke off so abruptly I knew what she had been about to say.

"Give me time," I said; and the words came a little more thickly than I had expected. "It's too soon yet. Still too soon since she died. But give me time, and maybe . . . maybe, even me."

—Gordon R. Dickson

DICKSON DESCRIBES HIMSELF
AS "A GALLOPING OPTIMIST,"
UNSHAKABLY CERTAIN THAT
"MAN'S FUTURE IS
ONWARD AND UPWARD."

THE PLUME AND THE SWORD

by Sandra Meisel



August 28, 1969. Music tore at my ears. Body heat and cigarette smoke made it hard for me to breathe. I couldn't move for the press of the crowd nor talk for the noise of the combo. The first night of my first World Science Fiction Convention had begun on a wretched note.

From time to time, the musicians would strike up a fanfare and yet another celebrity would be introduced from the bandstand, to preen or cringe while the multitude applauded. In this parade of notables, one figure stood out: Gordon R. Dickson glowed with singular good cheer, perfectly at ease under difficult conditions. His book jacket photos had led me to expect solemn tweediness, not this gracious merriment. With his curly hair, he reminded me of a jaunty russet plume.

Over the next few years I glimpsed him at other conventions—appearing on panels, singing at parties, dashing down hotel corridors. Yet I never presumed to approach him even when we were brought together as journalists covering the launch of Apollo 17.

Events of March, 1973 finally cut through my diffidence. At that time, Gordon Dickson was the guest of honor at a regional sf convention in Columbus, Ohio. He arrived suffering from a middle-ear infection that severely impaired his balance. Nevertheless, he gamely discharged his convention duties. He had to give his major speech clinging to the rostrum for support—the audience had insisted he stand so they could see him. Yet his distress only strengthened the impact of his words because it showed he cared more about his Childe Cycle than his comfort.

Work that meant so much to its author deserved a look at the very least. I had read Dickson's short fiction since 1955 when I was thirteen years old. But despite my casual admiration for items like "Call Him Lord," none of it had ever struck home. To me, his stories were prisms of milk glass—smooth and

slightly opalescent, but opaque. Everything changed on reading *Dorsai*! This was no tabletop ornament. It stretched out above me like a clear, pale Northern sky. Then *Necromancer* and *Soldier, Ask Not* in their turn crossed the border of those heavens to unseen realms beyond. I resolved to know the steel-bright mind that wrote such things.

The author smiled politely when I declared this intention on May 23, 1975. Experience had made him skeptical of critics. Nevertheless, I surprised him by keeping my word. By 1976, my interpretation of the Childe Cycle pleased him sufficiently that he recommended me to the attention of editors. Thus I am here to present my seventh effort in Dickson criticism.

* * *

The harmony of opposites is Dickson's constant goal, in life even as in art. This author who unifies opposing principles in his fiction unites within himself the most disparate extremes of frivolity and keenness—the plume and sword alike are his to wear.

In person, Dickson's fluffiness has always made the greatest impression on the greatest number of people. He is everyone's favorite conventioneer. (During his forty years in sf fandom, he has attended hundreds of conventions.) His image as the jolly party-goer, singing and playing the guitar until dawn led Ben Bova to parody *My Darling Clementine* in Dickson's honor. The chorus concludes: "Science fiction is his hobby/but his main job's having fun."

Dickson is a veteran trencherman, a mainstay of epic dinner parties, but he has also been known to spend more time selecting the wine than eating the meal. His bizarre preference for drinking milk, juice, coffee, beer, and Bloody Marys at the same breakfast has been cause for comment since his student days at the University of Minnesota thirty years ago. Lately, allergies (including—alas—a mild one to wine) and a desire for waistline trimness have tempered these

tastes somewhat but Dickson's zest for living remains uncommonly brisk.

Yet such pleasures are the least components of his *joie de vivre*. Dickson has a capacity for wonder that will not be worn out. It has been claimed that no one else can say "golly" quite as joyfully as he does. (Dickson's habit of burbling along in innocent schoolboy exclamations once inspired some of his friends to stage a "Gordon R. Dickson Murfle-Alike Contest.")

Enthusiasm colors everything he does. He not only admires fine craftsmanship, he quizzes craftsmen on the tools, techniques, and attitudes that support their skills. (How many men would demand to see that wrong side of an embroidery?) He is always eager for new knowledge and fresh experiences. Recent endeavors include lessons in bagpipe-playing and also in *akido*. Moreover, he encourages the same adventurousness in others. His friends have found themselves whittling knives, making lace, or writing novels for the first time at his urging.

Dickson describes himself as "a galloping optimist," unshakably certain that "man's future is onward and upward." Right must inevitably triumph. He admits that human beings may not be quite perfectible: "Perfectible is a little too good to be true—but improvable, tremendously improvable by their own strength."

Idealism gives him confidence in his own potential as well as that of his species. After watching his own Childe Cycle gradually move from rejection to acceptance, after observing fractious humans slowly struggle to build new things together, Dickson concludes that creativity can overcome all obstacles. It is the only sure key to progress.

This same confidence in creativity makes him patient with other people, no matter how unpromising they may seem. He is among the most approachable of all sf professionals. For instance, few others would

have taken the time to explain the elementary rules of prosody to an aspiring ballad writer and been on hand afterwards to applaud her first acceptable efforts. Dickson's forbearance, skill, and above all, his respect for even the scruffiest amateur's dignity, have made him a superb mentor for young authors who are serious about their profession. (Among the newer names in sf who have at times listened to him are Joe Haldeman, Robert Asprin, and Lynn Abbey.) Dickson tends to downplay his influence because he believes that "teaching comes automatically as breathing" to experienced writers. Yet his inner nature is revealed by the positive effects he has on those around him. For the past three decades his encouragement of talent and his support of professionalism have worked like buds of yeast to leaven the sf field.

One thing Dickson will not endure patiently is a shoddy performance. His Victorian-style upbringing imbued him with high standards of excellence. He has an aristocrat's awareness of his own prerogatives, even in trivial matters: woe to the careless waiter who serves Dickson's Vichyssoise improperly chilled. But his special ire is reserved for time-wasters too lazy to develop their own talents. "Some people," he complains, "like my advice so much, they frame it and hang it on the wall instead of using it." Fortunately such failures are rare. Most of those who beseech his advice or cry on his broad shoulders put the experience to good use.

Dickson's helpfulness arouses a corresponding helpfulness in others. Whether he asks for a Puritan sermon text, an Italian menu, a sample of Gregorian chant, or medical data on battle wounds, someone will promptly supply it—fandom is a living data bank. So grateful is he for help, he attracts almost too much solicitude. At times the attentiveness of friends reduces Dickson to the status of a favorite teddy bear in danger of having all its fur petted off.

Dickson's admirers do react intensely. Women's tears over the fate of Ian Graeme in *Soldier, Ask Not* prodded him to re-examine the implications of his text and see a solution to the tragedy. Other fans want to elaborate the cycle's background with or without the author's sanction. There was the lawyer who speculated on interstellar legal systems and the artist who tried to predict future art tastes. The most conspicuous example of this phenomenon is a non-profit organization known as the Dorsai Irregulars which provide security services at sf conventions, sometimes in costume. The author has licensed their use of the Dorsai name and insignia.

Dickson appreciates such vivid identification because he enjoys playing roles himself. The historical persona he designed to join the Society for Creative Anachronism is "Kenneth of Otterburn," a fourteenth century Border lord whose heraldic badge is the otter. This character is a bow to duality in general and to Dickson's own Anglo-Scottish heritage in particular. One of the author's collateral ancestors, Lord Lovta, was beheaded in 1747 for supporting Bonnie Prince Charlie. The official Dickson arms are: "or, a stag lodged proper, laurel wreath vert in orle," which is to say, a stag at rest on a golden field bordered with green laurel leaves. The family motto is "*Cubo sed Curo*," "I lie down but I remain watchful."

More importantly, this SCA project, like so many of Dickson's activities, is a remote preparation for the Childe Cycle. The climax of *Childe*, the concluding volume of the series, will be modeled on the Battle of Otterburn fought between the English and the Scots in 1388. Furthermore, investigating the life of an imaginary medieval nobleman will also give him special insights into the mind of the real Sir John Hawkwood, hero of the Cycle's opening volume.

Dickson is never content to do his research from books, even from primary sources. Whenever possi-

ble, he must visit sites and handle actual artifacts. For example, he absorbs historical *mana* by fingering Plantagenet coins and reading gothic manuscripts. When reality is unattainable, he turns to replicas. His most ambitious plan yet is to commission the making of a complete suit of armor such as Hawkwood might have worn. (He rejects suggestions that experiments with fleas, lice, and dysentery might be equally instructive.) So far, he has acquired only his mailshirt, helmet, and a magnificent pair of armored gloves. But attired in a friend's full equipage, Dickson cut a marvelously gallant figure—six feet of blue-eyed knight with a bit of lace visible at his wrist to accent the steel and leather. "I felt as if I could walk through doors," he said, striding off down the motel corridor.

His own experience did not suffice; he wanted to observe another man's reactions as well. So he convinced a less-than-eager Kelly Freas to try on the armor next. Others might have followed their example but by then the outfit's undergarments were disagreeably drenched with sweat. The author's zeal for medieval weaponry is so compelling, one unmartial colleague was persuaded to take up arms and beat on the maple tree in Dickson's back yard with a sword—all by way of sealing a business partnership.

Although mimetic research sounds amusing, it is no game to Dickson but rather a measure of his dedication to his craft. He needs to set all his senses gathering data in order to generate the authentic details his writing requires. His creativity is almost a metabolic process: information digested, art synthesized. Consider the awesome volume of material he had to process for *The Far Call*, the finest realistic novel about the space program yet written. This book's flavor comes from the author's own fervent pro-space views. Its substance is the product of many visits to Kennedy Space Center and lengthy consultations with experts on the scene. Dickson believes he

must eat the bread of a place before he can truly know it.

Dickson deliberately incorporates his own interests, experiences, and values in his fiction. Take for instance, his fascination with animal psychology. "I tend to gestalt things," he says. "I see humans and animals as illuminating one another by what they do and also humans and animals illuminating aliens and vice versa." Thus Dickson's favorite beasts show up in his pages either wearing their own hides or disguised as aliens: bears (*Spacial Delivery*, *The Alien Way*), wolves (*Sleepwalker's World*), sea mammals (*Home From the Shore*, *The Space Swimmers*), cats (*Time Storm*, *Masters of Everon*), and, of course, otters (*Alien Art*). On the other hand, Dickson lent his own antic enthusiasm and exasperating glee to the teddy bear-like Hokas (*Earthman's Burden*, *Star Prince Charlie* written with his old college classmate Poul Anderson). Dickson contemplating a gourmet meal or a fine guitar is the very image of a Hoka.

Guitar in hand, Dickson is a pillar of convention "fiksings," gatherings of people who perform odd songs which may or may not have any bearing on sf. Although his tenor has lost its original clarity, his renditions of classics like *The Face on the Barroom Floor* or *The Three Ravens* are still enjoyable. It is even more of a treat to hear him sing his own compositions like the grim *Battle Hymn* of the Friendlies, the wistful love song from *Necromancer*, or the rollicking *Ballad of the Shoshonu*. This has inspired some of his fans to write Childe Cycle songs themselves.

Among sf writers, Dickson is second only to Poul Anderson in the ornamental use of songs and poetry. Like Anderson, Dickson was raised on folk ballads, epics, fairy tales, and the great nineteenth century novels although there was more of a British than a Scandinavian slant to his literary formation. Furthermore, Dickson, along with Anderson, Robert A.

Heinlein, Jerry Pournelle, Richard MacKenna, John Brunner, and Cordwainer Smith, has been heavily influenced by Rudyard Kipling. (Kipling's impact on sf, now reaching into its second and third generation, has never been adequately investigated.) However, Dickson also cites major mainstream American and Russian authors and even Thomas Mann among his influences.

One expects a professional writer to maintain a large library and, indeed, the walls of Dickson's Richfield, Minnesota home are lined with books. But Dickson is a true bibliophile. He loves books simply as physical objects, delighting in fine bindings and crisp pages. He shows a marked preference for hardbound volumes even for items of passing interest. Accompanying him to a bookstore is like tagging behind a tornado. His ever-expanding holdings are systematically catalogued and he maintains a complete collection of his own editions.

Dickson has stronger opinions than most writers on how his work should be illustrated and collects originals of the illustrations that please him. (Wallspace in his home not devoted to books is mostly covered with art.) His feeling for visual aesthetics was deepened by years of night classes at the Minneapolis Institute of Arts. His studies taught him the difference between written and painted visions. He ruefully observes that too often writers try to paint with their "writing equipment" while painters try to write with their "painting equipment."

Dickson's life and career are also molded by a complementary set of physical pursuits. Allergies—and time—now bar him from the camping, climbing, and other outdoor recreations he formerly enjoyed. (However, on a recent trip to Florida he caught the small marlin that decorates his office wall.) Yet the experiences he has had with wildlife and open spaces remain with him still as raw material for creative

efforts. He would not be the same man or the same writer if boyhood memories of Pacific breakers did not echo in his dreams.

Dickson's handling of nature is subtler than Anderson's lush, almost pantheistic approach. He sees it primarily as a milieu for human action. (His preference for somber, austere landscapes is most poignantly revealed in *Alien Art*.) Having lived in Western Canada as a child and in Minnesota since prompts his frequent use of these regions as story settings, either directly or as models for alien worlds. His beloved Canadian mountains, "the bones of the continent," become the cool, rocky highlands of the Dorsai. Northcountry lakes and woodlands reappear in *Pro*.

Indoors, Dickson's ardor for fitness shames his more sedentary friends. His ambition to achieve something of the high performance under stress he admired in tough old fighting men like Hawkwood led to his involvement with the martial arts—the chivalry of medieval Europe and the *bushido* of feudal Japan have much in common. Formal training has done more than impart special physical skills. It has also reinforced views he already held on self-mastery and functional beauty. Performing a clean knife pass takes the discipline of a dancer; a well-designed blade is a pleasing piece of metal sculpture.

Dickson uses the Oriental martial arts to study the attainment and control of that perennially fascinating phenomenon, the exaltation state. He can and—on occasion—has discussed the topic for long hours on end. What lies behind hysterical strength, stunning intuition, heroic virtue? Creativity is once again his answer. When human beings operate at the very highest levels their bodies, minds, or spirits permit, they enter a transcendent phase Dickson calls "creative overdrive." In this condition, they can direct their conscious and unconscious powers to some

otherwise unreachable goal. Salvation is integration and creativity integrates.

Thus, cerebral, artistic adventure heroes are Dickson's trademark. In *The Final Encyclopedia*, for instance, Hal Mayne is a poet who has passed through previous incarnations as a soldier (*Dorsai!*) and as mystic (*Necromancer*). Michael Sandoval in *Lost Dorsai* is a musician and Cletus Graham in *Tactics of Mistake* has tried painting. Dickson endows his heroes with the talents he himself esteems and lets them demonstrate overdrive by their deeds. They are offered as examples of what the entire race could achieve if only its creative energies were fully engaged.

Dickson himself is an advertisement for his theories. His memory lapses are legendary—once when making introductions, he could not recall his own brother's name. He often confuses the titles of his books, scrambles the locations of his planets, and forgets the lyrics to his songs. Nevertheless, his mind becomes astonishingly supple and efficient when overdrive directs it in the service of his art. In this heightened state, he can move briskly through public appearances though exhausted and can soar to fresh imaginative insights. For Dickson, creativity is both the journey and the journey's end. It enables him to unite the plummy and swordlike extremes of his own nature in order to work.

He has an unparalleled sense of vocation, a commitment to his artistic mission as keen as any crusader's vow. By writing the Cycle, he hopes to bring the evolutionary progress he describes that much closer. When asked if he expects the Childe Cycle to appear on some thirtieth century list of Ten Books That Changed the Cosmos, Dickson replied with a smile, "And what are the other nine?" His idealism has been dismissed as naive in some quarters but events within and without the sf field con-

tinue to vindicate him.

Some authors stumble into their trade for lack of anything better to do; others are forced into it by economic necessity. Not so with Dickson: "I've been a writer all my life, as far back as I can remember," says Dickson. "Nobody ever told me not to until later on, by which time it was too late." His talent was encouraged by his parents, an Australian-born mining engineer and an American school teacher who met and married in Canada. His older half-brother is the distinguished Canadian writer and publisher Lovat Dickson but his mother's influence was the crucial formative one. Her reading him books and telling him stories are among his fondest early memories.

Maude Dickson, a wonderfully gracious and spry lady of ninety-one, modestly disputes the importance of her efforts. Nevertheless, her son was a precocious writer: a newspaper published his poem "Apple Blossoms" when he was only seven years old. In 1939, at age fifteen, he entered the University of Minnesota to major in creative writing but his studies were interrupted by military service during World War II. Army aptitude tests predicted he would have a bright future as a dentist.

Dickson graduated in 1948, planning to take his doctorate, teach, and write on the side. He abandoned this "unduly sensible" scheme to follow his gift and write full-time. It was a desperate gamble. He supported himself by selling his blood—twice as often as permitted—and subsisted on a diet of stale bread, peanut butter, and vitamin pills. His sacrifices were rewarded when his first sf story, "The Friendly Man," appeared in *Astounding* in February of 1951.

Three decades, 40 novels, and 175 shorter works later, the gamble may be said to have paid off in honors and prosperity. Dickson has won the Hugo for "Soldier, Ask Not" (1965), the Nebula for "Call Him

Lord" (1966), the Jupiter for "Time Storm" (1977), and the British Fantasy Award for *The Dragon and the George* (1978) as well as receiving many other award nominations. These days, a dedicated staff including a full-time business manager and part-time secretarial and research workers assist him. Maintaining his affairs in good order requires an otter-keeper's patience but the task should become easier once the intricacies of his newly purchased computer system are mastered.

Dickson is one master who seeks perfection in his craft and freely shares his expertise with fellow guildsmen. He served two terms as President of the Science Fiction Writers of America (1969-71) and is currently working to extend the benefits of SFWA's organizational experience to the fledgling Association of Science Fiction Artists. Much in demand as a speaker and resource person, he is one of the few—for years the only—non-academic professional writer in the Science Fiction Research Association. He took part in one Clarion Workshop for new writers and regularly attended the Milford Conferences for established writers during the 1960's. (However he was never known as a member of the infamous "Milford Mafia.") He has also been invited to participate in sessions of the SF Institute, a teacher-training program held annually at the University of Kansas. Thus, chat by speech, he fosters professional excellence and public understanding.

Dickson's mastery of technique combines theoretical lessons acquired in university classes taught by such people as Sinclair Lewis and Robert Penn Warren with ruthlessly practical ones learned in the low-paying sf magazine market. His faith in his own ability saw him safely through both processes. "I was a fully formed writer long before I got my degree," he explains, "I had enough mass and momentum along the road I wanted to travel so that I couldn't be jolted

off." Neither lethal classroom situations nor the pressure of gaining enough story skills to stay alive impeded his progress.

Now in the mellowness of his maturity, Dickson is reaching the destination he chose for himself half a century ago. He successfully merges style and content, polished literary form and research-based substance, into one limpid whole. Although clarity can be a handicap when critics equate obscurity with profundity, Dickson's art conceals his artfulness on purpose with a view to reaching the widest possible audience. He believes that "good fiction should become transparent so people end up reading it not so much for the words as for the ideas."

Dickson has always been a highly conscious writer. There is nothing random or spontaneous in his tightly structured prose, never a wheel misplaced, never a gear unmeshed. He seeks the optimum configuration for his fictional drive train in order to transmit messages most efficiently. Philosophical convictions generate the relentless power of his best work.

He calls his method of rendering principles in fiction the "consciously thematic novel." This technique, developed from mainstream models, enables him to argue a specific point of view without resorting to propaganda. It presents an unbiased selection of natural incidents to support its thesis. "The aim is to make the theme such an integral part of the novel that it can be effective upon the reader without every having to be stated explicitly," says Dickson. A consciously thematic story can, of course, be read and enjoyed for its entertainment value alone. But ideally, when the reader sees all the resonances and repetitions, the author hopes that "he will do the work of looking at this slew of evidence I've laid out and will, on his own, come to the conclusion I'd like him to reach."

Dickson calls the Childe Cycle "my showpiece for the consciously thematic novel." Curiously enough, the Cycle itself originated in this very way, through a deeper interpretation of pre-existing evidence—as though the unconscious side of the author's mind were operating on the conscious side via thematic methods.

During the 1940's, Dickson started—but never finished—an historical novel entitled *The Pikeman* about a young Swiss mercenary serving in fifteenth century Italy. This plot, enhanced by ideas drawn from Rafael Sabatini's *Bellarion* and from *Astounding* editor John W. Campbell, yielded *Dorsai!* in 1959. Then one night at the following summer's Milford Conference, a hitherto unsuspected pattern sprang at Dickson from the pages of *Dorsai!*. "Eureka! I had it!" he recalls, "I got up the next morning and spent three hours trying to tell Richard MacKenna about it, a process by which I sorted it out in my own mind. The essential structure was born full-blown at that moment."

The Childe Cycle is an epic of human evolution, a scenario for mankind's rite of passage. Over the course of a thousand years, from the fourteenth to the twenty-fourth centuries, interactions between three archetypal Prime Characters—the Men of Faith, War, and Philosophy—succeed in uniting the unconscious/conservative and the conscious/progressive halves of the racial psyche. The result is a fully evolved being endowed with intuition, empathy, and creativity which Dickson calls Ethical-Responsible Man. At that point, the human organism will be no longer a "childe" but a spurred and belted knight.

When completed, the Cycle will consist of three historical, three contemporary, and six science fiction novels. *Dorsai!* (1959), *Necromancer* (1960), *Soldier, Ask Not* (1969), and *Tactics of Mistake* (1971) have

already appeared and are scheduled for reissue by Ace. *The Final Encyclopedia* and *Childe* are currently in preparation. These novels are accompanied by a series of shorter works or "illuminations" that stand outside the argument of the Cycle proper but share the same settings and characters: "Warrior" (1965), "Brothers" (1973), "Amanda Morgan" (1979) and "Lost Dorsai" (1980). "Amanda Morgan" and "Brothers" have been set in a narrative frame with illustrations and published by Ace as *The Spirit of Dorsai* (1979). An expanded, illustrated version of *Lost Dorsai* is due from Ace in 1980.

In Dickson's future universe, mankind has shattered into Splinter Cultures that develop only one facet of human nature at the expense of the others. The most important Splinter Cultures are the Dorsai (Warriors—Body), the Exotics (Philosophers—Mind), and the Friendlies (Believers—Spirit) but none of these are fully human and none are the ultimate society. Dickson's messianic hero Donal Grame, first-born of the Ethical-Responsible Men, lives three lives and thereby absorbs the best qualities of Warrior, Philosopher, and Believer. His indomitable will divides the racial psyche in order to develop it, then reunites it in order to perfect it.

Dickson has, in effect, created his own secular-historical repertory company of archetypes playing in universal dramas. The Cycle functions like an original experience. It has shaped its author as much as he has shaped it: life anticipates art, art elucidates life. Dickson's twenty-year quest to complete the Childe Cycle has become a kind of initiation for him, both as an artist and as a man.

The plume waves. The sword flashes. The valiant chevalier has pledged himself to see the journey through and will not count the cost of keeping faith.

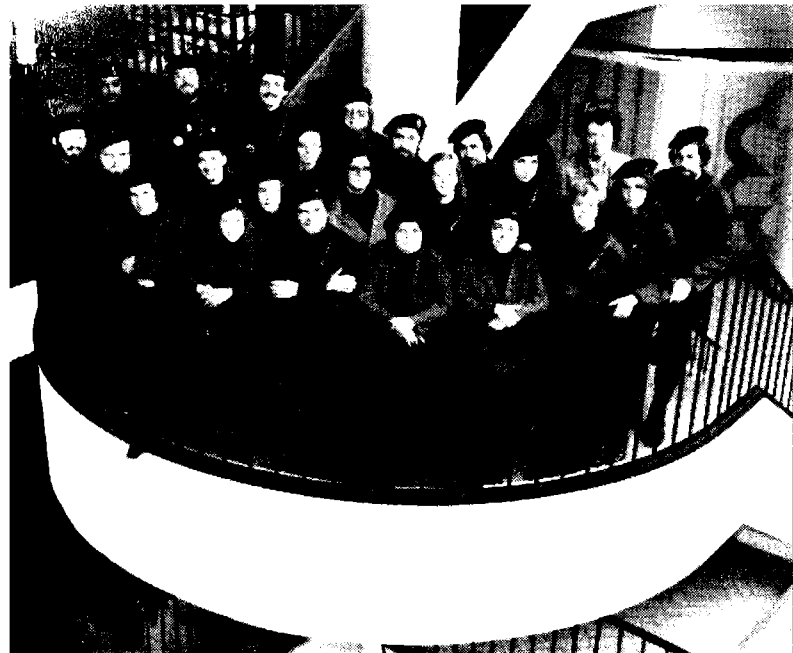
—Sandra Miesel

THE DORSAI IRREGULARS

by Jay K. Klein

Four hundred years hence there'll be a planet of the finest fighting men in the universe, who fight wars on a low-bid basis. Gordon R. Dickson told us this in *Dorsai!*, the first of a series debuting twenty years ago as a serial in a science fiction magazine. Now, there are just 27 Dorsai, otherwise normal men and women who formed with the author's permission the Dorsai Irregulars, Inc.

This group started as a prize-winning presentation by eight science fiction fans at a world science fiction convention several years ago. Founder and commandant Robert Asprin originally was a cost accountant before becoming a science fiction writer, and is fascinated by efficiency, especially applied to the military. It was his idea to take contracts for security duty as a service to science fiction conventions that had been using high-cost, poorly motivated standard



hired guards at arts shows and sales rooms.

The Dorsai are strictly non-profit, working only for expenses or even just partial reimbursement. Commandant Asprin figured this would help conventions cut costs while giving members of the para-military outfit a chance to meet the future half-way. Conventions have also been able to draw on a wide variety of trained professional help since the Dorsai include such personnel as a doctor, a lawyer, and entertainers.

Asprin is at the extreme upper left in the group photo, has written his own story about mercenaries of the future, and still handles finances and helps work out contracts for the Irregulars. Author Gordon R. Dickson is the civilian at the upper right. Photo of The Dorsai Irregulars by Lance Ferrao.

—Jay Kay Klein

NEW

THE BRAINS KEEP COMING

AS I WRITE THIS I'M
IN VIRTUALLY INSTANT
COMMUNICATION WITH A
NUMBER OF COMPUTER
EXPERTS NOT SHY OF
LETTING ME KNOW IF
I'VE MADE A MISTAKE.

by
JE. POURNELLE
P.H.D.

BEGINNINGS

I've just finished reading my 1974 essay "Here Come the Brains" (included in my book *A Step Farther Out*, Ace, 1979, and if you read this column you *must* want that book . . .) and I find that when I refurbished that essay in spring of '79 I had to insert about a dozen interpolated comments. The Big Brain Revolution proceeds apace as I predicted—except that it's somewhat ahead of schedule.

Consider: I wrote that essay on what was then one of the best tools available to a writer, an IBM Selectric II typewriter. The 1979 revisions weren't done on a typewriter at all. Instead, I used a home computer system, in which the text appears on a glass TV-like screen and can easily be edited in various ways. In fact, one doesn't bother with things like a carriage return at the ends of lines: the computer figures that out and wraps the words around for you. You just type, and mark the ends of paragraphs, and let the machine take care of the other trivial details.

But for this essay I'm working with something considerably in advance of my home system. Oh, true, I'm physically banging away on my normal keyboard (which looks suspiciously like a Selectric keyboard; one's fingers get used to certain patterns) but in fact my computer is taking a rest. I've got it fooled into thinking it's no more than a rather smart terminal, and the actual text storage and editing is being done on the other side of the continent in New Jersey. Moreover, as I write this I'm in nearly instant communication with a number of computer experts not shy of letting me know if I've made a mistake. (Actually, it's a rather upsetting experience to know that a dozen or more people may be looking over your shoulder, and normally I wouldn't write under those circumstances; but it is amusing to use an experimental information exchange brain for *this* column,

and it may even be that useful suggestions will come from someone in, say, Seattle, or at Stanford.)

Now, true, my impromptu "consultants" for this article consist of a random selection of people mad enough to be up and logged onto a computer at this ghastly hour; but it need not be that way. I could have invited several people to watch and make comments, and it would have worked the same way.

And there's one look into the future: the nearly unlimited conference with instant feedback. Of course it's possible now and certainly will be simple in future to restrict one's audience to those invited; the public features are peculiar to the system I'm working with, not inherent in the long-range use of a big brain. This happens to be a commercial system which has invited several users to try it out (I suspect in part to see if we'd be interested in paying for the service) and not all the bells and whistles are installed. Still, it's more than enough to give an idea of how it works.

Then, too, a few months ago Larry and I were shown around MIT's Artificial Intelligence Laboratories, and got to see some of their *very* large brains in operation; and they are impressive indeed.

Anyway, given all this new computing experience that has suddenly come my way, it seemed reasonable to devote a column to the present and future state of the Big Brains . . .

* * *

But first, perhaps we ought to look at the "little brains" available to anyone—and realize that not long ago these micro computers now aggressively sold by firms like Radio Shack and the Heath Company would have been considered very powerful machines indeed. In fact, my home micro in its own right has considerably more computational power than the best computers envisioned by Robert Heinlein in his future history series—and his early works

were the most accurate predictors of the future that we had.

Recall what his best computers were doing? Andrew Jackson "Slipstick" Libby, a young genius with total recall who'd memorized the log tables, was able to do the machine's job, which mostly consisted of multiplying numbers and solving simple algebraic equations. No human alive could keep up with my computer, which can patiently rattle off complicated equations full of natural logs and fractional exponents.

And I've often told the story of my 1954 visit to ILLIAC, then the world's largest and most expensive machine, which couldn't even match a good modern hand calculator, much less an inexpensive (under \$1000 in 1979 dollars) home micro. There's a lot of computational power available in the "little" brains; enough to make several business revolutions fairly certain, and we'll return to that subject.

Moreover, the *big* brains are more and more available to the general public. In the '60s there were a number of commercial firms which offered access to big machines; that idea died because it was too early, but now I see new ads for nets that for \$100 hookup and a few bucks an hour will connect you to a big machine similar to the MIT system, and I predict a great future for that business. By the time this gets into print I expect there will be two or three nets; before this essay gets collected into book form there will be a *lot* of them, probably including Ma Bell who may find it profitable to give away the computer time to encourage you to use your phone more.

So what good is all that?

A lot. And the effects will change your life, some in subtle ways, some fairly dramatically.

First, the text editor itself. Although there are some bugs in these programs (MIT's fanciest text editor sort of grew, and to the extent it was designed at all

was intended for people fairly sophisticated in the use of computers rather than naive users) the fact is that even the worst of them beat the daylights out of a Selectric II. Consider: one major secret of success in professional writing is that the public rarely sees a first draft. The best way to do good writing is to rewrite. Sometimes to rewrite a *lot*. But that takes mechanical work. There's nothing fun about bashing the keys of a typewriter, and it's even less amusing to take a nice clean draft and start tearing it apart. The psychological block against smearing ink on pretty new copy, fresh back from the typist, is Alps-sized.

But if you know that a clean copy can be obtained in seconds . . . and that you needn't retype anything other than changes themselves . . . then rewriting becomes easy.

Computers can take all the mechanical work out of writing. They can go further than that. They can automatically check spelling, and ask if you really meant "thrity" or "seperate". It won't be long before programs to correct grammar will be available.

That's text creation. What of publishing?

The publishing industry as we know it is inevitably doomed. I've described this before, but it can't hurt to repeat it: once the big brains become easily available to everyone, "publishing" will consist of writing your book and depositing it in a central information utility. Those wanting to read it simply ask for it; their credit card information is already on file as part of their access to the big computer. The book appears on their screen and their account is charged for the service. A royalty is simultaneously credited to the author's account.

This could be done now, but it won't happen for a few years. At the moment, books are more convenient: you can carry a book around with you, from room to room or even out of the house, while to read via computer requires you to stay next to the termi-

nal. However—they'll soon improve the terminals. There's no reason you couldn't have a handy flat screen, not a lot bigger or heavier than a book, something easily held in your lap, with controls for "turning pages" backward or forward. The first ones will have a cable running to a wall jack, but later improvements can let your pocket terminal communicate wirelessly via satellite, giving all the handiness of a book—and the convenience of carrying a whole library.

Now publishing by computer has problems. One severe difficulty will be piracy—but then piracy is already a problem in these days of cheap copying machines and offset presses. As far as I can tell there are no "show stopper" problems associated with using computers for most information exchange.

* * *

Another industry that will be greatly affected by cheap big brains is education. For example: MIT has a program called MACSYMA, short for Symbolic Algebra, which literally lets you play about with systems of equations, do substitutions, change variables, put in trial values, integrate, differentiate, get numerical answers—all without having to worry about mistakes in your arithmetic. MACSYMA is capable of very high-powered operations, such as expanding Taylor series, doing Fourier transforms, and mucking around with functions of complex variables—but it is also simple to use. Mrs. Ellen Lewis, one of the MIT Mathlab staff, was amused to find that her seven-year-old son had plugged in every mathematical fact he'd been taught and solemnly reported that MACSYMA got a grade of 100.

If something like that had been available when I was an undergraduate, I might well have become a theoretical physicist. I never had much trouble understanding the *concepts* of modern physics, but when it actually came to crunching the numbers to

produce a result tallying with the answer in the back of the book I had a notable lack of success. Since I couldn't be *sure* I understood what I was doing—the only real check was whether you got the right answer—there seemed nothing for it but to go into a field in which I got better grades. It wasn't for years that I learned that my mistakes were truly trivial, things like multiplying wrong or dropping decimal places, or even silly late-night mistakes in addition. By then it was too late.

Five years from now that won't happen to anyone. Within five years every student (well, every student in an up-to-date university) will have access to enough computing power to generate the right answers provided the student has asked the right questions. The dropped decimal and the inadvertant change of sign are on their way out as eliminators of hard-science majors. I can't think that will be detrimental to our future.

Beyond that, what? First, let's set some ground rules. I can't possibly cover the entire subject of the electronics revolution. I can't consider all the implications of the big brains in simulations: of such sophisticated modelling that you really can do "thought experiments" with new chemical and physical processes and get meaningful results; but it's clear that such modelling and the resulting proliferation of formerly-too-expensive experiments will have a fairly profound effect on the knowledge explosion.

For this column I want primarily to look at the effect of big brains as they become increasingly available to the general public. Even that's a tall order.

After all—what are computers used for now? Games, mostly, isn't it? Do the people who buy them actually do anything but play "Star Trek"?

Yes: true, for the first couple of years all the magazines intended for the home computer user

were largely filled with articles about and programs for playing games (and usually damned dull games at that) but that's no longer true. Now the average issue of **BYTE** is likely to be devoted to accounting systems, or basic robotics. There are still games in plenty, but even in that field it's interesting to watch progress: from "guess a number" and primitive versions of hangman to Othello and Chess . . . and then beyond board games entirely to things you can't do without either a computer or a large crew of referees.

As for example **ZORK**, a fine madness in which one goes exploring a dungeon, gathers treasures, solves puzzles, maps large areas, escapes death (or even gets resurrected if need be!) In **ZORK** and its predecessor **ADVENTURE** and other games of that ilk, the machine knows where you can get to from where you are, and tells you what you see when you do certain things. A typical **ZORK** command might be "Go north", and the response might be "You have come to a long winding corridor, dimly lit with torches. At the far end you see six elves kneeling to shoot dice. From their conversation you learn they are dicing to determine which one will kill you."

Now what earthly use is a thing like that (beyond having fun with it)?

Well, number one, in order to make the game interesting the implementers have had to invent something fairly sophisticated: a parser, which actually takes simple English and does a fair job of interpreting it into something the computer can deal with. And that is, when you stop to think of it, no small feat—and as applicable to a business computing system, or a device for controlling industrial processes, as to a game.

Second, the **ZORK** and **ADVENTURE** type of games have in them a map: at any given point in the game there are a number of things you can do, and your alternatives change as you move through the

dungeon; moreover, you may have removed objects from a particular room so that the next time you visit it your alternatives are not at all those you had the last time through.

Generalize that: doesn't it sound like a pretty sophisticated "programmed learning" device? Change the script from dice-throwing elves to "force = mass times acceleration", and the response you give from "Go north and get sword" to an attempt to explain what $F = MA$ means—and you're on the way to a teaching program. With a little work you can set things up so that a good teacher, knowing nothing about computers and programs, would be able to design a course and put the proper concepts into it.

The implications for education are obvious. A great deal of learning requires nothing more than a very patient teacher. I can think of few humans as patient as a computer . . .

Now programmed learning has to be done carefully; there are a lot of subjects not amenable to it. But some things simply must be learned (taxonomy, syntax, things like that) and they're as dull to the teacher as the student; computers are ideal teachers in many such instances. Mrs. Pournelle has found that her classroom computer has sufficient fascination that many of her students will play educational games by the hour—the same students whose span of attention is usually measureable in seconds.

And for that matter, need we dismiss the fun aspects of ZORK quite so quickly? These games are not dull (I found ZORK a trap into which I put altogether too much time) and solving one can take longer than reading a novel. In fact, the adventure-oriented game may well become a rival to the adventure novel, and Larry Niven and I are seriously considering designing such an adventure to be implemented by the computer gnomes for sale to the computer-owning public. An enthusiastic blurb for one of my recent

books said "You will *live* the life of the JANISSARIES . . ."; the computer adventure would make that very nearly true.

* * *

So far we've talked about "Big Brains" and computers as if they were black boxes, and in one sense that's the proper way to think about them. As these things become more advanced there's less and less need to understand what goes on inside them. Indeed, when I first bought mine I was determined not to know.

That resolution faded when I discovered one of the major problems with these machines: the people who understand them simply cannot talk intelligently to the people who don't. As a result there are all kinds of nasty surprises waiting for the naive user. In simple self-defense I had to delve into the theory of modern computers . . . and once inside the black box my insatiable curiosity took over.

Once you know what's happening inside the computer it becomes a lot easier to predict their future: not only to see that it will not be long before you and I will be able to afford a system with nearly all the capabilities of MIT's Big Brain, but to *know* that development is inevitable.

Thus I'm going to take a minor excursion into how these things work, but do understand: the brain revolution does not depend on a general public understanding of the machines, nor does it depend on the computer scientists' learning how to write. If it did, I'd say the revolution is a long way off indeed; but as I hope to show in a few paragraphs, that problem is going to solve itself.

* * *

The first thing you learn about modern computers is that they're *small*. The working heart of my fairly advanced home micro is an electronic chip about three inches long by one wide. The rest of my system,

taking up about four cubic feet for the computer itself and another three for the disk drives, is auxilliary equipment: power supplies and motors and memory boards and the like, and all of it could be considerably compressed if necessary, since a great deal of it is empty space to promote cooling air flow.

Because they're small, these machines are *fast*. In the early days of computers it seemed ridiculous to worry about the physical size of the machines: after all, the information moved about inside them at the speed of light, and what's a foot or so at that speed? But as larger and more complex computers were contemplated that path length became increasingly important until it was critical, and if the Large Scale Integrated circuit (LSI) hadn't been developed the really big brains would have been impossible.

LSI technology also made the machines cheap: the central processing unit chip in my computer can be bought in quantities for under twenty dollars. The recent popularity of home computers has also brought down the price of the other chips: while last year memory was on the order of \$1600 for 64,000 "bytes" (don't worry about it; a byte can be thought of as an alpha-numeric character like the number 8 or the letter a or the symbol *) you can now buy 64,000 bytes for under \$500—and the price, as well as the size of the memory chips, continues to plummet.

About that number 64,000. It's fairly critical to micro computers, because it's the number of memory cells the central processing unit—the tiny brain chip that does all the work—can directly address. Actually the number isn't 64,000, but 65,536, which is 2 to the 16th power. "Micro" computers are 8-bit machines and employ two-word addresses, and once again I'll explain before I lose someone.

A computer is a two-state device: that is, deep in the machine's heart there is nothing more complicated than an ability to detect whether a particular

chunk of the computer's memory contains a 0 or a 1. (Incidentally, although there are a number of science fiction novels that deal with the marvel wrought by the invention of a 3-state or multi-state machine using a logic more complex than the 0, 1 logic of present devices, don't believe them: with a two-state machine you can simulate any degree of multi-state logic.) For reasons we won't go into here, a single cell's worth of information is called a "bit", and at the risk of boring some of my computer-familiar readers, let me say it another way: one "bit" of information consists of no more and no less than knowing whether a particular memory location holds a 0 or a 1. (Purists will know that there's nothing sacred about 0 and 1; I could as easily use "true or false" or "red or green" or any other pair of mutually exclusive terms.)

A single bit of information isn't generally very useful (although it could be: is the switch that controls an ICBM launch open or closed?). Computers therefore collect the bits into larger chunks which are sometimes called "words". Micro computers use words that are 8 bits long. Now it is obvious that the number of different "things" an 8-bit word can distinguish between is 2 to the eighth, *i.e.*, 256. (I know; for some of you it isn't obvious, but in the interest of getting on with this you'll simply have to take my word for it.)

Each memory cell of a micro will hold one 8-bit "word". Since there are 26 letters in the alphabet, (double that to distinguish between lower case and capitals), and 10 digits (0 through 9), each word of micro memory can hold the binary equivalent of one alpha-numeric character. Actually, in addition to the letters and numbers, a standard character set includes punctuation marks and also some "special" characters such as carriage return and delete used to control devices like automatic typewriters; even with all those we only come up to 128 distinct characters,

which is 2 to the seventh. For a number of reasons, a 7-bit machine would be highly inconvenient, so the central computer chip is designed to handle the next larger number.

The capability to deal with 8-bit words is designed into the central processing chip, an LSI which contains the equivalent of thousands of transistors and vacuum tubes. Also built-in to the micro-processor chip is an ability to use two words as a memory address—which is why you can't (without a number of programming tricks) put more than 65,536 memory cells in a micro.

Now that's a fairly large number, but it's not all *that* big: for example it's only about 11,000 words of standard English text, which means that if you want to work on something larger (like a novel) you have to have some other means of storing the information because you can't keep all of it in the computer's memory. There are a number of mass storage devices adapted to the home computer market. At the moment the most common is a simple tape cassette. More convenient is a "floppy disk", which looks a bit like a phonograph record sprayed with the dull brown magnetic coating of a cassette tape. Floppies can hold some 256,000 alpha-numeric characters and feed that information into the computer at many thousands of characters a second. More convenient still is the "hard disk", which by using a very rigid magnetic disk can squeeze several millions of words into a package smaller than a cubic foot, and can pick up or put down information at blinding speed—for example, a good hard disk system can copy this entire article onto disk quicker than I can read the four-word message saying that it has made the copy.

And the point of all this is that there are two major differences between micro computers and the really big brains: the big machines process bigger "words" (some use 16-bit words and some 32-bit words) and

thus address far more memory as well as process a lot more information per cycle; and the big machines have hard disks. Those differences are rapidly vanishing. There is already a reliable hard disk for home computers selling for under \$5000, and that price will fall; while a number of electronic suppliers are designing 16- and 32-bit chips suitable for small systems. In addition, there are a lot of new techniques for making memory cheaper. The result is that well before the end of the 1980s you and I will be able to afford machines with all the computing power now available to MIT's big brains.

That doesn't mean that we will automatically be able to do everything the big systems can do. Hardware isn't everything. Left to itself, a big computer won't do anything more than a small one (or indeed anything at all). That's one of the things that happened to the earlier commercial attempts to sell time on big machines: the customers just didn't know what to do with them.

Computers are extremely stupid. All they really know how to do is twiddle bits at incredible speeds. Their usefulness comes when someone figures out how to take a gadget that can add 1's and 0's and turn that capability into, say, a text editor like the one I'm writing this on.

One way someone might do that would be to build a program specific to a particular processor. The CPU (Central Processing Unit, the "brain") has what's called an "instruction set", which is a list of its capabilities and the command the machine has to get in order to make it do that. A typical instruction might be "load the accumulator with the character stored in the memory location you'll find in your H, L register." Another might be "subtract one from the number now in the accumulator." Each such operation is commanded by a code number. When I first got involved with computers back in the fifties all

programming was like that: you figured out what tiny specific operations the machine had to perform in order to get the result you wanted. (I was trying to make it invert a matrix, and it took three of us all summer to write the program.)

There are two problems with this kind of programming. It's hard to do, and it is highly specific to the particular machine; a program that runs on one computer won't run on another. Fortunately, though, once good machines were developed the people who really knew computers invented programs that would understand much higher languages: that is, there are now programming languages in which the way you tell the machine to invert a matrix is to say "INVERT MATRIX." A special program translates that instruction into the tiny specific operations needed for the particular machine you're running at the time; and the same program will run on more than one kind of computer.

And that has started a new revolution that *will* result in general distribution of the kinds of capabilities now found only in places like MIT and Stanford and the University of California.

At the moment computer science is in a transition state. The people who tend the big brains (particularly the grad students in universities) tend to be computer hackers; people intimately acquainted with the gory details of the machines, who know how to get inside the system and twiddle bits. Thus when they design higher-level languages they often build in a lot of their specialized knowledge, and that makes the higher-level languages harder to understand than they need be. In addition, although I know of no necessary reason why people really expert in computer science can't write plain English, the fact is that the ability to communicate with computers and other computer hackers almost guarantees an inability to communicate with the balance of humanity;

thus there is a great disparity between what the machines can do and the ability to teach non-specialists how to use them.

But that will inevitably vanish. On the professional level, big companies like IBM and Honeywell are well aware that user-oriented documentation is perhaps their chief stumbling block to increased sales, and are willing to pay large salaries to people who can eliminate the problem; and as I am fond of saying to one of the MIT hackers, English isn't *that* much harder to learn than LISP (a computer language popular at MIT and Stanford and incomprehensible to mere mortals). Secondly, the widespread availability of small machines has spawned a new generation of computer owners who, because the micros started with hobbyist kits, had no choice but to learn something of the machine's innards, but who are really more interested in *using* their machines than in twiddling bits inside them. They too will help fill the gap between computer scientist and the general public.

But finally and most important, the machines themselves are becoming large enough to support *really* high-level languages. In fairness to the computer hackers, for many years even the best machines were so limited that a complex program had to be very cleverly designed; really sophisticated techniques were required to get both the editing program and a decent amount of text into, say, 16,000 words of memory, and make the whole thing run fast enough to be useful. And of course the more sophisticated the program, the less likely it is to be comprehensible to the untrained—and the more likely it is to have unexpected quirks which the programmer knows how to avoid but which he didn't remember to tell the naive user. Now, though, with cheap memory and fast machines so easily available, the sophistication can go into the "translator" programs, so that the user can work with truly high-level languages; in

other words, to work in languages that automatically explain what the program is doing in terms comprehensible to people who haven't a clue as to what's going on inside the machine.

And that will take us into a really incredible era: a time when a very large part of the population will have instantly available not merely information, but the capability of doing things with it.

Example: last year my work load got so great that I had to hire an assistant. I learned to my horror that government has made things so complicated that you need a fair chunk of an employee's time just to keep the records and fill out the forms necessary to employ someone. In fact, I'm not at all sure I'm joking when I say that one major reason for high unemployment is that the average person contemplating going into business simply cannot figure out how legally to hire anyone.

But my computer came to the rescue; and I note that most computer magazines now advertise programs to handle taxes and accounting systems and payroll forms and such like.

It won't be long before the average citizen has as much computing power as the government; some of the disparity between citizen and government will be eliminated.

Information networks will sprint into existence. Some will be frivolous: perhaps electronic fanzines (something like that already exists); but others can be quite serious. National organizations with near-instant communications between members are not only practical but inevitable; the effects on our domestic politics should be interesting.

The information collecting capabilities are formidable. I will not soon forget the afternoon when John McCarthy of the Stanford Artificial Intelligence Laboratories plugged his hand-carried terminal into the telephone on my desk, called Stanford, and asked

for "hot news on fusion power"; the result was a precis of a number of items, including some from sources you'd never think to look at. I wish I had access to something like that every time I have to do a particularly hairy research article.

Fire departments can have instantly available data about the composition and flammability of every structure in their protection area, along with the precise location of water supplies and gas and power shut-offs. Court records can make sense. Legal research becomes greatly simplified—and available to all of us, not merely to lawyers.

And of course the potential for abuse is obvious. Big computers make collecting dossiers on nearly everyone quite simple; Congress has already had to deal with that. But the big machines also make *really* secure codes quite practical; we already know how to use "trapdoor" functions that let you encipher whatever you'd like—letters, your diary, records of illegal bets, anything you choose—in a way that even the most powerful machines available to government can't break. The advantages are not all to government.

There are some real dangers to widespread access to knowledge. When really powerful machines plus good chemistry simulation programs are widely distributed, there's nothing to prevent some whacko from inventing a new explosive through computer experiments. We can all think of other deviant activities the big machines may facilitate. The brain revolution is hardly an unmixed blessing.

But like it or not, the djinn is out of the bottle. The brain revolution snuck up on us; very few science fiction writers have dealt with a society much like ours in which really sophisticated machines are universally available—but that's what we're getting. The big brains are not only coming, they're here.

—Jerry Pournelle

Judo and the art of self government

by Kevin O'Donnell, Jr.



Anything can be used as a weapon... anyone can be the victim.

Brad McLonick adjusted his tie as he strolled into his warm, softly-lit office. He was a tiny man with a tendency to dandyism, a style he'd picked up from a PoliSci instructor at Oklahoma State. "160 cm. and 53 kg.," Professor Wiggins had told him, "are not going to outsize anyone, so you better outdress them. Score your points however you can." He tried. In his crisp, tailor-made suit, he was the picture of a perfect administrator. Only a receding chin and listless, mouse-brown hair marred the image.

Shooting a flawless cuff, he twitched the plexi-glass coffee table into precise alignment with the brown leather sofa. Since it was a cloudy January day, he left the green drapes closed—but did peek through them at the District of Columbia, 23 stories below. Lovely view. Lovely office. The Chinese rug was deep, the Thurber cartoon over his computer desk original, and the Muzak just loud enough to mask the foamy whirrs of the dishwasher in the kitchen, ten steps away. He eased into his swivel chair and put his 7-B's up, reveling in the easy pace that working out of his home permitted him.

"Good morning, Alfred," he said to his computer.

"Good morning to you, sir," it replied in its clear tenor. Except for its screen, and its rarely-used keyboard, it looked like a six-drawer aluminum desk with a kneehole.

"Any calls?"

"Category A, zero; Category B, zero; Category C, nineteen."

McLonick nodded. It was too early for his superiors

at the Office of Written Communications to be calling him, and his friends or peers, the Category B people, usually got in touch after working hours. That left the inferiors. "Those Cat C calls, were they all from authors?"

"Yes, sir."

"Anything interesting?"

"The usual importunities, sir."

"Clear them, then, I can't be bothered." Writers harassed him continually, some arrogant in their demands that he approve their books forthwith, others wringing their hands while they begged him to speed their works into the Info-Net so they could pay their rent, or their doctors' bills, *or their pushers, more likely*, he thought. To all, Alfred gave the standard reply: "The manuscript in question has been received by this office, and will be attended to as soon as circumstances permit."

Writers. He snorted. *Lazy, self-indulgent, subversive* . . . he knew all about them. Three years as Books Supervisor of the OWC's D. C. District Office had shown him the trash they tried to dump on an unsuspecting public, the sly tricks they used to circumvent the laws against portraying sexual activity, the transparent symbol-shuffling by which they attempted to criticize the government without actually committing themselves to sedition. Oh, he was very familiar with their underhanded ways—and proud of OWC's role in upholding public morality by censoring those writers who would inflict their sicknesses upon the nation.

He studied the holes in the acoustic ceiling tile for a while, then said, "Let's go over the budget again. Screen the summary."

Numerals came to life on the computer's grey-skinned display screen. He ran his eye down the columns, clucking his approval, until a line caught his attention. "Wait a minute," he said, dropping his feet

to the floor and rolling his chair closer to the desk. "Line Eighteen says we're going to end FY 08 with a hundred thousand surplus. Is that right?"

"Yes, sir."

He scratched his jaw. "Check it," he ordered.

Half a second later, the computer said, "That's a valid projection, sir."

"Damn." He took a ballpoint from his pocket and started to doodle on a memo pad. A tic-tac-toe board appeared, became a barred window, grew shadows and a pair of clutching hands . . . "Sonuvabitch," he said at last, "I can't underspend. We've got budget hearings in two months and the Director'll cut us back if we're showing an excess. What's the backlog like?"

"Close to a year, sir."

McLonick sighed with relief. That kind of workload would offset the unspent FY 08 appropriation. But still . . . it would be best if he could eliminate the surplus. "How many empty slots do we have?"

"Five, sir."

His brown eyes widened. "We only had three, yesterday."

"Four, sir—but Mr. Giomanni resigned last night."

"Art? How come?"

"His letter explained that he was developing double vision; he retired with 75% disability pay."

McLonick leaned back in his chair and thought a moment. "Let's get those slots filled, quick. Put an ad in the paper—same one we ran last time—inform Civil Service, process the applications, and have the top ten candidates on my desk next Monday. And listen, Alfred: check them out good, you hear? Literate, sensitive, articulate, and *quiet*. Don't let any ACLU people slip in, or any other extremists, either. Got that?"

"Yes, sir. Telephone call, sir—Senator Romorci of Connecticut."

"Wait a minute." He straightened his lapels. "Put him on."

The familiar red nose and silver hair of the junior Senator from Connecticut filled the screen. His hard eyes seemed to stare directly into McLonick's. "Good morning."

"Senator." Unconsciously, he sat more erect. "It's an honor."

"I'll get right to the point. Marilyn Safferstein of New Haven has complained to me that you've refused to let her novel, LEAPFROG THE UNICORN, into the InfoNet. I've read it. Excellent work. I want to know why you banned it."

"Well, sir—" he couldn't remember a thing about it. "Excuse me, sir." To Alfred, he said, "Split screen, give me the file on that book." When it materialized, he scanned his notes. "Ah, now I see. Senator, the work functions on three separate levels. The most obvious, the overt narrative, is of course a children's fairy tale. The second level, however, is an allegory calling for armed revolution, and the third, metaphorical level, recounts the bestial rape of a nine year-old boy. I think you'll agree, sir, that we don't want our children exposed to—"

"Crap." The Senator believed in succinctness. "My constituents—"

"We're just trying to protect them, sir," he interjected.

"And yourselves. Do you know how mad the people are?"

"Sir." He produced his martyr's smile. "The people established OWC to—"

"I know why it was done, I voted for it, dammit!" The Senator's cheeks had become as red as his nose. "It was to keep filth and falsehood out of American homes, is why. But—" he leveled a large-knuckled finger at McLonick "—you've gone overboard! You've abused your positions. I warn you, reform

yourselves from within, or have it imposed on you from without!" His angry gesture cut the connection; the screen blanked out.

McLonick nibbled his fingernail for a few seconds. "Alfred—tell OWC News that Senator Romorci's about to campaign against us. They'll know how to handle it."

"Yes, sir."

"Good. And get me Todd on the phone."

"Todd, sir?"

"Neil Todd, my deputy," he said impatiently.

"I'm sorry, sir, you have no deputy."

"I *what*?" His jaw dropped.

"You have no deputy, sir. The slot's been open for two years, now."

McLonick squinted at the speaker as if he couldn't believe what he was hearing. "Alfred," he began, "I hired Neil Todd two years ago, and he's been my deputy ever since. For Christ's sakes, I talked to him yesterday morning about the new stationery."

"Forgive me, sir, but it was me you spoke to about the stationery. It's on order, now."

"Fine, but put me through to Todd."

"Neil Todd, sir?"

"Yes," he said, barely masking his fury.

"Do you have an address on that, sir? There are a number of—"

"Somewhere in Gaithersburg," he growled, "but you've got his number. I've called him a hundred times, at least."

"I'm sorry, sir, there's no Neil Todd listed as residing anywhere in Gaithersburg, or in the surrounding communities. I do have two in Baltimore, however, and—"

"Never mind." Damn machine had glitched up again, obviously. Have to call repair later, see if they'd send somebody out. "If he phones in, put him through to me right away."

"Yes, sir."

"Let's get down to business—gimme the first book."

A title glowed on the screen: FRUITS AND NUTS, by Simon Pomed. McLonick frowned. "Is he the guy writes editorials for that Atlanta paper?"

"The same, sir."

"Uh-huh." He chuckled unpleasantly. Pomed had said some malicious things about OWC, things he had had no right to say. "Deny that book access to the InfoNet. Also—" while he pressed his thumb against the screen to formalize the rejection, he paused to think. Pomed was sure to make a fuss, but if it were done right, he could be made to look a total fool. Which would teach him. "Also, tell OWC News to deny any comment about this denial access to the InfoNet."

"Yes, sir. A note on that: Mr. Pomed pre-stated that he would appeal."

"Really? What's the appellate level backlog?"

"Approximately two years, sir."

"Fine." He beamed, and drew a face behind the doodle's bars. "We'll let old Simon stew a while, then."

"Would you like to enter into the record your reasons for rejecting this book, sir?"

Fingering his jaw, McLonick said, "Uh . . . not in the public interest, and uh . . . misinformed, misleading . . . ah, self-aggrandizing . . . disruptive of public tranquility, and, uh . . . promoting public suspicion of the government. Good enough?"

"Yes, sir—but those are odd criticisms of a cook-book."

McLonick shrugged. "By the time the Appeals Board gets to it, Pomed will have antagonized them, too. They won't read it, either. What's next?"

"Your cousin's novel had just arrived, sir."

"Martha's?" Aunt Agatha had been calling for

months, now, telling him that the book was on the way. And, incidentally, reminding him of how close she'd always been to his mother, God rest her soul.

"Yes, sir."

"Approve it." He took a nail file from his center desk drawer and began to manicure himself. "Do we have any submissions from major critics?"

"Yes, sir, from McDonald Grayn of TIME."

"Good." He sniffed, thought about how irritating family feuds can become, and said, "Give his memory banks free access to Martha's books, and leave a message for him. Tell him, uh, I'll be handling his novel personally, I hope to get to it by the fifteenth, and, uh, perhaps he'd enjoy reading this while he's waiting. What's next?"

"A rather unusual one, sir." The screen awakened with the title JUDO AND THE ART OF SELF-GOVERNMENT. The author's name, Mikhail Reef, was unfamiliar to both McLonick and the computer. "Though it lacks an imprimatur, it has already gone into the InfoNet."

"I thought unauthorized entry was impossible."

"It's supposed to be, sir, but the access program must somehow have been initiated, for it is in the Net now."

"Well, pull it out," said McLonick, "gimme page one, and compile a dossier on Reef."

"Yes, sir."

Words crawled across the screen. "I am worth a million dollars," began the first sentence, "I have never paid a penny of tax, and I never will. You too can be free. Just read and remember."

McLonick stiffened as he read on. Pages fluttered past his eyes like flakes in a snowstorm. He loosened his tie, unbuttoned his collar, tapped his foot angrily. "Who the hell is this guy?" he demanded.

"I'm still searching, sir," answered Alfred.

He couldn't believe what he was reading. Allegedly

a novel, the book contained chapter after chapter of detailed technical information on how to baffle the government computers that controlled the InfoNet. "Let the IRS pay *you*!" trumpeted Chapter One, before it devoted eighteen pages to a program anyone could tap into his computer to defraud the government. "Erase your past and establish a probe-proof new identity," shouted Chapter Two, as a lead into another long, complex program.

Agitated, McLonick stood, wishing he'd seen the book before talking to Romorci, so he could have shown it to him as proof of what OWC was up against. He didn't stop to think that it was also proof of the Senator's contention that the people were angry. "Alfred."

"Sir?"

"Will these programs work?"

"Oh, yes, sir, quite well." There was a trace of respect in its voice. "They're very elegant."

And the book had already gone into the InfoNet, which appalled him. Sure, Alfred had erased it, but there was no telling how many people had seen it first. If they'd hard-copied it, they could use it—and disrupt the entire social order. Why, everything from production quotas to educational statistics could be changed by anyone who could read, by anyone who didn't appreciate the efforts of the civil servants who had decided what would be best for everyone. Truth itself would be mutable, if people could contradict the OWC.

Writers! "Have you found anything on the author?"

"No, sir."

"Did you trace the submission?"

"Yes, sir, but it came from a public computer in Los Angeles."

"Well, what about the fingerprints?"

"Apparently, sir, the pub-comp user was ID'd as one Molly Lang—but the Molly Lang with those

prints has been dead for eighteen years."

"It hasn't been back-logged that long, has it?"

"No, sir."

"Well . . . inform the FBI that this Reef person is running around trying to destroy the system . . . and, naturally, deny the book access to the InfoNet." His thumbprint sealed the book's fate.

"Yes, sir," said Alfred, but the screen flashed bold letters reading: YOU HAVE TEN SECONDS TO CHANGE YOUR MIND. NINE. EIGHT. SEVEN. SIX—

McLonick laughed aloud, and took his seat again when the screen darkened after ZERO. "What's next?" he asked.

The computer stayed silent.

"Alfred!"

No answer.

"Sonuvabitch!" He checked the plug, but that was still in. "Speakers must have blown." He rolled the keyboard table over and jacked it into the computer, then sat and pressed the keys, but . . . nothing. The screen stayed blank.

"Double sonuvabtich!" When he picked up the phone, he couldn't get a dial tone. Like everything else in the office, it was routed through the computer. He'd have to go next door and borrow their phone to call the repair service. Wearily, he trudged through his living room to the low-ceilinged corridor.

Before he could knock on his neighbor's door, the elevator opened and two burly cops tumbled into the hallway, guns drawn, guns steady, guns aimed at him. "Freeze!" snapped the crouching one.

McLonick froze. "Uh—what's this all about, officers?"

The other cop came up and cuffed his hands behind his back. "How'd you get all the way to the 23rd Floor before you set off the alarms?"

"I live here," he said, furious at how the policeman

had twisted his elbows, but frightened as well. "Right there." He nodded to his apartment.

"Sure you do," said the cop. "That's why the building reported you." Thrusting his gun back into its holster, he detached a battery-operated ID box from his belt. When he slid the cap onto McLonick's right thumb, he whistled. "Charlie," he called to his partner, "looka this. Got ourselves a spy here. A Russian spy. Igor Dim—Dimitrovich, yeah, Dimitrovich."

Charlie glanced at the ID box's screen and raised his eyebrows. "Doesn't say 'spy,' though," he corrected. "Just says 'illegal alien' and 'Moscow resident.' What do we do with him, give him to the Bureau?"

"Lemme check." He hooked the ID box into his belt-radio, flicked a toggle, and asked. "Request instructions regarding disposition of this apprehendee."

Static hissed and fuzzed for a bit, then a mechanical voice read out, "Convey apprehendee to Dulles International Airport for deportation. Place on Aeroflot #315, ETD 11:18 a.m. Sedate if necessary."

Since McLonick started to struggle and shout at that point, the policemen were only too ready to gas him into unconsciousness. The last thing he saw in America was the purple cloud rushing out of the spray can under his nose.

And the first thing he saw in Moscow was a bleak-faced man in a long overcoat, a bleak-faced man holding a crumpled computer printout, a bleak-faced man who peered into his sluggish eyes and said, "Ah, Igor, according to our files, we have for a long time been hoping we would get another chance to talk with you."

While they led him away, he wondered where Neil Todd had wound up.

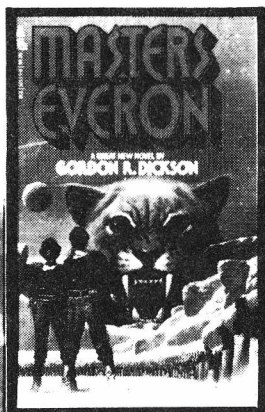
—Kevin O'Donnell, Jr.

Who are the "Masters" of Everon?

MASTERS OF EVERON


By Gordon R. Dickson

\$4.95



5-1/4 x 8-1/4

Masters of Everon, announces the brass plate on the door of the original Everon colonists' corporate headquarters. And so they had expected to be. But now settler and native life forms (and remarkable ones they are, too) are at each others throats, and the true masters of Everon have yet to be determined.

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BOOKS: A BINOCULAR VIEW

by Norman Spinrad
and Orson Scott Card



Norman Spinrad



Orson Scott Card

Spinrad:

If you're not yet convinced that sf has extra-literary dimensions, consider some highly political and even mystical forces generated by and interacting with science fiction at this very moment.

Far be it from me to bore either you or myself with yet another discussion of the difference between "reviewers" and "critics." Nevertheless, since there *are* now two book columns in DESTINIES and they *are not* designed to be the same sort of thing, I do feel it behooves me to explain what I will be trying to do in contrast to what Orson Scott Card will be doing in *his* column.

While Scott will be trying to do a fairly comprehensive survey on what's being published in the science fiction field in toto, I'll be concentrating on a couple or three books a column, or a general topic that may touch on books new and old, or maybe even just one book if a masterwork (or horror show) of such dimensions should come along to warrant it.

I hesitate to say that Scott will be the "book reviewer" and I will be the "critic," first because I'm hardly qualified to speak for his aims and second because "book reviewing," "literary criticism" and "academic scholarship" have a way of blending into each other, and on the highest levels of achievement, fulfill all of each other's parameters.

Case in point: THE SCIENCE FICTION ENCYCLOPEDIA edited by Peter Nicholls (Doubleday \$24.95). This weighty (in more ways than one) tome tips the scales at 672 pages of small three column print, is copiously illustrated in black and white, costs a mint, and in short is exactly what it looks like and purports to be—an actual honest to god Britannica of sf not merely from Asimov to Zelazny but in point of fact from Aandahl, Vance to Zulawski, Jerzy, respectively an obscure American sf writer of the 1960s and a "Polish playwright, poet and novelist, of sf interest for his untranslated trilogy about the colonization of the Moon, comprised of *Na srebrnym globie* (The Silver Globe), *Zwyciezca* (The Conqueror) and *Stara ziemia* (That Old Earth)."

This thing isn't one more illustrated history of science fiction. In the "book reviewing" sense, THE SCIENCE FICTION ENCYCLOPEDIA is the completist's dream and the typographer's nightmare, total coverage of the history of world science fiction in *all languages*. From the fan or collector's point of view, this is *the* indispensable guide, probably well worth the 25 bucks for the hardcover. Every god-

damn sf writer who ever lived seems to have an entry ranging from a one-liner to a full definitive essay of several thousand words depending on the status of his oeuvre. Ditto sf films, from essays on *Star Wars* to the monster movies of the 1950s summarized and evaluated for late show viewers in a few lines. The history of every sf magazine ever published is included. Editors. Critics. Fanzines. Even sf oriented comics and newspaper strips are covered.

From the academic's point of view, THE SCIENCE FICTION ENCYCLOPEDIA is an awesome and even insane piece of scholarship, exhaustive to the point of obsessiveness, which encapsules just about everything of value written about the field previously, and which makes any previous attempt at anything even remotely like this seem pale indeed. Not another word of academic writing about sf should be written until this volume has come into the critic's possession and, ideally, been assimilated. If nothing else, this book removes all honest excuses for factual error or off the wall wild assumptions as to what the author really thought he was about. Dated bibliographies are also supplied, which, while not quite definitive, certainly thoroughly outline the important works of everyone conceivable.

From the literary critic's point of view, THE SCIENCE FICTION ENCYCLOPEDIA gives you plenty to argue with no matter who you are. It goes beyond mere recitation of the facts and figures, it is dialectical and evaluative all the way through. The book is written in one way exactly like an encyclopedia—a long list of writers wrote the individual essays under the general editorship of Peter Nicholls. But unlike encyclopedia entries, every entry is signed.

Fairness demands this because the entries are written by strong-minded and opinionated types like John Clute and Brian Aldiss and Franz Rottensteiner and Thomas M. Disch and the like and while everyone

is being temperate and "objective" everyone is permitted to offer their own evaluations.

All in all, a work in which the categories of "reviewer," "academic," and "critic," synergize into a single harmony.

You can even read it as a novel, the ur-sf-novel that is the history and ongoing evolution of this . . . this . . . this thing that is science fiction. From it, you can grasp the social history of what has been a social phenomenon as well as a complex stream of world literature.

If you're not yet convinced that sf has extra-literary dimensions, consider some highly political and even mystical forces generated by and interacting with science fiction at this very moment.

Consider the L-5 movement.

Prominent coverage of which is rife in sf publications from *Starlog* to *Analog* including DESTINIES itself. Consider the rash of "L-5 science fiction novels"—Ben Bova's COLONY, Mack Reynolds' LA-GRANGE FIVE, Zebrowski's MACROLIFE, as well as enough shorter pieces to fill several anthologies.

The L-5 Society is an organization dedicated to the political actualization of the vision of Gerard K. O'Neill, a professor of physics at Princeton. O'Neill's original core proposal was to build a 10,000-person city in space at LaGrange Point 5, equidistant from Earth and Moon, with material boosted from the Moon being used to both construct the L-5 colony and go into the business of supplying solar power satellites to the Earth.

Straight out of fifty years worth of science fiction. George O. Smith's VENUS EQUILATERAL for the basics of a self-sustaining space colony ala THE MOON IS A HARSH MISTRESS, where we can also see—not for the first time—a key piece of the technology, the electronic catapult, or lunar mass driver,

which cheaply boosts freight off the Moon's low-g vacuum surface. A little of James Blish's *CITIES IN SPACE*, and you come up with a countercultural version of *THE MAN WHO SOLD THE MOON*.

Except that there is a Ben Bova novel going on too, a series of novellettes by Jerry Pournelle, and even a space fantasy by Timothy Leary.

Bova's novel *COLONY* is a political novel about an L-5 colony, just as *KINSMAN* deals with the space program on a politically informed level. Jerry Pournelle I do not think would object to being called a political sf writer in the sense that his work does not scant the political realities of his future societies. Timothy Leary, himself once a combination of Michael Valentine Smith, L. Ron Hubbard, and Johnny Appleseed, might best be described as a mystical politician.

And politics, science fiction, and the mystical impulse are all at work here.

While the L-5 Society is not officially backed by NASA, the Space Agency can hardly be displeased by the presence of a political lobby aimed at having the taxpayers spend up to \$200 billion on a visionary space program, especially when appropriation time comes around. O'Neill and other L-5 worthies testify before Congressional committees. The L-5 program incorporates a somewhat improbable reliance on the NASA Space Shuttle as a friendly gesture. This is not to suggest that a conspiracy is afoot, rather a natural alliance of like-minded people.

The L-5 Society also functions as a successful pr machine for its own program as well as for space activity in general. Coverage of the O'Neill proposals has been wide and almost universally favorable. Fringe groups have sprung up around them.

And more to the point of this sphere of discourse, the L-5 movement has cast its political eye on the

world of science fiction. L-5 people or their comrades of the spirit put on alternate or even main hall programming at many of the larger science fiction conventions. There are L-5 oriented fanzines.

And a lot of science fiction being written using L-5 colonies as backgrounds to pretty high degrees of specificity.

The French critic Michel Butor once seriously suggested that science fiction writers get together, agree on a desirable future, and then, by setting all of their stories in it, cause it to come into being.

However crazy this may seem, events have shown that it is possible for science fiction to cause itself to pass through reality. The Trekkies caused the first Space Shuttle to be named the "Enterprise," and even rammed the point home by having it rolled out of the hanger to the theme from Star Trek past the original crew of the "real" Enterprise. STRANGER IN A STRANGE LAND called forth the communal lifestyle as a mass phenomenon.

Now it would seem that a growing number of science fiction writers are being seduced by Butor's logic and O'Neill's vision and the L-5 movement's unfolding prominence into creating fictional worlds in a common L-5 oriented future.

Already, the process has been extended past the original core of O'Neill's proposals, and a certain coherent would-be self-fulfilling mythos is taking shape. The L-5 people, and even O'Neill himself, have in turn taken unto their bosom some of the further embellishments.

What does most of this L-5 fiction have in common? Well for one thing, by definition, it all assumes that something very much like O'Neill's L-5 colony will be built in the near future, even to using some of the specific design and terminology, as well as frequent actual references to O'Neill and his work.

For another, the fictional L-5 colony is almost always painted in utopian terms to one degree or another, at least in contradistinction to the worn-out, mined-out, tired, corrupt old Earth.

In works such as Joe Haldeman's TRICENTENIAL and Zebrowski's MACROLIFE, the theme of transcendence through breaking the bounds of Earth and living free among the stars emerges, a vision picked up as positive feedback by elements of the L-5 movement itself.

Clearly a lot of people writing about L-5 colonies in space would like to live there. Clearly there is a sincere belief among both the L-5 people and many science fiction writers that the colonization of space itself represents the high road to the future evolution of the human species.

All well and good. The argument for solar power satellites is cogent and persuasive. We'd all like to find an infinite new frontier to explore. And there is indisputably a hunger in our society for a positive image of an ongoing upwardly evolving transcendent future.

Indeed, the other side of the L-5 movement is mirrored in the alternative future proposed by the anti-nuke, small is better, environmental movement, which also seeks a way out of the polluted, energy-hungry present. That this too has become a mass movement is indicative of a growing popular realization that we must work to build a positive future if our species is to survive.

Timothy Leary, whose stylistic and cultural roots are more congruent with those of the sub-culture of the anti-nuke movement nevertheless was active in the L-5 movement for a time, interestingly enough, trying to voice its mystic dimension.

Which, ultimately, is what this is all about, as stated most overtly perhaps in MACROLIFE. Whereas the anti-nuke environmental movement

seeks a modest decentralized clear solar future living in tune with its planetary biosphere, the L-5 movement and its schisms seeks a Faustian transcendent future of man-made reality evolving towards the transhuman as it fills the universe with itself.

On an ultimate level, these theological goals may not be as dichotomous as they seem. The Earthly paradise of the environmental movement can best be built with the solar power satellites of the space people. Mastery of closed system recycling required to build worlds entire is precisely the same science that is needed to clean up the mess on the world we've already got. The fusion and dialectic between these two emerging charismatic causes may be a dominant factor in the evolution of our species through its current adolescent crisis.

The question is, what place does all this have in the writing of science fiction? Now clearly all that stuff is a rich vein of thematic material for science fiction stories and novels. It could even be argued that it represents the main gestalt of the genre in terms of esthetic, world-view, and even spirit. I've written my own interpretation of this Ultima Thule in *RIDING THE TORCH*, my new novel *A WORLD BETWEEN* touches on yet another extension of the transcendent viewpoint of Faustian science, and my forthcoming novel *SONGS FROM THE STARS* has the dialectic between "soft" and "hard" sciences at its center, so I'm certainly in no position to maintain that these themes are being overworked.

However, thematic content is one thing, and the politicization of art, in however noble a cause, is quite another. The fact is that virtually all of the thematic and even hardware content of the L-5 movement comes straight out of 50 years worth of science fiction. Ve vas dere first, Charlie! Right down the line. Without the vision of half a century of science fiction writers, the L-5 movement not only

would not exist, it would quite literally be inconceivable. The social function of fiction in general is to cloak history in spirit, encompass facts into emotional reality, and allow the heart to assimilate the head. The unique specific social function of *science fiction* is to somehow do all this not for the present or the past but for the future. Through science fiction, images, concepts, emotional realities, and levels of consciousness of a currently non-existent future infiltrate the consciousness of readers and thus attune them physically to the very concept of ongoing visionary evolutionary change itself.

But science fiction does this by painting word pictures of many possible futures, not Butor's consensus-reality. The very essential spirit of the genre denies the restriction of single-future, single-value, consensus reality thinking.

As witness the richness of the science fiction literature in the L-5 movement's sphere of discourse. Long before O'Neill designed his specific artifact, Heinlein, Aldiss, and a host of others had created a whole sub-genre of "Generation Ship" stories, Blish had New York, Budapest, and most of the cities of the worn out Earth plying the starways, Heinlein had built his mass driver on the Moon, and many an asteroid belt frontier society had declared its ecstatic independence from planetary chauvinism.

No, what bothers me about the spate of L-5 stories and novels is certainly not the thematic obsession, which is arguably central to what we are all doing, but a creeping Butorism in the fettering of the infinite possibilities in this sphere of discourse to an over-specific gestalt of hardware, near-future history, and set of philosophical assumptions. Surely there is space for one good novel informed by these parameters. The trouble is that too many of them have already been written. I fear that a certain well-meaning messianic spirit is afoot as well as the un-

derstandable desire to cash in on some free hype even as NASA is doing. After all, why not propagandize for a kind of future you sincerely believe in and sell a lot of copies in the process? And how better to do this than to fictionalize the success of a specific political and technological program promulgated by a growing lobby aimed at actualizing it?

In the Soviet Union, this is known as Socialist Realism. It successfully serves the existence of the consensus reality, but it's not so hot at producing meaningful art, even though more Soviet writers than we might care to admit probably write this stuff with utter sincerity.

Because ultimately, fiction that arises not from the writer's unique vision but from the portrayal of a wished-for consensus reality is boring. Dead inside. A Clockwork Orange. And therefore not only esthetically pale but ultimately politically counterproductive in the bargain.

Science fiction writers are minstrels of change, not futurologists, creators of the matrix of visionary consciousness in which specific political programs and technology may come to form themselves, not pr men for the space program, the future, L-5 colonies or any other consensus reality, dreamers, not engineers, leaders, not followers, and certainly not the groupies of our own groupies.

So leave us have some sense of proportion. Let us have both a little more humility and a little more pride. We are not messiahs leading our people into a future of our own creation, but we are not mere propagandists for someone else's future either.

Come on fellas, we don't need a set of blueprints for space-going, non-planetbound, evolutionary futures, we don't have to dream the same dream. We can do better than that.

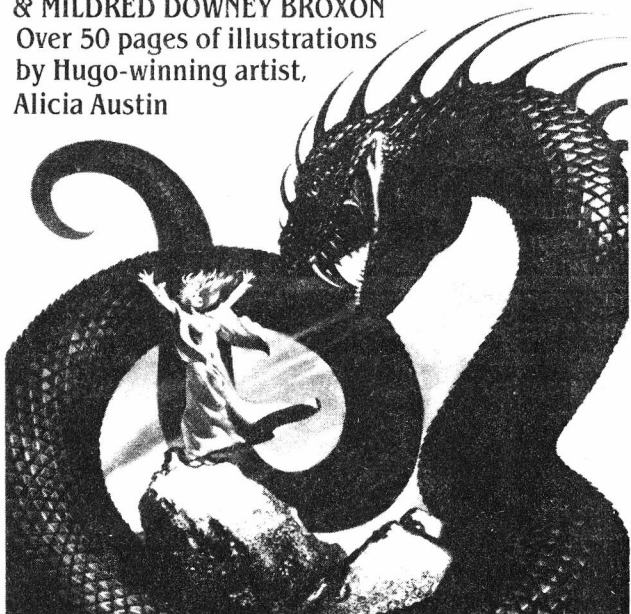
And we have been for fifty years.

—Norman Spinrad

*In a vessel that sails on a timeless sea,
a god sings of human mortality...*

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My candidate for best novel of the year is Engine Summer.

Spider Robinson is a tough act to follow. After all, it's taking two of us to replace him. Norman Spinrad will be doing in-depth criticism of a few books each issue; I'll be going over a larger number, reviewing, briefly, from fifteen to twenty books in each column. At first I assumed that Norman (whom I have never met) and I would compare notes and make sure we didn't discuss the same books. Now I'm glad we aren't doing that—you will quite probably be treated to the spectacle of two science fiction reviewers disagreeing on the same book. I'm right, of course, on any of the points in question. . . .

Editor Baen has urged me to be brief—the ideal is one or two good, solid paragraphs per book reviewed. And I mean to do just that. With exceptions. Occasionally, you see, I have fifteen pages worth of commentary that I'm dying to put down, and I will feel just as virtuous trimming it down to three or four paragraphs as I feel trimming a one-page mental review to a single paragraph. Be assured that whenever I run on to some length on a book, I am really exercising remarkable restraint.

And a final point. I am just weak-willed enough that I cannot bring myself to finish reading a book that I loathe, and I will review no books that I have not finished. Ergo, with rare exceptions, I will not be reviewing any complete stinkers. Usually if I mention it at all, I found it at least readable. So if, like Thumper Rabbit's daddy, I always seem to find a few nice words to say between blows of the meat-ax, it is

not because I'm a nice person. It is because some books are so bad it isn't worthwhile saying anything about them at all.

* * *

Michael Bishop is a frustrating writer, to me, at least. His prose is so good it turns me green; his characters are involving, demanding, unforgettable; he even plots well. It's his science fiction that bothers me. *Catacomb Years*, story by story, moved me and involved me, but the science fiction elements in it—the improbably domes, et al.—kept chipping away at my willing suspension of disbelief. In *Transfigurations*, his newest novel, much the same thing happens. It begins with Bishop's brilliant story "Death and Designation among the Asadi," and does an excellent job of expanding it to tell of further efforts to understand the fascinating, awesome aliens. The original story was the record of an anthropologist's study of the Asadi's religious, social, and political system until the anthropologist himself became irrevocably involved with the aliens and finally disappeared among them. The rest of the novel is his daughter's effort to find her father and vindicate his controversial findings.

The trouble is that Bishop actually explains every doggone mystery created in "Death and Designation." And the solutions are all rather ordinary science fiction. What seemed awesome and powerful quickly reduces to just another alien-race-trying-to-survive-its-own-mistakes story; what end the anthropologist met belongs in *Alien*, not this fine writer's work.

And yet the novel is still irresistibly good. The disappointments are only a small part of the book's effect. They're forgiveable enough that I expect *Transfigurations* to be on the Nebula ballot this year, and won't be the least bit surprised or dismayed if it wins.

Reviewed this issue:

Transfigurations, by Michael Bishop (Berkley-Putnam, 333 pp., \$10.95)

Engine Summer, by John Crowley (Doubleday, 182 pp., \$7.95)

The Web between the Worlds, by Charles Sheffield (Ace, 273 pp., \$4.95)

Macrolife, by George Zebrowski (Harper and Row, 279 pp., \$12.95)

The Ultimate Enemy, by Fred Saberhagen (Ace, 256 pp., \$1.95)

Hegira, by Greg Bear (Dell, 240 pp., \$1.75)

The Road to Corlay, by Richard Cowper (Pocket, 239 pp., \$1.95)

Windows, by D. G. Compton (Berkley-Putnam, 238 pp., \$10.95)

Silverlock, by John Myers Myers (Ace, 516 pp., \$2.50)

Harpist in the Wind, by Patricia McKillip (Atheneum/Argo, 252 pp., \$8.95)

Dream Weaver, by Jane Yolen (Collins, 80 pp., \$10.95)

The Hundredth Dove and Other Tales, by Jane Yolen (Crowell, 64 pp., \$7.50)

The Dark Princess, by Richard Kennedy (Holiday House, 29 pp., \$7.95)

The Dead Zone, by Stephen King (Viking, 426 pp., \$11.95)

The Last Enchantment, by Mary Stewart (Morrow, 528 pp., \$11.95)

Tales of Neveryon, by Samuel R. Delany (Bantam, 264 pp., \$2.25)

Urshurak, by the Brothers Hildebrandt and Jerry Nichols (Bantam, 405 pp., \$8.95)

My candidate for best novel of the year, however, is *Engine Summer*, by John Crowley, a book so perfectly written that it surely deserves better than Doubleday's normal throwaway printing and binding job. Crowley's *The Deep* stunned me when I was lucky enough to pick up a copy by whim before it disappeared from view; his *Beasts* was a disappointment only because it was not as good; but *Engine Summer* is that rare thing in science fiction, a book that sets out to achieve a small but difficult objective, and achieves it without a misstep.

Rush that Speaks tells the story to an unnamed listener; the revelation of the listener's identity is a surprising climax to the book. Raised in the intriguing community of Little Belaire, which winds around a Path that only those born and raised in the community can ever learn, Rush ventures out in order to find a girl named Once a Day, whom he came to love. His experiences in a post-technological America lead him inexorably to an understanding of why Once a Day will never come back to him, how even when the machines have failed mankind we persist in misusing them, and finally that being human means something better than any good thing the machines could ever bring. If you read only one book this year, this is the one. (Editor Baen warned me that I had to say something bad about the books I liked, or no one would believe me. So here it is: *Engine Summer* is too short.)

I believe a reviewer has an obligation to announce his biases before he indulges them. So, before I disembowel anybody, I must point out that I have a strong bias in favor of books that provide, not just commentary on, but strong emotional involvement in humanity. Put more simply, I like characters that I can feel with and for, and when a novel lacks in this area, it takes much more effort on my part to appreciate other virtues it might have.

With that warning out of the way, I turn to Charles Sheffield's *The Web between the Worlds* and George Zebrowski's *Macrolife*, two books whose primary purpose seems to have been to persuade and inform rather than to tell stories about people.

The Web between the Worlds is an engineer's dream. Sheffield populates the novel with more machines than people, and the machines *are* interesting. Much of the book is devoted to the problems of constructing a skyhook or Beanstalk—an exceptionally strong cable connecting the earth with the sky, with gravity balancing centrifugal force to keep the thing aloft. The idea is identical to Clarke's elevator in *Fountains of Paradise*, but this is only coincidental—after all, the idea has been around for some time, and it's surprising it hasn't been dealt with before, as Clarke points out in a foreword to Sheffield's book.

Sheffield does not stop with the skyhook, however. His future science and technology includes Caliban, a giant squid doctored so that his brain, linked with a particularly talented computer, can accomplish tasks far beyond the powers of present-day cybernetics; Atlantis, a water-ice asteroid hollowed to make a fit human habitation; Way Down, a pleasure resort in an anomalous underground cavern; the Spider, an eight-legged machine that spins cables for unbelievably long bridge spans; taliza, a perfect memory drug with terrible side effects; the coal mole, which chews and processes asteroids the way earthworms devour dirt; and the slingshot, a launching device in space that achieves tremendous acceleration. Sheffield writes about these things so well, and so clearly, that by the end of the book I felt a vague surprise that none of them actually *existed* yet.

Sheffield's previous work has been criticized because the people seem to exist merely to reveal the ideas. In a way, this is still a valid criticism of this book, too. But *Web* goes a bit farther toward creating

real people. In fact, the book begins with a scene that is more than promising—the account of the death of the protagonist's (Rob Merlin's) parents. The people are handled convincingly, movingly; I was all set to identify with them. And then, except for a thread or two of characterization here and there throughout the book, Sheffield more or less ignores the people and concentrates on the machinery. It disappointed me, but mostly because the opening proved to me that, if Sheffield only cared to do it, he could write novels that would be pleasing scientifically *and* emotionally.

In fact, a friend of mine pointed out that Sheffield could easily have turned Rob Merlin into a human being instead of a glib, machine-loving engineer, simply by having him wonder, at a few points in the book, why it is that he *doesn't* care more about the death of his parents. As it stands, Merlin seems much more interested in the skyhook than in the revenge that constitutes the main plot motivation. But if he spent just a little time wondering why he was so heartless, it might have made him into an interesting character. Unfortunately, Sheffield didn't do that, and so the book leaves the distinct impression that, heartless as Merlin is, we're supposed to admire and like him. I'm afraid that I didn't. And so, while Merlin is involved in adventures that should have gripped me, I was left as a passive onlooker, not really giving a damn about what happened next.

Still, if you like hard sf, this is a fine example of it, better than much I have read in the genre. It's a bit unfair to fault a writer for not having done something that he wasn't really trying to do. And I suspect that the rest of us, who don't care so much for scientific research, will be able to mine Sheffield's work for good ideas for years to come. (No, of course not, I wouldn't think of stealing somebody else's machines. Hee-hee-hee.)

George Zebrowski's *Macrolife*, however, was far more pretentious than Sheffield's *Web between the Worlds*, and so its failure is far more deplorable, and the book far more difficult to read to the end. Where Sheffield plays with machines, Zebrowski plays with ideas. Or, rather, with *idea*: the whole long work really has only one viable idea in it, that of (you guessed it) macrolife. The concept of macrolife is that, just as every individual human being is a composite of distinct cells, so all of humanity on earth is an organism, with each individual merely a cell in that organism. When mankind is viewed this way, the obvious question is, Why doesn't mankind, as a whole, reproduce itself? *Macrolife* is devoted to tracing the history of that reproduction, with humanity spawning "macroworlds" (his word—since they're smaller than Earth, I would have called them "miniworlds") that eventually spread man throughout the universe and even allow our descendents to survive the collapse of the universe and the subsequent Big Bang. In short, this book really is what blurb-writers would have us believe much of science fiction is: a story that crosses galaxies and spans eons of time.

Yet Zebrowski succeeds no better than Sheffield in creating believable characters, and his failure is all the worse because it is clear throughout that he thinks he has. He keeps putting in scenes and language that, for them not to be rankly sentimental or embarrassing, we would have to care very much about the characters. Maybe some readers would care about them. But since they all spend most of their time talking about philosophical concepts—the same ones, over and over, ad nauseum—I frankly found them boring and rejoiced a little when a few of them died. The most boring ones, however, live on and on, and are even cloned so that they can talk to themselves and get answers eternally, I suppose.

No, I am getting too sarcastic. The book is, in the end, just a misguided effort—an attempt to put an exciting idea into a novel without realizing that the idea doesn't belong in the foreground of that novel. If Zebrowski had written a story about characters who were trying to achieve something else, and the macrolife concept merely loomed in the background, both the novel and the ideas might have been satisfying. But, with the ideas dominating in the foreground and the characters reduced to shadows, even the ideas became dull, and I found that, finally, very little more was said about them than had been covered in the quotations, some fictional and some real, that began the book.

Sheffield and Zebrowski are fine writers. In these books, unfortunately, neither comes up to what he is capable of doing, Sheffield because he gets distracted by his glittering machines, and Zebrowski because he forgot, or ignored, what fiction *is*: storytelling. Not philosophy. Not blueprints. But if you enjoy browsing through *Principia Mathematica*, *Macrolife* may seem to you to be light Sunday reading. And if you aren't looking for emotional involvement, *Web between the Worlds* can be a lot of fun.

Kevin Christensen, a fine Salt Lake writer whose work will soon be appearing in *Destinies*, is also a rabid fan of Fred Saberhagen. He loaned me (by brute force) several novels in Saberhagen's Berserker series, but I never found time to read them. Then, at a convention in New Mexico, I met Saberhagen, one of the nicest people I've run across in a long time. I vowed then and there to acquaint myself with his work. I mean, somebody that nice must write nice stories, yes?

No. Saberhagen writes *mean* stories, and *The Ultimate Enemy* (Ace), a collection of some of the most recent Berserker stories, is a mean book. I read it in one sitting, quite against my will. None of the stories,

individually, made me want to stand up and cheer. But none of them was even close to being bad, and most were excellent examples of good writing, good craftsmanship, and a fine mind at work. Saberhagen understands people so well that stories that could be mere action and adventure become much more.

The Berserkers are machines created in a war between alien races long before humans came along—but the Berserkers, irrevocably programmed to destroy all life and intelligent enough to adapt themselves to meet whatever threats they face, are doing a fair job of threatening to wipe out humanity. In only a few of these stories, however, is a Berserker at the heart of the action. The reason Saberhagen can spin out this series indefinitely is because he is dealing primarily with human beings, and how they treat each other under the constant threat of destruction by these unrelenting machines. And when the Berserkers are in the forefront, it is not a story of man versus machine so much as it is a story of man versus the gods, for the Berserkers, whimsical and cruel and remorseless as they are, can be placated, can be worshipped, can be hated, can be outwitted.

I won't try to list all the stories, or review them individually. Let me just say that all of them are good reading, and the last one, "Wings out of Shadow," is outstanding. In fact, I think I was wrong: pardon me while I stand up and cheer.

Sometimes science fiction books create worlds that overwhelm any characters that can possibly be placed in them. *Ringworld*, *To Your Scattered Bodies Go*, *Dune*, and a few others have come up with something unforgettable. To that list, I'd like to add *Hegira*, by Greg Bear. The world is earthlike, except that about where the tropics and the polar circles should be there are immense, unscalable walls, and instead of a sun and moon, huge obelisks rise at regular intervals, topped with light. These obelisks, made of a

material that cannot be manipulated by most existing technologies, have engraved in them the sum of all knowledge, and from the obelisks the peoples of the earth take their languages, their religions, and their science. The higher their technology, the higher they can climb up the obelisk to read—ladders, buildings, balloons, and finally airships bring more knowledge until finally one nation gains enough knowledge to knock an obelisk down and study it along its entire length.

Through this world (and these events) we follow Kiril and his companions, who follow a timeless pilgrimage trying to get through the wall to the Land Where Night Is a River. Kiril, at least, succeeds.

The only weakness of the book is that, right at the end, it seems as if Bear wasn't quite sure what to *do* with the Land Where Night Is a River. He rushes through the final revelations of the book, wraps everything up quickly, and leaves me with the feeling that after a lot of foreplay, I have been abandoned without being fulfilled. Slam-bam, thank you ma'am, to coin a cliché. I wish the last thirty pages had been a hundred. But even with the disappointment, I was glad I read the book. And Bear even manages to make his three main characters interesting, even if they *do* get upstaged by the landscape.

"Piper at the Gates of Dawn," by Richard Cowper, was a Nebula finalist. It is the story of a boy with a talent for music who manipulates his own death and becomes a sort of Messiah for a world, half-submerged in an icecap melted by fools in the twentieth century, that desperately needs some spark of spiritual fervor. In England, Gollancz published Cowper's sequel, *The Road to Corlay*, which follows the efforts of the boy piper's followers to preserve and spread the religion of the White Bird despite persecution from the Jesuits, who will do anything to stop the heresy. This Pocket Books edition is the first time the

two works have been combined in one book.

The book is well-written and makes good, exciting reading, but it is marred by a misguided effort to make a fantasy, complete with magic, into respectable science fiction by putting in a time traveller from the twentieth century. The time travel element only detracted from the story—if you're already using miracles, magic, and the direct intervention of God, why do you have to find a science fictional excuse for sending an angel? Despite the flaw, the book is excellent. You can't miss it on the stands—it's the one with the best cover art of the year, a beautiful painting by Don Maitz.

D. G. Compton's *Windows* is a Serious Novel, which means that at times the prose is dull and author's messages ooze out from between the lines of type like Lovecraftian nightmares. Despite this, I enjoyed the novel more than I expected: the central metaphor of the book is strong enough, and the plot and characters hold their own enough, that the book finally concludes in a very satisfactory way. If the characters spend a lot of time in interminable introspection and self-flagellation and if the protagonist is often insufferable as a self-appointed Messiah, still the suspense and, ultimately, the excellence of the writing compensate, particularly since the protagonist eventually does discover that he has been an ass and takes definite, responsible, and violent action to set his family's life to rights. The pretentious style at the beginning eventually softens and becomes less intrusive by the end. A book that seemed designed to be a snob hit read by the elite is, after all, one that we who read for reasons other than to be impressed and baffled can also appreciate.

I intend to devote this column to new books, not reprints. But even my firmest resolves can be shaken by an exceptional book, and *Silverlock*, by John Myers Myers (no, I didn't stutter; that's his name), is just

such a book. If someone said to me, "Hey, would you like to read a book in which a selfish and ignoble fellow is shipwrecked in the Commonwealth of Letters and wanders around meeting characters and going through events from practically every great work in the history of literature until he finally becomes a pretty decent person and goes home," I would say, "No thanks. Sounds tacky." Well, it *would* be tacky, if it hadn't been done so well. The book alludes to about eight billion different literary works, but even if your reading has been confined to sci-fie and Harlequin romances all your life, you'll *still* enjoy reading it—Myers weaves the allusions into his story so skillfully that the story is a delight in itself. Occasionally the fact that our intrepid hero, Shandon Silverlock, really doesn't have a purpose in mind makes the story sag, but such lapses are only for a few pages, and eventually interest picks up again. By the time you're through, you'll be addicted. I had never heard of the book before a review copy arrived in the mail, but apparently since it was first published in 1949 it has gathered a small but dedicated group of fans whose only initiatory rite is having looked up at least some of the references and learned some of the songs in the book. For once, I find myself in sympathy with fans of a particular book—this one is good enough to be worth spending time on, not just reading it, but also discussing it and learning from it. Would that English literature classes could be so painless.

I have waited two years, irritated at Patricia McKillip for the cruelly tantalizing ending of *Riddle-Master of Hed*, for her trilogy to be completed so I could read the whole story. At last the second volume, *Heir of Sea and Fire*, and the third volume, *Harpist in the Wind*, are both available—perhaps in paperback by the time you read this. This is one of the best fantasies to be written, ever, and I place it with

Donaldson's Thomas Covenant trilogy and Tolkien's Lord of the Rings trilogy and Peake's Gormenghast trilogy and Beagle's *The Last Unicorn* as an epic that deserves to last forever. McKillip creates an intricate structure of riddles within riddles, and at the climax, when I was sure I had long ago guessed the last surprise, she manages to answer the biggest riddle of all—one that I had not really been aware was being asked. Along with this she creates sympathetic characters, an intriguing system of magic, a world rich with possibility, and if sometimes she is vague and occasionally pulls a rabbit out of a hat into which only doves were placed, read with confidence that eventually all the vagueness will be clarified and all the rabbits will turn out to be doves after all.

McKillip's books, oddly enough, have all been issued as children's books, though I don't know many children who would be able to appreciate her fantasies. It seems to be a trend, however, and I have found it very rewarding, when I am looking for a good, well-written fantasy, to ignore the so-called "adult" fantasies that proliferate with an astonishing number of Frazetta covers that Frazetta did not paint, and instead browse through the children's section of the bookstore for some of the best writing going on today. For instance, Jane Yolen, who has had several excellent stories in *Fantasy and Science Fiction*, has two recent collections, *Dream Weaver* and *The Hundredth Dove*, both children's books, and both some of the best reading you're likely to get in this imperfect world. Yolen has set herself what I would consider an impossible task: writing new fairy tales. Fairy tales, with their brevity, cruelty, simplicity, and mythic power, are almost impossible to bring off—Yolen succeeds amazingly often. Her books are also illustrated beautifully by David Palladini (*The Hundredth Dove*) and almost as well by Michael Hague (*Dream Weaver*). If you're bored with the old

Grimm tales, Yolen will take you into something new and often better.

And as long as I'm violating the virginity of a science fiction magazine with fantasy reviews, let me commit a few more ravishments. One of my favorite short fantasies is George MacDonald's "The Light Princess." I sneered when I saw Richard Kennedy's book *The Dark Princess*, which so obviously mirrored MacDonald's theme; I loathe rip-off imitations. So I was wrong. Mirroring MacDonald is what Kennedy does, but it's a trick mirror, and a deep one, and writing more briefly and with a more serious tone than MacDonald, Kennedy creates something beautiful, powerful, and well worth reading. The illustrations by Donna Diamond, while sometimes affected, do enhance the book overall.

Stephen King's *The Dead Zone* will be a bestseller without any help from me; but for those of you who, like me, were turned off by *Carrie* and *Salem's Lot*, I recommend that you give this book a try. King is a very, very good writer by anybody's standards, and beginning with *The Stand* he has made a definite move away from occult/horror/thriller novels to serious fantasy with memorable, well-drawn characters and themes unexpectedly profound in a writer whose works regularly sell just under a billion copies.

Mary Stewart's trilogy on Merlin and Arthur is more historical fiction than Fantasy, but it is worth noting that the final volume, *The Last Enchantment* (after *The Crystal Cave* and *The Hollow Hills*) is a fine ending to the series. Stewart's research into Arthurian Britain has been thorough. She firmly gets rid of Launcelot, who doesn't belong in the legend (the French invented him so they could put one of their own countrymen in center stage), and in all makes the fanciful story feel real, right down to the grit on the roads and the blood on the swords. What Mary Renault has done for Theseus and Alexander,

Mary Stewart has done for Merlin and Arthur, and there's enough magic and mythology to satisfy all but the most diehard fantasy fans.

Samuel R. Delany is, unashamedly, a science fiction writer. He not only has produced some of the best of it ever written, he has also helped make it an intelligible phenomenon in a series of essays that, if sometimes inscrutable or illogical, are always thought-provoking. Now he has produced a fantasy, *Tales of Nevèrÿon*, that I wish I had written. At first the book is structured like a short story collection, but after the three main characters are introduced in the first three stories, their lives begin to interweave until, at the end, they are united in a common purpose, a violent, quixotic, and magnificent quest to abolish slavery.

Nevèrÿon itself is sketched in only lightly: this is a novel of characters and philosophy, not landscapes. At times, Delany verges on turning a story into an essay, with an undigested lump of abstract conversation or exposition threatening to do to this novel what Sheffield and Zebrowski did to theirs; but Delany always stops in time, and once he has made a point he does not return to it and harp the same theme endlessly.

I'm a believer in beginnings, middles, and end. *Tales of Nevèrÿon* is a novel with a beginning and a middle. OK, if the writer's good enough, I can forgive anything. And, after the unclimactic ending, Delany does pull off an effect that dazzles. He includes an appendix that reveals that the entire novel is based on the oldest writing known to man, one that has turned up, in various versions, in practically every ancient culture, including the oldest repository of writing ever found. The essay illuminates and emphasizes many important and forgotten points brought out in the novel. And the date at the end of the essay, when compared with the date of copyright

on the book, also tells you something about Delany's sense of humor.

I thought it would not be possible for any publisher ever to bring out a worse fantasy novel than *Sword of Shannara*. I was wrong.

Urshurak, by the Brothers Hildebrandt and Jerry Nichols, is as misguided an effort as I have ever seen. In the acknowledgements, the authors thank Sydney Weinberg, Betty Ballantine, Nancy Weisenfeld, and Ken Leish "for editing," among other things. Surely in all that group, someone should have noticed that the writing quality would get a good, solid *B+* from a high school creative writing class. The book is, quite literally, impenetrable. It reads as if the writer (apparently Jerry Nichols, following the Hildebrandts' story line) laboriously constructed each sentence, debating with himself over every word, freely consulting his thesaurus, but without any ear for the natural flow of language. The language, including the dialogue, is unbelievably formal, preferring the passive voice and the pluperfect to the active voice and the simple preterite—and then, here and there, a perfectly absurd colloquialism drops into a line of dialogue or a sentence of narration. I inflict a sample on you:

" 'She is as real as you, or as I,' replied Elgan. 'It was she who sent out the rat-creatures, or Blegons, as they are called. They were in search of the Prince, of this I'm certain. The Blegons were carrying out the destructive will of Gorta and the location of your home apparently stood in their path. These beasts have little intelligence, but possess a terrible lust for blood. The wanton slaughter of your family was the worse because it was merely incidental. Yet who knows?' Elgan shook his head sadly. 'The tragedy that befell you led to your saving Ailwon's life. Still, if I might have prevented your loss, I would not have hesitated an instant. But it was not within my power.

I am often a prisoner to the whims of fate, just as you are.' "

Why didn't an editor take a heavy black pencil and show the writer how much of that verbiage was unnecessary? The paragraph, with just a few simple changes, could have read:

"She *is* real," replies Elgan. "She sent the Blegons in search of the Prince. Blegons are stupid—all they're good at is killing. Your home stood in their path." Elgan shook his head sadly. "It was fate that led them to your family, the same fate that led you to save Ailwon's life. I would have prevented your sorrow if I could have. But would that also have left Ailwon to die?"

The prose in this edited paragraph doesn't exactly sing, either. But it shows that identical ideas—and perhaps a few more—could have been conveyed in far fewer words, in language far closer to being natural. In short, *Urshurak* is one of the few published books I have ever read in which the writing itself was not even close to being competent.

And yet. In one very important sense *Urshurak* is a much better book than *Sword of Shannara*. Where *Shannara* was an unconscionable imitation of Lord of the Rings, a direct rip-off of a masterwork that could only lead me to believe it was cynical exploitation, *Urshurak* is sincere. It is derivative, but not imitative. I believe that the Hildebrandt brothers were trying to be original, were trying to create something good. And, in fact, there is little wrong with the story itself. It isn't exactly good, but in the hands of a barely competent writer it could have been a fair sword and sorcery book. This book is not a rip-off. It is honestly bad. Sort of the difference between Jimmy Carter and Richard Nixon. You may not want either one as president, but you really can't *hate* Carter. You can't hate *Urshurak*, either. You just can't read it.

—Orson Scott Card



FAMOUS EVENTS OF THE FUTURE

THE JOVIAN SKI PARTY

On December 16th, 2017, two dozen members of the group "Children of Liberty" (a political action organization of European radicals) seized the Jupiter Company's flagship HOLST and, without proper authorization, jettisoned four tons of alpine and nordic skiing equipment into Jovian space. The "Party" was a protest against the massive tax burden placed on so-called "luxuries" bound for Europa, Ganymede and other Jovian moons. The colonials, infuriated by what they considered unfair taxation (with no corresponding representation on either the board of the Jupiter Company or on Earth's U.N. Security Council), boarded the HOLST disguised as aboriginal natives of pre-technological North America, although they didn't really fool anybody for a second.

Science-fiction, right? Wrong. It could be future history, especially if the United Nation's Agreement on the Moon and other Celestial Bodies is signed in its present murky form. As it stands, the Agreement mandates the establishment of a new multi-national Regime with jurisdiction over the entire solar system. It effectively bans private enterprise from outer space, and requires *all* activities in space to be under the control of an OPEC-like Earth monopoly. If the human race is to avoid the mistakes of the past, human and political freedoms *must* be assured off-planet. The time to start is now, and the way to begin is to learn the facts. Why are we interested in this? We're the L-5 Society, and we're *going*. Join us. Write:

The L-5 Society
1620 North Park
Tucson, Arizona 85719



THE L-5 REVIEW

#3

Don't be surprised if the Department Of Defense picks up the slack in NASA funding of mass drivers and solar sails.

NEWS BRIEFS

The Salyut-6 space station crew, commander Vladimir Lyakhov and flight engineer Valeriy Ryumin returned to Earth at 15:30 Moscow time Sunday, August 19 after a record-breaking 175 days in orbit.

A Tass special correspondent asked the two cosmonauts, "What were your most memorable moments upon landing?"

"My first impression," replied Lyakhov, "was the odors of the steppe when I opened the hatch."

When the cosmonauts arrived at Baykonur they were handed bouquets of gladioli. The cosmonauts couldn't hold them long, admitting they felt "heavy as sheaves of wheat." However, Soviet doctors report Lyakhov and Ryumin were in the best condition of any returning cosmonauts. The two walked around

and even took a short swim their first day back on Earth.

They didn't sleep well the first night, however, because even the softest bed felt like a rock after months of weightlessness!

On July 3 the United Nations Outer Space Committee unanimously reported out an "agreement governing the activities of States on the Moon or other celestial bodies." The General Assembly will vote on it later this fall. It is expected to pass by a heavy majority.

Although the entire U.S. delegation to the U.N. Space Committee supports the treaty and Neil Hosenball, NASA General Counsel has suggested that *by stretching the treaty's language it will be possible for private companies to operate in space*, other commentators are alarmed by the proposed restrictions.

Former chief U.S. negotiator on deep seabed issues Leigh Ratiner warns that the treaty *will effectively ban private enterprise using extraterrestrial materials*. J. Henry Glazer, J. S. D., opposed the treaty because it regulates *trajectories to the Moon* as well as the Moon itself—and all other celestial bodies. Glazer supports a *laissez-faire* approach to all shipping of goods and passengers in space. *"It's an issue of human rights."* He also believes "There's no such thing as a treaty that doesn't mean what it says." Here, quoted verbatim, is a "President's Message" on the subject from Charles Sheffield, President of the American Astronautical Society:

"Anyone who believes that private enterprise should play a part in the development of space will be alarmed by the proposed international agreement now being considered in the United Nations. This agreement applies to the development of the moon and all other celestial bodies, including the asteroids.

"In effect, the Agreement will limit all off-Earth

development to national governments and international organizations . Any resources discovered will be the common property of all nations, and no nation will be able to develop an area of the moon or other body without giving free access to all other parties to the Agreement.

"For countries in which there is no private enterprise, the Agreement will have little impact on their possible methods of off-Earth development. In Russia or China, the space program is by definition a Government program. In Japan, the relationship between government and industry is much closer than it is here or in Western Europe. It seems that the big loser from the proposed Agreement will be industry in the United States and Western Europe.

"Although the initial period of the Agreement would be ten years, there is little doubt that it would be extended well beyond that, probably for the next fifty to one hundred years. To me, that says that the idea of private industry taking a direct role in space development has been killed for the lifetime of anyone reading these words.

"If you believe that private enterprise has a role to play in space development, I suggest that you study this proposed Agreement, and if your conclusion is the same as mine, do what you can to make sure that it is not passed in the U.N. If you need more information, write to the AAS and we will provide it to you. We will keep you informed through the Newsletter of the progress of the Agreement in the United Nations."

American Astronautical Society
6060 Duke Street
Alexandria, Virginia 22304

Congress chopped \$1.5 million from the Department of Energy budget for solar power satellites. The final budget is still considerably higher than last year's however, including \$5.5 million for R&D and \$0.5 million for equipment purchase.

Russian cosmonauts Lyakhov and Ryumin installed a 10 meter radio telescope on the aft area of their Salyut-6 space station. The antenna was delivered by a Progress 7 transport rocket. It has been used to survey parts of the Milky Way as well as the Sun and Earth.

When used to observe the Earth it returns data on humidity and surface water content. Observers also point out that it should be able to *detect the wake of submarines* even when deeply submerged, possibly allowing the Soviet military to make a *first strike against U.S. subs.*

Job opening: Princeton Prof. G. K. O'Neill is looking for someone with a B.S. or M.A. in physics or electrical engineering, recent graduate, with one or two years experience in discrete component electrical circuitry design, to work with Bill Snow on the mass driver project. Send your resume to Laura Hagopian, Dept. of Physics, Jadwin Hall, Box 708, Princeton, NJ 08544.

The Soviets have pressed the U.S. to suspend testing of the space shuttle as part of the Strategic Arms Limitations Talks. The Soviets fear the shuttle may be used as a satellite killer, scooping up targeted space vehicles and either destroying them or hauling them to Vandenberg Air Force Base for inspection. The shuttle cargo bay is big enough to capture the entire Salyut space station.

The European Space Agency and China have begun negotiations on possible cooperative space projects.

June 6 the Soviets launched an unpiloted Soyuz 34 craft. It will conduct two days of propulsion system tests in order to better determine if the thruster fail-

ure which aborted the Soyuz 33 mission to the Salyut-6 space station has been solved. After completion of tests it will dock at Salyut's rear port.

Speculation has it that the Soviets don't want the Salyut crew to return to ground in the Soyuz craft, which has been docked with the Salyut for over 100 days. The Soviets have never tried using a Soyuz after more than 100 days in orbit and, especially after the Soyuz 33 near-tragedy, may prefer to keep the recently-tested Soyuz 34 available at the Salyut in case of an emergency evacuation.

NASA's recently completed *Lunar Resources Study* concluded that the use of lunar materials for power satellite construction *probably will become cost effective* if more than three 5GW plants are built. Taking uncertainty factors into account, they calculated a 92% probability that lunar resources would become cost effective for a program of 30 power satellites.

The lunar resources scenario studied would require a 36-person space base in low Earth orbit, 1,365 people in a space manufacturing complex, probably in a higher orbit, and 48 working on the Moon.

Carter's Office of Management and Budget has released plans for the next four years of NASA activities. The FY'80 request is \$4.7 billion, to be followed by \$4.6 billion in '81, \$4.3 billion in '82, \$4.0 billion in '83, and \$3.7 billion in '84. The message is clear: *four more years of Carter means a 22% cut* (not counting inflation) in the NASA budget.

The National Academy of Sciences Environmental Board has begun a study of the solar power satellite concept. The use of extraterrestrial materials will be evaluated. The study is being funded by the "High Frontier Feasibility Study" appropriation in last year's National Science Foundation bill.

The *Office of Technology Assessment (OTA)*, one of the U.S. Congress' fact-finding arms, will award \$400,000 in contracts to study space technology applications. Remote sensing, communications and space processing manufacturing will be emphasized.

At the request of the Senate Commerce Committee, another OTA group is evaluating solar power satellites. This OTA study was first proposed by futurist Barbara Marx Hubbard in a Congressional resolution in 1978. OTA was founded in 1973.

The space shuttle has been further delayed by main engine troubles, forcing NASA to reschedule at least four or five commercial payloads for expendable boosters. *There is only a 50/50 chance that the first shuttle will be able to fly by June 1980.*

On JULY 1, Thomas A. Mutch of Brown University was appointed NASA's Associate Administrator of Space Science. He succeeded Noel Hinners, who had resigned March 31.

Mutch has been leader of the Viking lander imaging team and a member of the Lunar Science Review Board. His responsibilities as Administrator for Space Science will include working with the Congresspeople who fund space sciences.

The U.S. *House Appropriations Subcommittee on Military Construction* has deleted the funds needed to install space shuttle launch facilities at Vandenberg Air Force Base. These launch facilities would enable the shuttle to reach polar orbits. These orbits are needed for spy and other military satellites as well as for Earth Resources satellites. If launched from Kennedy Space Center the shuttle would follow the heavily populated Eastern Seaboard, opening the possibility of a major disaster.

If this cut is upheld by the Senate, *it will delay the first polar shuttle launch until at least 1984* and will force the government to buy \$200 million worth of Titan launches to orbit already scheduled payloads. The Vandenberg shuttle facilities were budgeted for \$78.2 million this year.

Solar power satellite boosters are rejoicing over the nomination of *John Deutch* for *Undersecretary of Energy* in the U.S. Dept. of Energy. Deutch, formerly an M.I.T. chemistry professor and a Rand Corp. and U.S. Dept. of Defense consultant, is well known as a progress-oriented, optimistic backer of energy R & D. Researchers say that *Deutch is expected to give power satellites an even break.*

Space Forts or "Where Are You, Obi Wan Kenobi?"
H. Keith Henson

We who have grown up with the bomb can hardly imagine a world without the Sword of Damocles hanging over our heads by a thread. Strategic warfare has been dominated by offense for over 30 years.

Even though it might take 20-50 years, advances in space might swing the balance back toward defense. Here are some wild speculations, hopefully based on engineering realities.

Don't be surprised if the Department of Defense picks up the slack in NASA funding of mass drivers and solar sails. A mass driver is just what you need to bring most of an asteroid to the vicinity of the Earth by throwing away part of the asteroid for reaction mass. Solar sails would bring them back piecemeal. A million-ton asteroid in high Earth orbit would solve a number of problems such as providing hardening for certain advanced weapons systems and their heat sinks.

“Hardening” is the capacity to take a beating and remain functional.

“Heat sink” is an engineering term which can mean anything from a tiny clip on a transistor to the Mississippi river. It's whatever is used to get rid of waste heat. On Earth, waste heat is mostly carried off by water or air and eventually radiated from the vast area of the planet into the cold (three degrees above absolute zero) universe. Some of you may remember the story by Poul Anderson about a rogue planet (Satan) that was thawed out by a close pass near a star and then kept warm as it sailed back into the dark by industrial waste heat on a grand scale.

Getting rid of waste heat without a planet isn't hard, but it isn't cheap either. Waste heat radiators are a major factor in the design of space industrial facilities, habitats, farms and military bases. For all of these, including, in the long run, military bases, the Stefan-Boltzman law relating temperature and radiation rate and the fact that people and their machines function best around “room temperature” implies that the radiator surface area will be about four square meters for every kilowatt of waste heat.

Military fact #1: in the size we need, waste heat radiators will be very large. Radiators must be filled with something (substitutes for wind and water) to carry the heat. For both physical and economic reasons radiators should have walls no thicker than required to contain the filling material.

Military fact #2: radiators are unavoidably fragile. Something both large and fragile would make a lousy military heat sink. Nobody can cheat on physical laws, but with an asteroid, you would be able (for a while) to use the “Alice's Restaurant” method of waste-heat disposal. (Alice lived in the belfry of a deserted church and put the garbage downstairs.)

Two weapon systems, particle beams and lasers,

have the potential to end the current offense-dominated Mexican stand-off known as "Mutual Assured Destruction," or MAD. Lasers are getting about \$200 million per year development money in this country, and particle beams are believed to be better supported in the U.S.S.R.

Both particle beams and lasers are line of sight, speed of light weapons. This could make for some mighty short wars! They are very similar in needing millions of kilowatts of power and large heat sinks (because they are not very efficient) and both work better in space. Either method, with enough power behind it and a good enough aiming system, could make short work of ICBMs, submarine launched ballistic missiles and perhaps even bombers and cruise missiles, thereby eliminating all three of the U.S. "triad" at one stroke.

Skip for a moment the moral and geopolitical implications: how does an asteroid fit into this picture?

First, it's by far the easiest way to get a hardened site into space. Hardening is absolutely essential if the opposition has a similar installation. Otherwise, all the advantages go to "he who shoots first," a *much* worse situation than MAD. An actively defended fort could most likely stop missiles, but there is no way to shoot down a laser beam. However, you need not worry about lasers if you are inside a multimillion-ton asteroid. An MIT study some years ago concluded that even to slightly deflect an asteroid (e.g. Icarus) would take a lot of the very largest hydrogen bombs people make. A laser that could wipe out missiles would just blow little pock marks in the surface of an asteroid.

Second, to keep the laser cool you need a monster heat sink that a hostile laser won't cut to confetti. Radiators are just too vulnerable, (see above) so the waste heat will have to be stored till the war is over

and that means an asteroidal sized mass to store the heat. Even if the laser gasses only make one pass through the laser and then are discharged into space, a substantial heat sink would be needed for the auxiliary equipment and such things as cooling the laser mirrors. For the same reason, all the energy to fight a war will have to be stored inside.

How much energy storage and heat sink capacity would be needed to fight a hypothetical war between the major powers with space-based lasers zapping all the missiles? Unless you complicate things by having the forts try to fight each other to the finish, a few gigawatt hours of beam energy is sufficient to wipe out the warhead delivery systems inventory of the entire world. Altogether there are less than 5000 ICBM's and submarine-launched ballistic missiles. Five gigawatt hours of beam energy would give a little less than a ton of explosive effect for each one.

Because lasers are only about 20% efficient,* and allowing for some safety margin, energy storage might be ten times the beam energy and heat sink capacity about eight times the beam energy. To get a feel for this amount of energy in standard military terms, one gigawatt hour is equivalent to about 900 tons of TNT.

The next question is how big an asteroid do you need in order to absorb, say, 40 gigawatt hours? A simple rule of thumb is that a kilowatt second will heat a kilogram of rock about one degree C. Forty gigawatt hours is 14.4×10^9 kilowatts, which means this much energy would heat a million ton asteroid 14.4 degrees C. Thermal stress rather than absolute temperature rise may turn out to be a determining factor. To keep a fort ready, you keep it cold.

How would an asteroid fort be constructed that

*If you believe in higher efficiency, plug in your own numbers. Free electron lasers might reach 50%.

could take considerable pounding from lasers and missiles and still be able to zap ICBM's. The best type, to start, would be the solid nickel-iron variety found in science fiction stories. Unfortunately, that may be the only place to find them. The processes (hotly argued over) that formed these objects may have left fracture-prone weak zones of silicate material between large blocks of solid metal.

For iron asteroids with fracture zones of stony iron (lumps of iron mixed with rock) the first job will be some outside shaping followed by drilling a lot of holes through the asteroid and stringing it together with steel cables. This would probably work with any asteroid that had as much compressive strength as concrete.

Next, a maze of coolant channels would be drilled through the rock or iron. Iron would provide an advantage here because of its much better conductivity. Either rock or iron would be fairly easy to drill through, but a mixture would be more difficult. The laser, control system and power storage would be installed in cavities dug out of the center of the asteroid. My guess is that energy would be stored in flywheels or fuel cells. Primary power could be nuclear reactors or solar cells. Either the solar cells or heat radiators for the reactor would hang outside and you could expect them to be shot off right at the start of any action.

Lastly, the surface would be covered many meters deep with foamed metal to soak up energy from a close nuclear blast or a short laser pulse. Much of the energy from a nuclear blast in space arrives in the form of X-rays which heat the outside surface so fast that a shock wave causes pieces to fly off the inside wall (spallation). A substantial layer of something crushable takes care of this problem.

To track targets and control the aiming of the laser would require a dispersed phased array radar too

spread out to knock out with missiles and too hard to take out quickly with a laser. Verification of target destruction and some tracking would be done optically or with infrared. The radar information would be transmitted over redundant channels to a very large, fast computer in the fort. This part is within the capacity of present day electronics.

Like the Death Star in *Star Wars*, a space fort would have a vulnerable spot. It could be knocked out by a beam that went in where its beam went out. To protect its "Achilles Heel" each one might be surrounded with a flotilla of actively controlled mirrors: a fort could take bank shots with a diffuse beam at the other forts, while avoiding looking directly at them. (A fully focused beam would be so energetic that it would not be reflected, but would just vaporize the bank-shot mirror. The bank-shot mirror would refocus the beam more tightly.)

There are many counter and counter-counter strategies including shooting lasers at the forts from the ground, trying to disable all the enemy's reflector flotilla, hardening the bank shot reflectors, and sling-ing rocks at the forts. None look very promising. Attacking from the ground with lasers looks like it would bankrupt the country that tried it.

Why? Missiles can be destroyed by the energy equivalent of a few kilograms of TNT. A bomber can be wrecked by the equivalent of a few hundred kilograms. But an asteroid would take hundreds of megatons of TNT or millions of gigawatt hours. Not counting laser inefficiency, or the cost of the laser, a million gigawatt hours at one cent per kWh is \$100 billion. The lasers would cost a thousand to a million times this much. Hitting a fort with another asteroid would be effective, but would take years due to celestial mechanics considerations. Also, it isn't easy to do secretly. Even the slightest ability of a fort to dodge would make it vastly more difficult to hit.

And a shoot-out between forts of similar size looks to be a real idiot's delight: "this hurts me more than you" really applies to space forts because four times as much energy as is in the laser beam must be dumped internally, and the vast majority of energy delivered by the laser beam would be reradiated; the remainder would do very little heating. Even with limitless energy available, an attacker using lasers would cook itself long before doing much damage to a target fort.

For the same reason, a small amount of hardening would protect a ground installation from attack by a space-based laser. The total energy available within a fort due to laser energy storage is equivalent to only a few hundred to a few thousand tons of TNT.

Schemes to put forts out of action would be less attractive if many countries owned several forts each. If only two countries owned one fort each, a fort being put out of action would leave the owner of that fort in a very bad fix, exposed to ICBM's without any way to retaliate. If a dozen countries owned several forts each, there would be very little point in keeping ICBM's active at all. Of course, some countries would still keep ICBM's around just to force others to spend money on defense. (A major effect of the U.S. bomber fleet is to force the U.S.S.R. to spend a bundle on air defense—money that would otherwise be spent on other military projects.)

Whether or not asteroid forts and very large lasers in space would have a major effect on ground warfare is a good question. I am sure tanks would be much more difficult to take out of action than cruise missiles or bombers. However, if the problems of shooting down through the atmosphere can be solved, it might accelerate the current trend, started by precision guided munitions, to quickly remove large, expensive objects from the battlefield. I don't think the troops will go back to swords and horses, but auto-

matic rifles, hand-held rocket launchers and motorcycles might be the most expensive items practical on a year 2000 battlefield.

May the force be with you!

The Truth About the Skylab Crew "Revolt"

B. J. Bluth, PhD.

Rebellious Astronauts! How remarkable, and even romantic, to find a revolt at the heart of the NASA Space Program! And it seems Henry S. F. Cooper, Jr., in *A House in Space*, succumbed to the temptation. The record needs to be set straight.

Cooper starts the "Skylab rebellion" theme early, by saying that one of the most important results of the Skylab experiment was that "some of the astronauts would rebel." At the end of the sixth week in space, the third Skylab crew, composed of Commander Gerald M. Carr, Science Pilot Edward G. Gibson, and pilot, William R. Pogue, took a day off. This action, according to Cooper, was preceded by days and days of bitching, complaining, grumbling, griping, and impatience about nearly everything in the Skylab. Ground Control, he says, "wondered whether there was anything in the strange alchemy of space that changed their characters. They were unaccountably irritable, even when they were getting dressed in the morning. They complained that there weren't enough changes of clothes . . . they bitched that the bundles had been packed too tightly. Then they grumbled that they didn't have a great enough variety of clothes."

The "complaints" go on as Cooper notes men "blowing up" over velcro that didn't stick, and pockets that were too small, evidencing a "blend of ridicule, exasperation, and plain hostility" that was notably unusual for astronauts. This "testiness" culminated at the end of the sixth week in what Cooper calls a "memorable bitch" where Carr made a "sort

of declaration of independence to the ground" followed by the complete crew taking the whole day off—the revolt.

One thing Cooper fails to mention is M487, the "Habitability Experiment." All the crews went up to the Skylab equipped with an elaborate checklist of some 180 items that they were to evaluate and make descriptive comments about, "especially for items considered only adequate or less than adequate." Not only were they to fill out the checklists, they were also asked to voice-record spontaneous comments when the situation arose as these were considered an "excellent source of data since they would probably be the result of some onboard discovery." The whole point of M487 was to have complete written, audio, and filmed records about the habitability of the design of the crew quarters and work areas in zero gravity conditions so future space stations could be designed more effectively and more comfortably. Many of the comments that Cooper dubs spontaneous "gripes," "grumbling," "complains," and "bitching," etc. are actually responses to the items on the M487 Checklist, and the third crew members were not the only ones to be critical.

To give you some idea of the extensiveness of the experiment, *some* of the checklist's 180 items are as follows:

Architecture:

Compartment Arrangements

Color Scheme

Floor Design

Light Baffles

Windows

Communications

Environment:

Temperature

Noise

Humidity

Food Management:

Beverage Dispensers

Food Cans

Wardroom Table

Water Gun

Garments

Comfort/Fit

Warmth

Don/Doff Ease

Housekeeping

Cleanup Procedures

Trash Collection

Unanticipated Problems

Utensil Wipes

Locomotion

Maintenance

Manual Dexterity

Mobility/Restraints

Equipment Restraints

Shoe Cleats

Handholds

Sleep Restraints

Off-Duty Activity

Personal Hygiene

Tool Inventory

It was the spirit and intent of this experiment to identify and describe as many problems as possible, when they arose, on the assumption that the men would forget many of the details once they returned to Earth.

It is true that Carr, Bigson, and Pogue took a day off, but the term "revolt" is not the only interpretation possible, and with the M487 to defuse much of the supposed "rebellious" attitude of the crew, the picture looks quite different.

The situation *was* one of frustration for the crew. Contradictory commands had been given to the crew before launch and once they were up in Skylab. Carr

had been told by William C. Schneider, Director of the Skylab Program, that his crew was to go at a slower pace than the previous two crews. However, Ground Control was busy adding new experiments to the schedule which resulted in putting the crew under a lot of pressure. According to Carr's statement to the ground:

"We'd all kind of hoped before the mission, and everybody got the message, that we did not plan to operate at the second crew's pace . . . We're beginning to get just little hints and indications that we're getting into a time bind—that it's got people really worried down there. People are asking about experiments, and the medics are asking about exercise . . . I imagine you guys are probably caught right smack in the middle of it."

Carr wanted to know where things stood, what needed to be done to catch up, and "What can we do that's reasonable?" He wanted to be in on the conversation. Instead of being labeled a "diatribe" and a "declaration of independence" this stand on Carr's part can be seen as a "hold" until things could be straightened out and the conflicting instructions resolved. Carr himself saw that as Commander, and in a position to directly observe the effects on himself and his crew, it was up to him to call the slow down. Soon after Commander Carr requested that Mission Control work out the contradictions, "the third crew's performance soon improved."

In light of M487 and contradictory work expectations, Cooper's revolt dissolves along with the mist of the "strange alchemy of space," leaving us again to marvel even more at the fact of people's capability for work and survival in space.

B. J. Bluth is an Associate Professor of Sociology at California State University, Northridge, CA. She conducted a symposium on the industrialization and settlement of space June 25th through August 3rd, 1979.

A question of Semantics? Comments on the above by
Henry S. F. Cooper, Jr.

Dr. Bluth is correct in pointing out that many of the pithier comments about life and conditions inside Skylab came in response to lists of questions they had to answer for the so-called "Habitability Experiment," M487. Many did not. She is wrong in saying I made no mention of the experiment in *A House in Space*; I describe it on pp. 39 and 40, Bantam edition. Discussing living conditions in space, even at the ground's request, is still a legitimate expression of the astronauts' feeling, and I fail to see how it detracts from the genuineness of the third crew's irritation. I certainly don't see how the M487 "defuses" Commander Gerald M. Carr's words with Mission Control, which preceded the astronauts' taking a day off—especially as he also questions the ground controllers' motives and suggests that some of the extra workload might be caused by "people coming out of the woodwork with new things to be done." No one at the time regarded Carr's words as a fireside chat.

I think Dr. Bluth misunderstands my use of the phrase "strange alchemy of space," which I introduce early in the book (p. 10) only to knock it down later myself. It was appropriate there because at the beginning it was a question in the minds of many people at the Space Center who were baffled and concerned by the irritation of the third crew. I then go on to demonstrate at considerable length how the crew's problems and annoyance in fact are due to overprogramming by the ground and contradictory commands—a situation Dr. Bluth presents as though she just discovered it. The fact that these problems originated on the ground is not a good argument that the astronauts were any less angry at Mission Control. There is always a tendency to play down the

intensity of an event afterwards, but I do not think that Dr. Bluth has succeeded in smoothing over this one.

B. J. Bluth Responds

The point to be made about the Third Skylab Crew is that there is no evidence they "revolted." A "revolt" implies a rejection of the legitimate authority. It is a protest which refuses to accept the obligation and duty to obey, and substitutes some other authority—thus a declaration of independence.

To suggest that people trained in, and a part of the military, as Commander Carr and Pilot Pogue were, "revolted" is a serious innuendo, both to the people involved and for those planning future space missions, and such intimations can have many unanticipated consequences.

Thus, it makes a big difference if you imply that the astronauts' "gripping" and irritability were all signals that foreboded a climactic revolt, or if you say that (a) a lot of the apparent "gripping" was a planned response to the M487, (b) a lot of frustration was in response to impossible and contradictory commands, and (c) Commander Carr exercised his legitimate authority to solve the problem. The event was intense. But was it a revolt? I think not.

P. S. *A House in Space* is well worth reading.

The American Heritage Dictionary defines "revolt" not only as "an uprising against state authority" but also as "any act of protest or rejection." Attempts to define the troubles aboard Skylab as revolt or non-revolt might end up as just a question of semantics.

—Jennifer Atkins, ed.

A MESSAGE FROM MARS

The "Red Planet" of Mars has always intrigued Humankind. Your fascination began with Lowellian fables of canal building civilizations, and today you are frequently tantalized by the scientific mysteries revealed by the Viking spacecraft.

Three years after their arrival here, the Viking spacecraft are still transmitting valuable information back to Earth about Martian weather, "mars-quakes", and your search for life. The orbiting spacecraft will run out of propellant in March of 1980, but the remaining operational Viking lander will automatically continue to send back weekly bursts of data and pictures until 1987, and possibly beyond.

Whether Viking's Martian "collect telephone call" is accepted by waiting earthbased receivers depends more upon available funds than it does upon events here on Mars. The amount required to receive, process, and analyze Viking's data over the next seven years is pathetically small: approximately \$1 million for the total program. And the potential benefits are large; Viking's legacy will allow you to better plan for future unmanned and manned missions to Mars, thereby paving the way for a greater program of expanded planetary exploration at quite a reasonable cost.

And with this unique opportunity for all Humankind

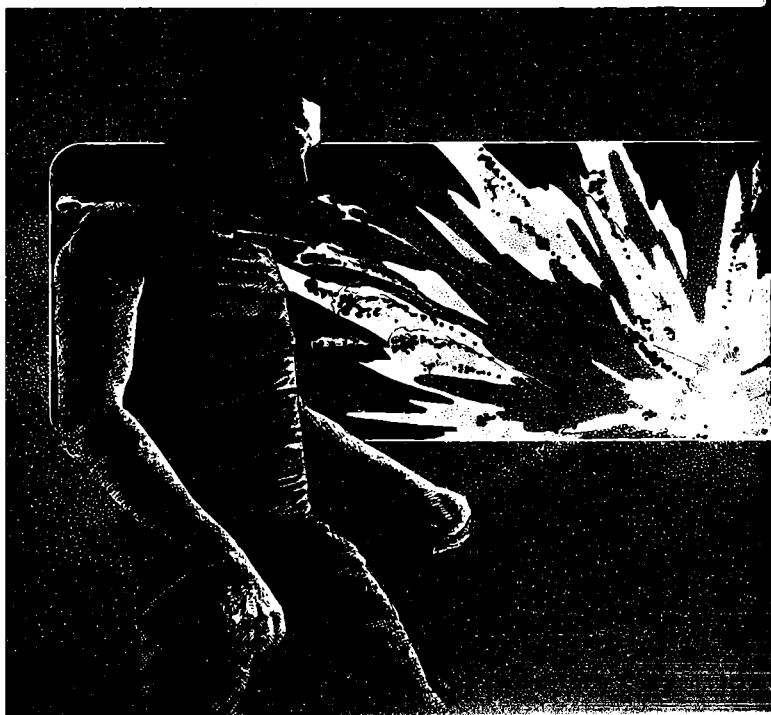
comes an invitation to all space enthusiasts in America and the World. For the first time in the history of the space program *YOU* are being given a chance to directly show *YOUR* enthusiasm and support for space activities. *YOU* are being given the opportunity to be personally involved in the exploration of the Solar System. *YOU*, through your private monetary donations, can keep the space program, and in particular Viking, functioning. For example, if one million people such as yourself each contribute \$1, then Viking's signal will be answered for the next seven years. And if such funds are raised privately, Viking's signal will bring much more than scientific data to the halls of officialdom. Private funding of Viking will be a graphic demonstration to Washington D.C. of the immense public interest that exists in the space program.

Plans are being discussed with NASA whereby contributions would receive personalized photographs of Mars, and perhaps have their names placed upon a plaque to be deposited on Mars when we finally return to the Red Planet. Nothing can be promised at this time, but if you contribute, you will be kept informed of all developments in this drive to raise \$1 million for Viking.

Mail your tax deductible contributions (minimum amount \$1—made payable to the Viking Fund) to: THE VIKING FUND, P.O. BOX 7205, MENLO PARK, CALIFORNIA 94025, U.S.A. This "do-it-yourself" space program is operated by the San Francisco Section of the American Astronautical Society. All contributors will receive acknowledgement of their gift, as well as an open invitation to the presentation of the fund to NASA. The presentation will occur in Washington D. C. on or before July 20, 1980: the fourth anniversary of Viking's landing on Mars.

Under~

by David Drake



ground



The source of power is power. This is well understood —underground.

Two sections of floor collapsed and armed figures began to leap upward into the electronics emporium above. Two of the three Commissioners scowled as they watched the projection sphere, though they knew that the scene had actually occurred more than a year before. Lemba, the Chief Commissioner, was fat and black and too experienced to show emotion except as a ploy. He gestured toward the sudden chaos in the sphere. "At the start, no one was killed. Knocked around, threatened if they got in the way of the looters, but—"

A red-capped policeman burst through the outside door, carrying his heavy-duty stunner at high port. The projection brightened as a dazzling crossfire cut the patrolman in half.

Arcadio, the other male Commissioner, swore under his breath. "Powerguns, when we can't get them ourselves."

Lemba nodded.

Except for the Commissioners themselves, the sixty-meter room was empty of its usual crowd. Further, though scanning cameras recorded the events of the room as they did the events of all other rooms in the State, the data of this meeting were

restricted to the Security Police alone. Newshawks could appeal the Interdict to the courts, but even if they were successful, the delay of several months would kill news value in a society that lived from day to day.

Chains of pale, ragged looters were shifting equipment down through the gaps in the floor. Others guarded the hundreds of frightened hostages and the outside doors. The raiders were armed with a variety of weapons, including the powerguns which were supposedly only in the hands of the military. A stocky, red-haired woman raised her pistol and fired. One of the scanning cameras exploded into gobbets of burning plastic. The looter turned and blew apart a second camera. The scene in the projection sphere lost much of its precision, but the computer directing the simulacrum still managed to import an illusion of three-dimensionality.

The woman turned to face the remaining scanner. What looked like a bead necklace trembled on her bare bosom. As she leveled her powergun she grinned and extended the middle finger of her left hand. The whole screen spurted cyan, then went transparent.

"At the end of it there were five dead," Lemba said to his colleagues. "The one you saw, and a patrol car that exploded in the air. Red Teams were dispatched automatically, of course, and they weren't equipped to deal with powerguns."

"It isn't just the dead, though," objected Arcadio.

"That's right," agreed Kuhn, whose hair today matched the giraffe-patterned brown-on-blond polygons of her suit. She slapped the data print-out in front of her. "Of the 212 persons inside when the raid began, 27 are missing. Some—most—can be presumed to have been abducted for reasons one can guess. But there were several others, men and women who nobody'd have grabbed for a brothel or ransom. They were just ordinary people who opted to go Un-

derground when they found the way clear. And *that's* the frightening thing."

"Not in comparison to the reason for this particular raid," Lemba replied equably. "Perhaps you thought this incident"—he waved at the vanished projection—"merely underscores the fact that Underground is organized and controlled by persons who are utterly ruthless?"

Arcadio and Kuhn stared at the fat man. Their expressions were compounded of disgust and irritation. "If you've requested an Interdict merely to play games—" Arcadio began.

"What's really frightening," Lemba went on, tapping his own data sheet with a callused index finger, "is that this raid provided all the necessary control components for a fusion powerplant. Coupled with other recent raids and . . . various other sources of information, Central has determined that Underground *has* a fusion unit in operation now. Beneath the City, where it will kill ten or twenty million people when it fails. And it's up to the three of us to decide how to shut that plant down before the disaster."

The hard faces of the subordinate Commissioners went blank. After a moment, Lemba continued, "Since I had a little advance notice of this—"

"Something this critical should have been routed to all of us, immediately!" Kuhn interrupted.

"—I was able to get a possible answer from Central Records. The data bank states that while a full-scale assault would almost certainly fail, an individual infiltrator might be able to eliminate the plant . . . and its personnel. It's probable that we will get only one opportunity, so we need to choose the most effective person for the task. The man the data bank recommends is a Crime Service employee in Southern Region. His name is—"

"Field Agent Jed Lacey?" queried a young man in a crisp yellow uniform. The legend printed on his cap band read, "TAKE PRIDE IN OUR CITY."

Lacey looked up abruptly. His mastoid implant was useless out of Greater Greensboro Subregion. He felt naked without it, his link to all the knowledge in the State. For that matter, Lacey missed the needle stunner which normally rode high on his hip. "Right, I'm Lacey," he said when he had identified the speaker from among the throng filling the airport terminal. "You my driver?"

"Well, I'm your guide, citizen," the City employee said with a false smile. "My name is Theron Barbee. We'll be taking public transit to the Commission offices. We don't approve of the waste of air cars here, you see."

"Right, I see," Lacey said sourly. He nodded toward the sky. Air cars streamed among the buildings like foam on a rocky strand.

"Well, of course that's private sector," the guide said with a sniff as he led Lacey toward the long queue for the buses.

"Sure," agreed Lacey. "Well, if they won't give their people tools to do their jobs right, they needn't be surprised when the jobs get done half-assed. But it's not my City."

The sprawling crowds were an emotional shock to Lacey, though intellectually he had known what to expect and had tried to prepare for it. His suit of red-orange covered him throat to digits in high style. He liked the color, though it was too blatant for him to have worn it while working. Lacey had stopped working the moment he boarded the airliner in Greater Greensboro, answering a summons relayed through his superiors.

But more than the color, Lacey liked the fact that the suit left only his face bare to a woman's touch. For

fifteen years, physical contact with a woman was all that it took to crumple Lacey as effectively as a kidney punch could; and in the crowded City, he knew he could not avoid such contact.

When the third bus hissed up to their stop, Barbee called, "Quick now!" and swung aboard without further warning. Lacey followed the yellow-clad man, using his locked fists as a prow to split the would-be passengers who had pushed ahead of him. He ignored the yelps, the elbows chopping at his ribs and the boot-spikes gouging his shin armor. He had to ignore the other people, because half of them were women; and if he even let himself think of that for a moment, he would collapse in uncontrollable nausea. Though his suit kept him from actual contact, Lacey's real problem was a psychic one: a repulsion implanted in his mind by a Psycomp after his conviction for rape.

The bus moved off slowly. A dozen people gripped the door jambs with all but their fingers and toes outside the vehicle. "It's an express," the guide



shouted to Lacey over the babble. The powerplant itself keened through a hole in its condenser tubing. "It'll take us straight to the City Complex."

Lacey muttered something under his breath.

Actually, they were still a kilometer from the Complex when the bus halted in a traffic jam the like of which Lacey had never imagined. "Well," Barbee said with a bright smile, "I guess we'll just walk from here."

"This happen often?" Lacey asked as he jumped to the sidewalk. The buildings lowered down at him. They had been too massive to demolish and rebuild at heights which could be served by stairs. Though the cost of power for elevators was almost prohibitive, there were people who would pay it for the privilege of living and working in this giant replica of a termite colony.

"Well, it happens," the guide replied ambiguously. He set off at a rapid pace.

They climbed over and scraped between the vehicles which had mounted the sidewalks in vain attempts to clear the jam. At last Lacey saw what the trouble was. An entire block was covered, building-front to building-front, by a roiling party of more than 5,000 people. They were dressed and undressed in a multiplicity of styles. Banners shaded the gathering with slogans which were meaningless to the Southerner. As he began to thread his way through the celebrants, Lacey realized that they were homosexuals.

The squat field agent bumped a man whose nude body was tattooed in a pair of polychromatic starbursts. The man turned and raised a cup of something amber and alcoholic. "Join us, love," he offered.

"Thanks anyway, friend," Lacey said and moved on by. When he had caught up with Barbee—the local was far more adept at slipping through the dense crowd—Lacey demanded, "Where the hell are your

cops?"

The guide looked back with distaste. "You'd better get rid of your provincial sexual attitudes fast," he said with a sniff.

Lacey snorted back. "Look, if they're out of *my* subregion, I don't care if they do it with broken bottles. I just mean I'd expect your Red Teams to pay some attention to the people blocking a street—in the middle of town, in the middle of the bleeding day!"

"Well, they're quiet, they're not hurting anybody," the man in yellow said. Then, with some embarrassment, he added, "Besides, the patrols are understrength now. Finances are, well. . . ."

"Sure," Lacey said, glancing over his shoulder at the party. He was visualizing how twenty men could clear the street with a tanker of stun gas and enough trucks to hold the bodies. It wasn't his city, though; and Lacey was far too intelligent to believe the State would be a better place if everyone's instincts were like his. Control was the key . . . but no control was as important as his own self-control.

Barbee stopped finally in front of one of a line of concrete buildings, new enough to be twenty stories high instead of eighty. The windows were opened in more facets than a beetle's eyes. "Here you are," said the guide, "the Tweed Building. You're to report to Capt Max Nootbaar on Level Twenty. He'll have your instructions."

Lacy looked upward. Yellow-painted air cars burred to and from the landing stage on the building's roof. At least somebody on the City payroll had access to transport that couldn't be mired by block parties. "Crime Service headquarters?" the Southerner queried.

"That's right."

"And no elevators, I'd guess."

"Of course not."

Barbee was already walking away, toward a more

distant building of the vast Complex. Lacey let out an inarticulate scream and leaped upon the slimmer man, throwing him to the ground. The Southerner brought a flat tube from under his tunic. It snicked out a 5 cm blade when he squeezed. "I'll kill you!" he shouted to the guide. "I'll cut your heart out!" Only someone who had seen Lacey in a killing rage before would have noticed that this time his neck scar did not writhe against flushed skin.

The street was straight and broad; a dozen scanning cameras on it recorded the incipient mayhem. Relays tripped, panels glowed red, and a patrol car slowing to land on the Tweed Building instead plunged down toward Lacey. In contrast, the pedestrian traffic surged outward like a creek against an obstructing rock. The passers-by continued to move as if they were oblivious to the mingled screams of victim and assailant.

Lacey suddenly stood, closing and slipping away his knife. He reached out a hand to help Barbee up. The guide screamed again and tried to crawl away. Fear wedged his body against the seam of building and sidewalk.

The ten-place patrol car slammed to the pavement behind Lacey. "Get 'em up!" a hoarse voice shouted.

Lacey raised his hands and turned with a quizzical expression. The four uniformed policemen had him covered with needle guns and a stun gas projector. "Good morning, sergeant, patrolmen," Lacey said calmly. "I'm Field Agent Jed Lacey from Greater Greensboro. I'm due for an appointment with Capt Nootbaar. My guide here tripped on that crack in the pavement. Must say I'm a little surprised to have a Red Team react to that." He smiled. "I'd have expected Public Works, if anyone."

The sergeant frowned. Barbee saw that Lacey's back was turned. He began running down the sidewalk, first in a crouch and then full-tilt. Lacey

glanced at him. "Must be in as much of a hurry as I am," he remarked disinterestedly.

The patrolmen wore puzzled expressions. Their sergeant queried his mastoid implant, then waited for the answer with his head cocked. When it came, he spat disgustedly and reslung his gas gun. "Yeah, Capt Nootbaar says send him up," he said. "Two bleeding false alarms in one day."

"If you don't mind, I'll ride up with you," Lacey said, lowering his hands as the Red Team locked its weapons back on safe. "I was afraid for a moment I'd have to climb twenty flights of stairs."

"Sure, room we got," the sergeant grunted. "Men, no, but we got room." The driver lifted them vertically, faster than they would have dropped in free fall. "First the computer crashes us in on a strangling. That turns out to be two kids screwing under a sheet. Then we're held over our shift 'cause the bloody Streets Department sits around with its thumb up its ass instead of fixing the sidewalks. I swear, a bit more of this and they'll have to look for me Underground too."

Capt Nootbaar had been alerted by the sergeant's call. He waved toward the doorway to attract Lacey's attention. The captain's desk was a little larger than most of the hundreds of other crowding the unpartitioned room, and extensions from the desk supported three scanner helmets instead of just one. Lacey made his way to Nootbaar with practiced care; governmental offices were just as crowded in Southern Region as they were here. At a glance, Lacey assessed the captain as sixty, softly massive, and a better cop than this place had any right to hope for.

"Expected you by the stairs," the big man said as they shook hands. He tapped his scanner helmet. "Interesting replay here of how your guide tripped."

Lacey smiled. "I'm an honored guest of the City," he said. "They could find me a car. Besides, it's been a

while since you've climbed any stairs yourself, hasn't it?"

Nootbaar looked down ruefully at his gut. "Well, there's a patrol inbound past my block every morning at 0655. Wouldn't be efficient for me to waste energy walking, would it?" His eyes raised and caught Lacey's. "You know, if I'd realized you weren't just some rube the brass was wasting my time with, there'd have been a car at the airport. Sorry."

Lacey smiled more broadly. "Guess if I'd needed your help, I wouldn't have deserved it, hey?" The smile passed. "Though you *can* help me learn what the hell I'm doing here."

Nootbaar shrugged. "Pull down some headgear," he said as he reached for one of the scanner helmets himself. "I'm supposed to give you background," he went on, his voice muffled by the two helmets. "I don't know quite what they want you to do with it; but if they give you a chance to back out, Lacey, don't wait for them to ask twice."

Lacey's helmet formed a dull image in response to Nootbaar's direction. "I'm picking this pretty much at random," the local man explained obscurely to Lacey. They were watching a sub-surface level of an old building converted to residential occupancy. Sparse glow strips provided less light than would suffice for reading. Transparent panels, waist high, marked off narrow aisles and living units scarcely more spacious. "Do you have a district, a tolerated zone, where you are?" Nootbaar asked.

"You mean, no scanners, no police?" Lacey said. "Enter at your own risk?"

"That sort of thing, yeah. A place all the decent folk kind of ignore, unless they need something that's sold there. Violates State statutes as well as local, but let the State try and enforce it if they think it's so damned important."

"I know the theory," the Southerner replied.

"There's places I've been that have them. But not Greensboro. Christ, there's nothing you can't buy legally, unless it'll permanently injure somebody else. And if it's just that you don't want the scanners watching—" Lacey paused, his flesh trembling with the memory of his own needs being satisfied under a scanner's glare—"that's tough."

"We got a district here," Nootbaar said. "It's called Underground."

On the helmet screens a figure rose from out of the floor and began scuttling toward the open staircase. "There's one for sure!" the captain exclaimed. He boosted the magnification. First the scanner focused on the wooden grating that had been shifted to give entry to the level. Then Nootbaar switched to close coverage of the figure itself as it scurried up the stairs. "Probably an old heating duct," Nootbaar said, presumably referring to the access hole. Lacey waited with the silent patience of a sniper who moves only enough to start a bullet toward an opponent's heart.

After walking up three levels of stairs, the figure exited to the outside. Street cameras automatically shunted their data to the watching helmets. The subject was a woman in flowing gray cover-alls and a hat whose brim flopped over her eyes. She turned into the doorway of a quality clothing emporium. The floor within was leased on a square-meter basis to scores of individual boutiques.

Without warning, the woman scooped up three dresses awaiting alterations on a counter. The boutique manager shouted and leaped atop the counter. The thief ran for the door as the manager collapsed. A 'customer' standing in the next booth had stitched him through the chest with a needle stunner before following the woman out the door.

Thief and guard burst back outside. The light-sensitive fabric of the stolen garments blazed like a

sodium flare. There was no patrolman in sight. Heedless of the slow traffic, the pair darted to a pedestrian island in the middle of the six lanes. A metal plate there hinged downward. In the instant before it closed again over the fugitives, Lacey caught a glimpse of stone steps and a dozen other faces.

"Old subway entrance," Nootbaar said with dismal satisfaction. "That's all the show. We may as well look at each other for a while."

Lacey swung up his counterweighted helmet. "You've got a Coventry for *thieves* up here?" he said incredulously. "You just ignore them if they make it to ground before you catch them?"

The bigger man sighed. "Maybe there was a choice once," he said, "but the size of it scared people. The subways'd been closed because they were inefficient and the surface streets were enough without private cars. There were water and sewer mains; some of them forgotten, some operating but big enough to hide in anyhow, to splash through . . . almost all the time at least. Cable vaults and steam ducts and sealed-off sub-basements; parking garages and a thousand other things, a maze twenty levels below you.

"You close one off and somebody breaks into it again before the crew's out of sight. Set up a scanning camera and in ten minutes it shows you a man reaching toward it with a crowbar. Send down a Red Team and nobody comes back." Nootbaar looked up. "And it's all so easy to say, 'They want to live like rats, what's that to you or me or the State?' "

"So it's a separate society?" Lacey offered.

"It's a worm in the guts of the City!" Nootbaar snapped back. "It's fences who sell goods at a tenth their surface price; cribs where they hose the girls off because they're too wasted to clean themselves. It's a family living in a section of 36-inch pipe, with no water and no light within a hundred meters. It's slash

shops that generally poison their customers even when they don't mean to. And Lacey—"the captain leaned across his narrow desk, his eyes black and burning with furious despair—"it's ten thousand people, or a hundred thousand, or just maybe—and they don't believe me, Lacey, but I've been down there—just maybe a million rotting devils and more every day."

Nootbaar shook himself and leaned back in his chair. "It's called Underground," he repeated.

Lacey traced his neck scar with one stubby finger. "What do they expect me to do?" he asked.

The heavy captain spread his palms. "I don't know," he said. "I don't think anything can be done. We can't cut them off from water or electricity—they tap the distribution lines. We'd have to shut the whole City down. We can't close off the exits from their warrens, because there's at least one opening in every block in the City. If we arrested everybody who came out of Underground, we'd have half the population in the slammer by Sunday morning. It's a cut that's bleeding us day by day, and some day it'll bleed us out; but there's nothing we can do."

"So take the gloves off," Lacey said. The captain's ironic smile grew broader. Lacey ignored it. "Get the State to send help. Hell, get the military in, it'll be a change from the Cordillera Central. Go in with stun gas, back it with powerguns; and when you've cleared a stretch, seal it for good with a long-term toxin like K2 so nobody'll try moving back in for fifty years or so. It'll cost something, cost a lot; but it's still cheap at the price."

"You'd have enjoyed talking to Director Wheil," Nootbaar said reminiscently. "He planned it just that way, ten years ago."

Lacey frowned. "Don't tell me you couldn't shoot your way through a bunch of untrained thugs, even if they were tough," he said.

Nootbaar shook his head. "We were making good headway—not cheap, but like you say cheap at the price—when about a thousand of 'em came outa the ground and took over Stuyvesant Armory." Nootbaar paused and sucked his lips in, his eyes focusing on the close-chewed nails of his left hand. "It wasn't the powerguns they took, though the fighting down below'd been hot enough already," he continued. "And it wasn't just that they got enough explosive to crater the City Complex like an asteroid hit it. The real thing was, they got all the K2 we'd stockpiled to close Underground after we'd cleared it. Used right, there was enough gas in Stuyvesant to wipe out the whole city; and nobody thought the people who'd planned the raid couldn't figure out how to use the goodies they'd taken."

Nootbaar looked at Lacey. "We hadn't figured a counter-attack, you see. Everybody we could trust with a gun had been sent Underground. So they recalled us without waiting for a demonstration; and that was the end of the only chance this city was going to have of getting shut of Underground."

Lacey drummed his left middle and index fingers. "You know pretty much what goes on down there?"

Nootbaar shrugged. "Sure, Intelligence Section runs people in all the time. For that matter, cops get laid and get drunk and buy hot goods too. But any time we've really tried to assassinate the leaders down there—Bill Allen, Butcher Bob Poole, Black May . . . especially Black May—the people we send don't come back. There's lines from here to Underground, and they go a ways up. They've got access to the scanners for sure."

Lacey massaged his short hair with both hands. "What's the drill, then? What am I supposed to do?"

"I'm to send you over to the Fernando Wood Building and the Commissioners'll tell you themselves," Nootbaar said, rising. He grinned, a transfiguring

flash. "Wouldn't be real surprised if there was a patrol headed that way about now. After all, it's only a hundred meters—unless you have to go down and up twenty flights of stairs in the meantime."

Lacey laughed and shook the heavy captain's hand. Nootbaar sobered and added, "Look, if there's anything I can do for you. . . ."

"You gave me some good advice at the start of this," the Southerner assured him. "I'll go listen to what your Commissioners have to say, but I'll bet I'm going to do just like you said. I'll get my ass back South where it belongs."

Nootbaar frowned. "I'm not telling you anything you don't know," he said, "but remember: all you need to get elected Commissioner is a constituency. You don't need brains or ability, and you sure as death don't need ethics. Don't give them anything they haven't paid you cash for."

Save for a narrow anteroom, the City Commissioners' offices filled the whole top level of the Wood Building. The anteroom had its own trio of scanning cameras, along with four clerks and a dozen uniformed guards who checked all would-be visitors before they were allowed into the Commissioners' sanctum.

Lacey bore the questioning with equanimity and even some interest. He had never met the elected powers of his own subregion. The whole business amused him.

When Lacey passed through the inner doorway, an alarm bell rang. Scores of people, both petitioners and functionaries, were already within the larger room. They got up at once and began to stream outside. Many stared at Lacey as they passed.

Puzzled, the Southerner turned to follow the crowd. From the center of the room, a fat, black man in a pneumochair with synchronized desk called, "No, not you, Citizen Lacey. Come over here."

The door closed. Lacey was in a huge chamber, alone except for the scanners and the three seated persons: the City Commissioners. Off-hand, Lacey did not believe he had ever before shared so large an enclosed space with so few people. Carefully, fighting an impulse to look over his shoulder, he walked into the semicircle of desks.

"I've placed an Interdict on this discussion, Citizen Lacey," the fat man said. The woman to his right glared from under a mass of green hair that matched her dress. The black grinned and corrected himself, saying, "Pardon, I should have explained that we placed the Interdict. Commissioner Kuhn—" he nodded right; the woman's glare transferred itself to Lacey—"Commissioner Arcadio—" he nodded left at the man with long, nervous fingers and a nose like an owl's beak—"and I myself am Chief Commissioner Lemba. I mention the Interdict only so you realize how important the matter you are about to learn is considered by ourselves . . . and by the State."

"All right," Lacey said quietly. There was a small secretary's console nearby. He slid it over to him, sitting on the desk rather than the low-slung seat.

Lemba continued, "You've been given the background on Underground. It's an unfortunate situation, especially since there appears to be a misguided minority which thinks it's better to live in squalor and anarchy—" his voice swelled—"than as a part of the greatest city this world has ever known!"

"I've never voted in my life, Citizen Lemba," Lacey interjected, hunching a little as he sat. "And I couldn't vote in this region if I wanted to."

Lemba blinked. Arcadio smiled for the first time, and even Kuhn's eyes had briefly less of hatred in them than before. She must have seen his life stats, Lacey thought. Couldn't expect her to like them.

"The problem, citizen," Lemba continued in less rounded tones, "is that some of those who have gone

Underground are scientists of international reputation. One of them—" a head formed in a projection sphere over the desk on which Lacey was sitting. The Southerner stood and walked back a few steps to where he had a good view of a balding, white-haired man with a look as sour as Kuhn's—"Dr Jerzy Swoboda, seems to have built a fusion powerplant down there."

The Chief Commissioner took a deep breath, more as a rhetorical device than from any onset of emotion. "I don't have to tell you how dangerous fusion power is. Environmental groups and the State Regulatory Board shut off even research on it two decades ago. And I don't have to tell you how many innocent men, women and children would die horribly in the event such a plant failed beneath the City.

"*Will* die. Unless the plant is shut down and destroyed, and Dr Swoboda and his associates are—" Lemba looked up at one of the room's scanners, still operating even though its output was restricted—"prevented from building another such death machine. Central Records says you are the best man to carry out this crucial mission."

Lacey filled his cheeks, then puffed the air out glumly. "Do the data banks give any reason why I'd want to carry out your 'mission'?" he asked.

"How about ten million lives, citizen?" Commissioner Kuhn snapped. Her irises had been dyed to match her hair and clothing. "Or don't you care about lives?"

Lacey met her glare. It did not bother him—as Lemba's growing smile did. "Look, it's not something we can argue about," the Southerner said in a reasonable voice. "You want to save them, then you go down and save them. Myself, I can live the rest of *my* life without your City. I've lived the past fifteen years without things that were a lot more impor—"

Lacey's voice died. He turned again to face Lemba.

"You son of a bitch," he said to the Commissioner in awe. "You knew I wouldn't be able to go down there without being able to touch women. . . ."

"What a Psycomp did, a Psycomp can undo," Lemba agreed in satisfaction. "Your psyche, Citizen Lacey, isn't the sort of thing that everyone would care to own. Still, I thought that in exchange for our unblocking it again, you'd be willing to do the City a little service."

Commissioner Kuhn was standing, her face flushed in ugly contrast to her clothes. "It's bad enough a man like this still walks the earth!" she shouted at Lemba. "Did you *see* what he did to get wet-scrubbed? You're *not* going to turn him loose the way he was before!"

Arcadio interrupted for the first time. "What happened fifteen years ago doesn't matter," he said. "What's important is what is going to happen right here if we don't act promptly."



"Citizen Kuhn," Lacey said.

She whirled on him, mouth opening to rasp insults; but ungoverned behavior had not brought her to a Commissionership. She waited for Lacey to speak.

"I'm not, I won't be, the guy I was before they . . . wet-scrubbed me," the Southerner said. His hands were locked tightly together. "I don't say I'm any better; but I'm not as young. I won't risk my—mind—on another gesture. Unless the gesture is more important than I ever expect anything to be again."

Kuhn looked at Lacey in disgust, then looked back at Lemba. "I won't argue with two votes," she spat. "But if he comes back alive, it's on your consciences. And it's up to you to explain it to the female voters of this City."

Kuhn walked out of the meeting room, letting the door bang behind her. Lemba beamed at the standing agent and said, "Dr Kabiliak is waiting on Level 3 with a Psycomp team—I rather suspected you were going to volunteer. We'll prepare everything else you'll need during the three days you're in the tank. We need to hurry on with this, you know." The Chief Commissioner chuckled.

Lacey turned and walked toward the door. He was already planning his insertion into Underground. He had as little feeling as he would have had if someone else were wearing his flesh.

Lacey vaulted the stair railing and dropped the eight feet to the floor of the lowest level. His bent knees absorbed the shock, then thrust him down the dim aisle at a run. Boots clattered on the stairs one level up, growing louder.

Two women were gossiping across the aisle as they would have done over the back fence of earlier ages. They lunged away, calling to their children in high voices. Lacey squirmed through an opening in the floor that had been an 18-inch drain pipe. A few

feet down it made a 90° bend. Someone shouted from the stairs and a sheaf of stun needles clicked against the concrete flooring and vitril partitions. Lacey shoved himself forward with an echoing curse, heedless of the nub of ceramic pipe that was gouging his suit and the thigh beneath it.

A pair of needles flicked his boot-sole, minuscule taps like a sparrow's kisses. Then Lacey was through, worming toward a dimness only less black than the tile tube itself. He could have been frozen and dragged back if one of the Red Team in pursuit had simply lowered a needle gun into the drain and fired a burst down its axis; but no one bothered to take that obvious step. Underground was safe, Lacey thought disgustedly; a self-fulfilling prophecy if ever there was one.

When Lacey fell into the sixty-inch pipe under the street, the first thing he noticed was the stench. In part, that was because his eyes had not adjusted to the absence of light. Still, the fetor would have been overpowering under any conditions. Thousands of fans pulled a draft into the tunnels, but tens of thousands of people breathed and sweated and excreted in them.

There were whispers and scrabbling. Lacey tensed for attack from some unseen direction. Fingers traced his throat and down his torso. "Come for a good time, honey?" a voice croaked. Other fingers, arthritic and cold, sought Lacey's hand and tried to drag it toward their owner's body. "Crystal'll show you a good time, better'n any a' those—"

Lacey shook himself loose. "I didn't come for that," he said. "I just needed to get away."

He crawled toward the main drain. Part of the evidence for a functioning fusion plant Underground had been the suddenly-increased theft and even purchase of lights and glow strips. Power pilfering had, if anything, decreased at the same time. The

blackness here emphasized the enormous volume of tunnels which not even epic banditry could illuminate.

Hunched over, Lacey began to walk toward the diffused light twenty meters away. The pipe, sloping upward to either side, made footing tricky. Hands caught him again.

"No!" Lacey shouted.

There was a blur in front of him, another figure or figures. More groping hands at his belt, his pockets, his groin. Lacey blazed with conscious loathing spawned by fifteen years of necessary avoidance. His boots and elbows slashed out. The little knife was in his hand, its blade already smeared with dried blood. The hands dropped away. Cracked voices lifted in a chorus of ecstatic pain.

The light came through a gap hacked without finess into a subway line. The tracks had been reclaimed for their metal after the system shut down, leaving an echoing waste of concrete and ballast. Now the axis of the great hollow was lumped with cribs and shanties of every style and construction. At intervals of twenty meters or so, glow strips were spiked to the tunnel ceiling. Their light would have been called inadequate even in the cheapest tenements above ground, but here it formed luxurious pools.

Lacey paused to get his bearings. He tucked away his knife. A grizzled woman was leaning the back of her chair against the tunnel wall beside the opening. She dropped the chair legs to the ground and whistled toward a seated trio fifty meters away. Near them a flight of steps led upward to a subway entrance. The three men rose and began walking toward Lacey and the woman. Weapons trembled in their hands.

Lacey glanced at them, then took a step toward a near-by canvas shanty. Four patrons were drinking

from mugs and arguing with the blocky bartender. The woman behind Lacey tapped him on the shoulder. In the dim light she had seemed to be carrying a short bamboo cane. It was in fact a length of steel reinforcing rod.

"Where you going, buddy?" she demanded.

Lacey's tongue touched his lips. "Look, I got in a little trouble—" he shrugged one shoulder in the direction he had come—"topside. Thought I'd—"

"Says he's a mole, sure enough, Mooch," the woman cackled to the leader of the approaching trio. "He thinks he is." Then, "Watch him, he's got a knife."

"Does he?" said Mooch. He was taller than Lacey and his broad shoulders supported arms so long his hands dangled near his knees. Mooch's bare torso sagged over his belt. Despite the fat, the muscles were there as well, and the many scars suggested how they had been used. "Funny, I got one too." He caressed the hilt of a long bread knife thrust bare between his belt and waist-band. Slung across Mooch's back was a gunpowder weapon whose magazine protruded over his right shoulder.

"Let's see your knife, boy," the burly man ordered flatly. The two men with him tensed. Lacey heard a whisper of metal as the woman moved behind him.

The Southerner's tongue touched his lips again. Very carefully, he brought the little weapon from its concealed pocket and handed it to Mooch. The bigger man turned the hilt over as he inspected it, looking for the mechanism. His thumb and forefinger accidentally squeezed together on opposite sides near one end. The blade shot out and nicked his palm. Mooch cursed, swapped ends of the knife, and snapped the blade off with a sideways flick of his thumb. He let the pieces clatter to the ground. A drop of his blood splashed on them.

"Cute," the leader said. More to the others than to

Lacey, he added, "Bill's coming, I buzzed soon as Angel here whistled . . . but I don't guess he'll mind if we see what this mole's got on him."

"Bet you thought you could just come Underground and nobody'd think twice, hey?" said one of Mooch's henchmen, a twisted black in a caftan.

Lacey felt himself edging backward even though he knew the woman was there with the steel rod. "Christ, there's a million people come down here each week," he stammered.

The black laughed and spun the chain in his hands as if it were a short jump rope. "Sure, but you wanna stay, you wanna be a mole. And we got word to watch out for moles for a while. Well, you may stay at that."

"Turn your pockets out," Mooch said.

Lacey obeyed without protest. He handed the burly man his stylus and his wallet with \$32 and a Class IV bank card. Mooch frowned. "Where's the rest?"

"Look, I didn't mean for this to happen," Lacey whined. "I didn't make any plans."

"Strip," Mooch ordered. His right hand was flexing on the hilt of the bread knife.

Again Lacey obeyed, folding his jacket and laying it on his neatly-arranged boots. Mooch snatched it up. He squeezed it into a tight ball to see if anything crinkled or poked within. Nothing did. He dropped the sheer fabric to the ballast and stepped on it.

Lacey swallowed but said nothing. He took off his trousers. The fresh scrape was a scarlet pennon on his thigh. He wore no underclothing. Mooch took the trousers from him, wadded them, and dropped them on the jacket. Then he punched the Southerner in the stomach.

Lacey kept his feet for the first few blows. He knew that however punishing the big hands might seem, the boots would be worse once he was down. His bare buttocks touched the concrete wall. The next side-thrown fist slammed him to the ground.

In his scanner helmet, Lacey had seen every form of mayhem humans could inflict on one another. Years before he had been beaten himself by the experts of the Red Team that arrested him for rape. He kept his fists pressed against his eyes and his knees high up to protect his groin. It wasn't enough, but it was all there was to do. The pain lessened after a boot drove his head back against the concrete. Then all Lacey's nerves seemed to have been coated in honey.

"Here comes Bill," the woman said.

The boots stopped pounding. "Took him long enough," Mooch grumbled.

"Mooch!" one of the guards cried.

Lacey swung the chair horizontally, not in a downward arc that could have been avoided. Mooch had time to turn his head toward Lacey's fury. A corner of the chairseat caught him in the ribs, just below his slung weapon. Mooch yelped as the air was smashed out of his lungs. The impact lifted the leader's feet from the roadbed. He flew forward, stopping only when his skull slammed the wooden frame of the nearest shanty. The structure sagged while its shouting owner tried to brace it with his hands.

Faces turned from either end of the tunnel, interest spreading like ripples in a long pool.

Lacey's body was white except where blood marked it. The scar on his neck was molten steel. He backed against the tunnel wall, waggling the chair. "Who's next?" he wheezed. "Which a' you bleeders is next?"

The chair legs wavered like a forest of spears in the face of the black with the chain. He stepped back, then stared into Lacey's eyes. He took another step backwards.

"Okay, buddy, you made your point," said a new voice. The speaker was also black and a head taller than anyone else in sight. He wore a powergun in an

Army-issue holster. It was as much a badge of authority as it was a weapon, an authority underlined by his score of armed followers. "Now, put the chair down or I'll blow you in half."

Lacey lowered his makeshift weapon. He leaned on it, breathing hard.

"Bill," said one of Mooch's subordinates, "he—"

"Shut up," ordered Bill, and one of his own men lowered a shotgun in response to the tone. "Next time Mooch works somebody over before I get there, I'll do worse to him myself."

As if in answer, the fallen thug vomited a mass of bright orange blood. His back arched, the shattered ribs clicking together like knitting needles. The next instant, Mooch went limp and still.

The black chieftain scratched at the butt of his pistol. "I'm Bill Allen," he said, "and you're in my territory. Who are you, and what do you think you're doing here?"

Lacey swallowed. The pain he had suppressed for a chance at revenge was returning. "I'm Jed Lacey," he said. "From Southern Region . . . Greater Greensboro. I . . . on the street, a bloody queer . . . with his *prick* out, and he touched me, *touched* me . . . I don't know how people can *live* with slime like—" He looked up, blinking the glaze from his eyes. Bill Allen was frowning. "I cut the bastard," Lacey said. "Every way but loose. So I had to run, and I ran here."

"What did he have with him?" Allen asked at random.

The female guard nodded twice to herself and said, "His clothes. And a little knife. And his wallet and a stylus. Mooch searched the clothes and that was all."

"Then put your clothes on, buddy," Allen said to Lacey. To the woman he ordered, "Bring me the rest of his gear."

Lacey limped to his clothing. As the Southerner

shrugged on the jacket, his hands tangled with the sleeves, Allen drew his pistol. "Now freeze right there, sucker, until you tell me how a stranger knew that pipe would lead to Underground."

Lacey held as still as a poised mantis. "Because I'm a cop," he said. "Because I was being briefed to lead a hundred men from my subregion down here next month. Us, and maybe fifty other subregions, and the Army; *and* every goddam cop in this city. Because they're planning to shut this place down for good and all."

No one within hearing made a sound. Allen's hand tensed on his gunbutt, then relaxed.

In the same wooden voice with which he had made the announcement, Lacey said, "Now can I put my pants on, citizen?"

"Put your pants on," Allen agreed. He knuckled his forehead with his gun hand. To no one in particular, he added, "We'll take this one to see Black May, he can talk to her . . . and god help him if he lies."

They moved fast through the hollow layers beneath the City. The number of people in the dim tunnels was amazing. Even more surprising was the constant traffic up and down passageways to the upper world. Underground was no less a part of the City than intestines were parts of the body that housed them. Say rather, an intestinal cancer.

At first Lacey thought there was no pretence of sanitation; then the Southerner noticed a gang of persons chained in pairs at the ankles. They were shovelling manure into a cart which two of them pushed along the aisles beside the cribs. The chains made them awkward, but they could not dash up one of the outlets to the surface. They appeared to be unsupervised.

"What're they?" Lacey asked Allen as they squeezed by the wagon.

"Umm?" the big man grunted. "Committee slaves. Those're mine, though I guess May thinks she's the Committee all by herself. They don't carry a full honewagon down to the Basement, they don't get fed."

"Basement?"

"Where they grow the plants and crap," Allen said. "You know." He looked more sharply at Lacey. "Or if you don't, you don't need to. So shut it off."

Because there were so many entrances to Underground, there had been neither need nor effort to group its pleasures by type or quality. To get from one parlor house to another, a squeamish customer could walk a block on the surface and thus avoid entering a warren of slash shops and dollar cribs.

One huge establishment, The Boxcars, completely blocked a tunnel intersection with walls of transparent sheeting. Girls paraded nude behind the wall when they were not working customers. Passage through the armed guards at either end of the house required purchase of a drink at the bar filling the lowest of the three levels, or a trick with one of the girls. The drinks were slash distilled from anything that would ferment. For additional kick, it was mixed with stolen industrial alcohols of which methanol was one of the least harmful. The whores were cheaper than the slash and, on the average, probably a greater risk to the user's health.

The guards nodded obsequiously when they recognized Bill Allen. "Any calls?" the big chieftain asked.

"Noonan put some messages on your desk," the guard captain said, nodding toward an opaque door at the end of the bar. "Nothing that won't keep."

Allen grunted and led the way through the far door. Lacey noted that two of the party had dropped off in The Boxcars instead of continuing on with their leader. The organization Underground was beyond anything Lacey could have imagined without seeing it, but the discipline appeared to be something short

of a military ideal.

They had walked over two kilometers. There had been at least a single guard at each direct outlet to the surface. Despite the darkness and the maze of passageways, Lacey was sure he could find his way back. It was an ability demanded by his years of service beneath a scanner helmet, tracking subjects by rapid leaps from camera to camera and keeping his orientation at all times.

Allen's entourage turned from a subway spur into a dry 8-foot main of some sort and then to a new opening burned through concrete and bedrock by the most modern mining equipment. Just inside the cutting was another band of guards lounging in a pathetic mixture of squalor and finery. There were more of them even than accompanied Allen—and they were better armed. Over half the men and women carried powerguns. The remainder had gunpowder weapons of one type or another, in addition to an arsenal of edged or blunt instruments. A small brazier warmed the fetid air. To Lacey's surprise, a telephone was glued to the rock wall. Shadows of microwire ran both inside and out in the direction from which Allen had led them.

"Got somebody to show to May," Allen announced.

The guards were rising, pocketing their dice and drawing weapons more for display than out of apparent need. Their leader was pale as boiled rice and missing his left arm from the elbow. "Got the hit man that's s'posed to be coming?" he asked.

Allen shrugged nonchalantly. "Maybe so, maybe not. We stripped him clean."

The guard chief shrugged in turn. "He goes down in chains anyway," he said. "You know the rules." He pointed his powergun at Lacey's midriff. "Get over there by the fire," he ordered, "so we can fit you for some new jewelry."

Lacey obeyed as humbly as he had Mooch. His

mind was on something else. Nootbaar had warned him that Underground had a pipeline into the City administration, but Lacey had not expected confirmation so quickly or so off-hand. Not that he was a hit man, exactly. . . . As directed, he rested his feet one at a time on a stool. A scabby dwarf tried hinged leg irons for size above his ankles. When a pair fit, another guard held the halves together while the smith fitted a hot rivet to the hole. He peened the ends over against a piece of subway rail. The shackles were locked to both legs with half a meter of chain between them. Lacey could shuffle, but he could not run or even walk normally.

And if the Underground's source of information were good enough, Lacey would not even be able to shuffle for long.

"Zack, Slicer," Allen ordered as soon as the second cuff was riveted home. A pair of husky cut-throats lifted Lacey by his shoulders and ankles. They carried him toward a steep flight of stairs. Allen's party had entered toward the middle of a multi-level parking garage. The two porters, followed by their chief and the rest of his entourage, descended the stone steps at a deliberate pace. As he passed doorways, the Southerner caught glimpses of barracks and equipment filling the large open areas. Each level was guarded by a separate contingent, bored-looking but armed to the teeth.

On the fourth level down, the lowest, no one looked bored. Lacey was momentarily startled that none of the crew of hard-faced guards meeting them carried powerguns. Despite the lack of that symbol, they were clearly an elite group. Lacey took in the pallets standing in floor-to-ceiling blocks. He grunted in disbelief. At least half the level was stacked with gray military containers of high explosive and bright orange tanks of toxic gas. A powergun bolt here would rock the whole city like an earthquake. The

Southerner could suddenly appreciate Nootbaar's concern for how Underground could respond to an all-out attack.

In the midst of the aisles of lethal material was a throne room. A dais and a massive armchair, both draped with cloth-of-gold, shimmered under a solid sheet of glow strips. On the throne sat the queen—black and perhaps fifty years old, with no hair on the left side of her head. On one arm of her throne lolled a white man less than half her age. He was dressed in tights and a cloak of rich purple.

"May," said Bill Allen in a subdued voice, "I brought a cop who says he's on the run. Says topside's getting ready to shoot their way down here the way they tried before."

The white youth giggled. Black May did not, but she thumbed toward the stacks of Amatex and K2. She said, "They weren't crazy ten years ago, what happened to them since?" She stared at Lacey, her eyes disconcertingly sharp. "Okay, what's *your* story?" she demanded.

"They seconded me from Greater Greensboro," Lacey began. In a few terse sentences he repeated the partial lie he had told Mooch and Bill Allen: the planned attack, the chance contact with a homosexual in the crowded streets; the knifing and escape down one of the routes his command was to have used for the attack. The story was as real as Lacey's foresight and utter ruthlessness could make it.

"Wank, check this out," Black May ordered. The man at an ordinary secretarial console beside the dais began speaking into his telephone. Radio would be useless for contact within the maze of tunnels. While ground-conduction equipment would have worked, it could not have doubled as a link to the normal communications of the City proper. It was obvious that such links were important to the governance of Underground. Lacey fleetingly wondered

whether the Commissioners had any real insight into their counterparts Underground, or whether topside intelligence sources stopped with estimates of bars, whores, and weapons.

"All of a sudden they don't care if everybody on the street at rush hour turns black and dies?" May asked rhetorically. She gestured again at the gas and high explosive ranked above her. The boy laid a proprietary hand on her shoulder, but she shrugged it off impatiently. He drew back with a moue.

Lacey tongued his lips. "They've got an insider," he said. "I never heard the name but I saw him. He's supposed to take you out—and all this—before it drops in the pot."

There was a sudden silence in the big room, marred only by the whisper of the telephone. Black May leaned forward, frozen.

"An old guy, about a meter seventy," Lacey went on. "White hair in a fringe behind his ears. But mostly bald, you know? Very thin, with a nose that's twice as long and half as thick as it ought to be."

"Swoboda!" somebody hissed behind Lacey. May's hand slashed him to silence as she thought.

Wank, bent over the telephone, missed the by-play. "Colosimo checked it on the scanners, May," he said. "Says it's just like the fellow says, a fag turns around and bumps him and this guy cuts the shit out of him. Blade wasn't very long, but it wasn't no fake. The crash crew had to collapse a lung, and if the flit pulls through, he'll do it on one less kidney than God meant him to have. It was real."

The news deepened the tense silence.

Lacey met Black May's eyes for a moment, then blinked. "Look," he said, "I got to take a crap."

The woman chuckled. "Well, don't look at me, sweetie," she said. "You'll have to ease it yourself."

The tension broke in general laughter. Lacey flushed and said, "Look, I mean . . . where?"

Black May waved her hand. "Take your choice," she said. "The honeywagon'll get to it sooner or later."

As if embarrassed, Lacey moved off into the shadow of a stack of explosives. A suspicious thug—courtier was too pretentious a word—peered around the corner a moment later, but she disappeared when she saw the Southerner was squatting with his pants down.

A thirty-gram ball of C-9 plastic explosive had been concealed in Lacey's rectum. He molded it quickly into the seam between the floor and a container of Amatex. Its detonator pallet lay against the stone flooring. If all went well, Lacey would be able to retrieve the charge and place it as intended, at the controls of the fusion plant. If not, it was where it would do some good as soon as somebody sent the right ground-conduction signal. Nature had left Lacey no choice but to remove the tiny bomb from its hiding place soon.

Lacey shuffled back into Black May's presence. The queen broke off in the middle of an order to the lanky redhead captaining the guard. "You!" she snapped, pointing a finger as blunt as a pistol's barrel at the Southerner, "how'd you come to see this traitor?"

Lacey shrugged. "A captain, Nootbaar, was briefing me three weeks ago Thursday when they first brought me up from Greensboro," Lacey lied. He had ordered a computer scan of the data banks to cull out any appearance of Swoboda on the surface during the past year. As the Southerner had expected, the physicist had come topside a score of times. The most recent instance had been three weeks previous; Swoboda had talked to a former faculty colleague in the latter's living area. If the City hierarchy had been alert, they could have arrested Swoboda then without difficulty—but that would have raised questions as to why the physicist was wanted. Besides, the

search would have tied up great chunks of computer time in a subregion in which availability was already far below requirements.

For now, all that mattered was that Swoboda could have been doing just what Lacey described. "This bald geezer walked through the room on his way up to twenty. Nootbaar pointed to him and said he was going to zap the big bosses and their goodies just before we dropped in on them."

"Wank?" Black May queried.

The secretary spread his hands. "No way to tell, May; a precinct helmet won't get us into the City Central scanners. Colosimo can follow Swoboda himself, maybe, if he keeps it to short segments and don't get the oversight program in the data bank interested. But Swoboda was topside that day—I met him as he went out and told him to get a tan for me, why didn't he."

"That son of a bitch!" the half-bald woman snarled. "And I trusted him. Bill!"

"May?"

"You and a few of your crew come on with me to the Basement. If this turns out to be straight, Swoboda's gonna get it where the chicken got the axe." May glanced at Lacey. "You come too," she ordered. "And somebody bring extra chains."

Half a dozen of Allen's cut-throats accompanied their leader in the vanguard. May's personal guards jostled after them. Lacey was thrust into the midst of May's entourage, shuffling quickly to avoid the possibility of a knife jabbed with more enthusiasm than care. They moved down an aisle between gray canisters. Lacey's chains clinked discordantly, like the background to a Vietnamese opera. The Southerner pressed his palms together, as close to a prayer as he had made in twenty-nine years.

At the end of the aisle was a steel door, massive

and obviously of recent installation. It reminded Lacey of a vault door or of a pressure lock, rather than any lesser type of portal. Allen swung it open; the four locking doors had not been turned. There was a hint of suction as the door opened out from a meter-by-two-meter slot cut deep in the living rock beyond. Allen and the others began to enter, stepping carefully over the steel sill. It was pitch dark within.

"Keep your hand on one wall," Black May suggested. "There's bends."

'Bends' was not the word for the right angles that broke the narrow tunnel every few meters. Lacey bumped and cursed. "What the hell is this?" he demanded.

May chuckled behind him. "Anybody who came Underground looking for me was gonna have the devil's own time at this end, especially with all the tunnels full a' K2, hey?" she explained cheerfully. Then her mood changed and she snarled. "Unless some bastard thought he'd cut me off on the outside of this!"

There was another heavy door at the far end. It also pivoted outward from the tunnel. In the pause before Bill Allen shoved it open, Lacey felt an edge of claustrophobia. Then there was light in the tunnel, more light than Lacey had seen since he came Underground. Blinking, Lacey stumbled with the pack of killers out into muggy brightness.

There was a squad of the same ilk guarding the inner door. They nodded respectfully to Allen and his men, then shuffled to their feet when they saw Black May was present as well. "Swoboda and the rest a' the needleheads here?" May asked the squad leader, a stocky redhead. She wore a necklace of what appeared to be dried fingers against her bare breasts.

"Unless they left before our shift started, May," the guard said. She grinned. "Hey, want us along?" she asked, touching the long sheath knife at her belt.

"Just don't let anybody out without I tell you, Minnie," Black May replied grimly. "Maybe nothing's wrong, maybe it is. . . ."

The huge cavern through which they began to stride was incredible to Lacey. Rank after rank of algae tanks marched in all directions. Though stone pillars studded the greenery, there were no walls as far as Lacey could see down any of the aisles they crossed. The roof, three meters above the floor, was bright with daylight-balanced glow strips. "Where the hell did you find *this* place?" Lacey asked in open amazement.

"Find?" May sneered. "Built, sonny, excavated it and sold the rock topside to the outfit filling ocean to build Treasure Isle. Honest business!" she added with a guffaw. "Bought the strips, too; there wasn't any place in the City where we could liberate as much as we needed. No problem, money we got. Only thing we needed then was the power to run them, and I guess we twisted that tail all right too." But the Queen of Underground scowled, and Lacey knew that her mind was on the man who had built her that powerplant.

There were men and women tending the algae tanks. They were as different from the crew surrounding Lacey as rabbits are from weasels, and they eyed the scarred cut-throats with rodent-like concern. May's henchmen, for their part, appeared as ill at ease in the lush surroundings as they were out of place. This orderly Eden had been created for technicians, not blood-letters, and both sides knew it.

"If we depend on topside, they own us," Black May said, as much to herself as to Lacey. "Down here, now, we got synthesizers and enough algae to work from to feed the whole City. We got power, a well four hundred meters down for fresh water, and a pair of ducts into the East River to dump waste heat. If we got to, there's the power and the tools here to punch a

line out to the ocean. There's a thousand techs to work it, and I got ten thousand guns I can put topside without emptying the bars." May knuckled Lacey's shoulder to make sure she had his attention as she concluded, "They were too late up there, sonny. I got a base. I own the City. I just haven't gone up to tell'em—yet."

They had finally reached the far side of the artificial cavern. Apartments of opaque sheeting were built against the stone. There was a neatness and order to these dwellings which was missing from what passed for human habitation elsewhere Underground—or topside, for that matter. Some of the buildings appeared to be shops and offices as well.

"Where's your power come from?" Lacey asked idly.

Black May looked at him. "It's here in the Basement," she said. "Don't worry about it, sonny."

A group of nervous techs was drifting out of the nearest building. A few of them carried tools in feigned nonchalance, hammers and hand cultivators. Against May's crew, they were as harmless as dolphins facing killer whales.

"I need to talk to Doc Swoboda," May boomed jovially. The listeners stirred, frowning.

"He's not—" a young black woman began. She broke off when a man stepped out into the bright light. He was old, balding, and knife-nosed.

Lacey pointed at him. "That's the one," he said. "That's the informer."

All but one pair of eyes followed Lacey's gesture. The exception was a squat thug with curling black hair so thick on his arms that it made his pallid skin seem swarthy. His fellows had called him Horn. The girl who had spoken saw where that cut-throat's gaze was focused. Her mahogany skin flushed deeper and she crossed her arms over her breasts, bare in the clean warmth.

"I don't understand," Jerry Swoboda was saying, drumming both forefingers nervously on his sternum. "Is something wrong, May?"

"Hard telling, Doc," the queen said, arms akimbo, "but I need to take you back for a while to see. Put the irons on him, Boxie."

"No!" the black girl shouted. As she leaped forward, Bill Allen blew her head apart with a bolt from his powergun. At the shot, a thug with a submachine-gun sprayed a burst into the stone floor and his own feet. The lead splashed and howled. The clot of technicians flew apart screaming. The gunman toppled in silence, too stunned for a moment to feel pain.

"For Chris' sake!" Black May stormed. A chip of jacket metal had cut her cheek so that it drooled a fat line of blood down to her jawbone. "Get them chains on and let's get outa here."

There was no question as to where the powerplant was located. A great conduit lined across the rock ceiling. Lacey had seen its exit into Underground proper through its own opening above the air-lock door. Wire tendrils from it fed the thousands of glow strips, and the roots of the conduit were somewhere in or beyond the apartment from which Swoboda had appeared. When the time came, Lacey would have no difficulty in locating his target.

His non-human target. Swoboda's eyes had the glassy stare of a fear-drugged martyr. Two women wearing knives were fastening his shackles. They used small padlocks through the holes in lieu of rivets. The physicist was given twice the length of chain that hobbled Lacey; no one was concerned about what the old man could do with a moment's inattention and a sudden leap.

At Black May's order, her entourage turned back the way they had come—with one exception. Lacey had already noticed Horn and what he was doing. Now Bill Allen noticed also and shouted, "Hey!"



There was no response. The chief's face hardened. He took two steps and kicked. Horn leaped up from the tech's corpse, his eyes for the instant as blank as Swoboda's had become. "You stupid bastard!" Allen shouted. "Save that for later!"

"Aw, Bill," the hairy man muttered. He fell into line shamefacedly behind Lacey.

The returning party's pace was faster than it had been as they entered the uncomfortable caverns. Enthusiasm at leaving made up for the need to carry Swoboda and the wounded gunman. Lacey had learned to throw his own chain forward with short, quick steps. He kept up with the others without being goaded. Rather to his surprise, the Southerner found that his mind was no longer on how best to accomplish his real mission. All the way back to the throne room, he was considering how to kill Horn and Bill Allen.

Black May sat down on her gold-draped chair and stared at the chained men. Her boy stopped pouting and began to massage the bare side of her scalp. Lacey tried to look nonchalant. If May didn't order his release now, he was in trouble.

"Bill," she said, "I want them where they're out a' the way." The bald side of her head was faceted by scar tissue. "Keep 'em where you've got prisoners for ransom—or do you have any now?"

"Naw, two got paid off and the woman's working The Boxcars."

"Good. Keep this pair there and keep a guard on 'em. That one for starters—" she pointed a finger at Horn; she hadn't forgotten either. "I'm going to get 38th Precinct to run Doc here's movements for the last few times he was topside. It'll maybe take a couple days, 'cause it'll have to go in as routine street-sweeps; but if our fink's right, it'll be hard lines for the Doc."

Lacey grinned broadly. It made him look cruel and

confident, both of them qualities Black May would appreciate. Besides, it genuinely amused the Southerner that he would soon be unmasked by the very data banks he had served for fifteen years.

As he shuffled toward the steps beside Allen, Lacey suggested, "If you cut these damned chains now, it'll save you having to lug me up these stairs."

The big chieftain snorted. "Sure. I watch you lay out Mooch and I'm supposed to take your chains off when May says not to. Besides, it ain't *my* back you'll ride on. Horn, Ledder—get this bastard up the steps. If you drop him, I'll kick your butts all the way to the bottom myself."

The trip back through the tunnels gave Lacey a charleyhorse in each thigh. Since that came on top of the beating he had taken from Mooch, Lacey was dizzy with pain by the time they stopped. According to his reckoning, they were in a branch tunnel near The Boxcars. Allen unlocked what had probably been an equipment closet. The door was sheet metal and not particularly substantial. Some of the customers in nearby booths watched what was going on. The shills and bartenders did not: they knew Bill Allen, and they knew that his business was none of theirs.

The rock on the other side of the small closet had been cut away recently. Allen shone a hand light within. The new opening gave into what seemed to be a blocked-off elevator well. The area was choked with trash, but in the middle of it stood a massive eyebolt, its base sunk deep into the concrete floor. "Home, simps," Allen said with a chuckle. "Till May gives the word."

A pair of his subordinates had appeared from the direction of The Boxcars, carrying shackles and a glowing brazier. Wank must have summoned them by phone. Allen nodded to the pair and said, "Lock this pair by the wrists, Becky. You can give 'em three

meters to be comfortable; but don't knock the leg irons off, hey?"

The smith and her helper riveted a manacle to Lacey's right wrist with a few expert blows, using the eyebolt as an anvil. Then they ran the attached length of chain through the eye itself and manacled the other end to Swoboda.

"Horn," Allen said grimly, "you sit right there at the doorway. Anybody tries to get in or out, you cut 'em apart with your toy there. I'll have a meal sent down in a couple hours. And you do *any* goddam thing but what you're told to, I make a belt of your hide and give the rest of you to May. Understood?"

Horn grunted sullenly. As his colleagues strode off toward drinks and ease, he glared at the prisoners. "You pull any goddam thing," he snarled in unconscious mimicry, "and I cut you apart." He fingered the hilt of the fighting knife in his belt. Then, with his back to the doorframe, he began to throw a pair of dice morosely.

"Why did you lie about me?" Dr. Swoboda asked in a low voice.

Lacey started, but the words were calm and not the prelude to an attack. He could just make out the physicist's form in the light that filtered through the open door. He did not reply.

"You can't just be a boaster who thought he'd denounce somebody important," Swoboda went on. "I don't think anyone in Underground but May herself really thinks that what I've done *is* important." He paused. "Oh," he said, "of course—anyone Underground. But by now the State has probably decided the blackout eight months ago was caused by the load from me starting up a fusion powerplant."

"You've built a fusion plant?" Lacey said, snorting as if incredulous.

"Of course," Swoboda repeated, and it was an instant before Lacey realized that the words were in

answer to his question. "It would have been the one hope for the world itself, but that was impossible. Still, there's a self-sufficient colony in the Basement now. Perhaps that will be able to continue, whatever happens to me."

"One hope for this whole island is to be blown to slag," Lacey gibed. He brushed a spot clear of varied garbage and sat down on the floor. "Go on," he said, "you wouldn't have built a fusion plant down here with all those people living over it. Why, I hear it wouldn't even be possible to shut one down safely if it *was* lit up."

"Nonsense!" the physicist snapped with more spirit than he had shown since being taken into custody. "All that it takes to shut down the plant is to open the fuel feed and chill the reaction. Two turns on a petcock! And the rest of what you're saying is *just* as absurd. People have always wanted to live fifty years in the past, and that was all right . . . but it isn't all right any more, it's suicide! Yesterday's fears are going to *kill* us, kill *all* human civilization."

"Such as it is," Lacey chuckled. He felt a sudden added coldness when he realized that he was no longer merely leading his quarry on, that he was actually becoming involved in the discussion.

"That's the point, you know," Swoboda said, returning to the emotionless delivery with which he had begun the discussion. "I couldn't convince the authorities that what I was offering would be safe. They wouldn't even let me experiment in an unpopulated area. They were afraid the newshawks would watch the scanners. They'd report that the laws were being flouted—and they're *stupid* laws!—and that a 'bomb of unguessable destructiveness' was being built; and every person who'd had anything to do with approving my project would be voted out or fired. Myself, I'd go under a Psycomp to have my brain cleaned. But *whatever* the risk—without power

for growth, what will this City be in ten years? What will the world itself be like in fifty? What kind of death would be worse?"

Lacey shrugged. "You're talking to the wrong guy," he said.

The physicist sighed. "No doubt, no doubt; but there isn't anyone else to talk to, is there?" He glanced toward Horn, who looked up from his dice to glower back. "No human being, at any rate."

Swoboda started to clear a place on the floor, but he was too nervous to sit. He began walking and turning, a pace in either direction so as not to foul the chain. "I felt like this three years ago," he said, "when I finally realized that I was never going to be allowed to build even a pilot model. The energy source that could save civilization, and it could never be built because the world saw too much and understood too little. That's when Leah Geilblum visited me." The physicist looked at Lacey. The Southerner's eyes had adapted to the dark well enough to catch a sheen of remembered hope in the older man's expression.

"I knew her by reputation, of course," Swoboda continued, "as she knew me. As an anthropologist, she saw even more clearly than I the horror, the irreversible horror, into which the world was slipping; and she saw the hope that my power source could provide.

"Black May had already recruited several biologists, planning her 'base'. It wasn't hard for her, you know. The more intelligent someone is, the more clear the need for a, a bolthole, becomes. And word of mouth moves swiftly in the academic community. Leah—she died only last month—she was 83 and it wasn't at all for herself that the concern lay—she convinced me to try to work with Black May, now that Underground had a single, intelligent leader. And Leah was right. It just seems that that wasn't enough."

There was an interruption from the doorway. Horn scooped up his dice and stood, trying to embrace the lithe woman who carried three meal packets and a canteen. "Rickie, hey, how about a trick, hey?" the guard rasped. "Look, I can pay—"

The woman dropped her burden without ceremony and elbowed Horn in the stomach. "Think I haven't heard, creep? Keep the hell away from me!"

"Look, just a feel, then, Rickie," Horn begged, crouching in desire and extending his hands. Rickie reached behind her back, then extended her right fist wrapped in barbed-wire claws. "I'll feel the heart right outa your chest, I will!"

Horn's mouth pursed and his hand dropped to his knife. Booth personnel were beginning to view the disruption blackly, and a few customers seemed to be drifting toward other parts of the tunnels. The woman swiped at Horn's eyes. "You try that," she hissed, "and I'll feed it to ya. And if I don't, cutie, what d'ye suppose Bill and May'll do?"

Horn cursed and turned and slammed his fist into the open door. It boomed thunderously. The woman walked back the way she had come. Horn saw the food containers and kicked all three of them violently into the closet. One of them sailed through the opening to the elevator shaft. Lacey ducked. The ruptured plastic spewed juices. Its integral heating element stank with only the empty container to absorb its energy.

Lacey smiled. It was as well for Swoboda's peace of mind that the dim light kept him from seeing the hunter's face clearly. Lacey tugged his companion silently toward the eyebolt so that the old man's hand rested on the metal. All the slack in the chain was on Lacey's side of the bolt.

"Hey Horn," he called to the guard, sitting again in the doorway. "There's rats in here."

"Hope they chew your eyes out!"

"No, I mean they're screwing in the corner," Lacey said. "Shine your light so's we can get a better look at'em, will you?"

Horn bounced to his feet and raised the flashlight Bill Allen had left with him. Then he paused and shifted the light to his left hand. He drew his knife and gestured with it. "Get smart and I'll spread you all over the room," he said.

Lacey nodded and stepped back. Out of the bright disk of the flashlight, he thumbed a chunk of potato into the pile of trash in the far corner. The litter rustled.

Horn stepped through the opening to the shaft. His knife pointed up at Lacey's throat, but his eyes were on the quivering circle of light. "Where—" he began.

Lacey flipped a loop of chain over the guard's head and jerked him backward. Swoboda squealed. Horn could not shout with the chain crushing his throat, but he slashed out with his knife. Lacey threw himself aside, tugging frenziedly at the chain. His body knocked the physicist down.

Horn tried to rise. He cut wildly to the side; his wrist struck the eyebolt. A cry wheezed past the chain and the knife sailed loose in the darkness. Horn's hand twisted toward the blackjack in his hip pocket, but his fingers would not close.

Lacey moved nearer. The manacle on his right wrist gave him an unbreakable grip on the chain. He planted both feet on the other side of the loop, pinning it to the floor. Then he pulled upward with his whole body. Horn thrashed furiously. Blood flecked his chin and the hairs on his chest. The motions became instinctual, like those of a fish on the sand. He gave a final, back-arching convulsion and lay still.

Lacey tossed the loop of chain free and collapsed beside the body. His gasping breaths came like sobs. "Get me the knife," he whispered to his companion.

"But we're still chained," Swoboda protested.

"Get me the bloody knife!"

Using the light, the physicist located the weapon. Diffidently, he set it beside Lacey's hand. The Southerner picked it up. The knife was of the finest craftsmanship. Its blade was 7 mm across the flats. Both the edge and the false edge had the yellow sheen which indicated they had been treated to triple density after grinding.

"Hold your shackle against the bolt and keep the light on the rivet," Lacey directed. He slipped Horn's blackjack from his pocket and stood.

Swoboda caught at his lower lip with his teeth. Lacey positioned the manacle as he wanted it. He set the knife edge against the peened end of the rivet, then struck the back of the blade sharply with the sap. The 3 mm rivet sheared.

"Why, that's incredible!" Swoboda blurted.

"Nothing incredible," Lacey said sourly. "Just a hell of a thing to do to a good knife." He pried at the manacle carefully, using the false edge and trying not to cut the physicist's wrist. There was already bleeding from damage the shackle had inflicted during the struggle with Horn.

The iron popped apart. "Now you get mine," Lacey said, handing the tools to Swoboda.

It took repeated blows by the older man before the second rivet parted, but even so it was only the matter of a minute. Lacey struck off their leg irons. He paused, staring into the physicist's eyes. "Can you get back to your Basement and dog the doors shut?" he asked.

Swoboda thought calmly, then nodded. "Probably. It isn't necessary to pass through the throne room, and the guards at the entrance door should have changed shift by now. They're used to me entering and leaving, so that shouldn't cause any comment unless I chance upon someone who saw my . . . arrest."

The older man rubbed his forehead. "As for dogging the inside door, the guards will probably believe me if I say it's necessary for a few days because we're, oh, raising the humidity briefly to enhance growth."

Lacey nodded. "I'll give you half an hour," he said. "That's all; and if it's not enough, that's too bad. Now get moving."

"Why?" Swoboda asked unexpectedly.

"Why the hell do you care?" the hunter blazed. He flung the knife away from him. It clanged and sparked on the concrete. "Mostly I do what I'm told. It doesn't make any difference, you see? I know we're all going down the tubes, I'm not blind. So it's easier." Lacey took a deep breath, fingering his scar. "Only maybe this time it makes a difference. To somebody. Now just get out of here."

Swoboda touched Lacey's hand, then squeezed it. As he turned, the hunter called after him, "You'll have to handle the guards inside yourself, afterwards. But I can't do it all."

No one shouted when the physicist slipped out into the tunnels. People Underground minded their own business; and besides, the thin old man was of small interest, even to the whores.

Lacey waited briefly, then strolled out to a bar. It had more pretensions than the blind pigs around it and there was a twenty-four hour clock on its back wall. Horn had had some money in his pockets. Lacey used part of it to buy a beer. The liquid was thin and bland—and therefore safe from being loaded with knock-out drops.

Lacey smiled as the bartender eyed him. Actually, there was nothing unusual about the Southerner's appearance compared to that of many others Underground. It was just unusual that someone as battered as Lacey was would have enough money left for a drink.

Lacey nursed the beer for the half hour he had

promised Swoboda. He ignored the prostitutes who approached him. If the bartender felt he was not drinking fast enough, he had better sense than to push the matter with the scarred man in red.

When the time came, Lacey up-ended his glass and strode out of the stew. As he neared The Boxcars, the hunter began to jog and then run. His face grew wild and he shoved people out of his way. The guards at the entrance to the brothel braced to stop him. Lacey thrust the remainder of Horn's money out with both hands. "Bill Allen," he wheezed. "I gotta talk to Bill!"

The guard chief frowned, then thumbed inside. "He's in his office," she said. "If he sees you or not's his business."

Lacey pushed through the cordon of naked women who tried both to entice him and strip his empty pockets. He flung open the door to Allen's office before a house man could stop him. "Bill, I gotta see you!" he said, slamming the door.

"What the bleedin' hell!" the black chieftain snarled. He was alone in the room, punching buttons on a computer console with one hand while the other held a sandwich. An open floor-safe protruded 200 mm from the rock beside him. He banged the heavy lid closed with his foot. "How did you get loose?"

"Bill, Black May's going to kill all of us," Lacey whined. The enclosed privacy of the office was disconcerting to him. "She's going to take her buddy-buddies into the Basement and gas us, gas all Underground to keep the topsiders from finding where she's hid!"

Allen was frowning, but he set down his sandwich. Before the chieftain spoke, Lacey blurted, "Look, Bill, I'm afraid your guards'd grab me 'f I tried to go topside alone. You need to get out too—you can take me! Bill, you ever seen what K2 *does* to a guy?"

"Balls," Allen said flatly. "Let's see what May says about this." He began to punch out a phone code,

keeping a corner of his eye on Lacey.

The Southerner's face tightened into intersecting planes of despair. "Bill," he pleaded, "Take me top-side and I'll give you a gadget you wouldn't believe."

Allen paused, his finger above the last digit of the code. "Talk," he said.

Lacey licked his lips. "Well," he said, "you got the stylus Mooch took off me?"

Allen nodded, his forehead wrinkling. He slid open a drawer in the console and pulled the ivory-colored instrument from the varied truck within.

"It's not just a stylus," the hunter said truthfully. "They learned a trick from Tesla—it's a laser that'll cut forever if you just hold the base against a good ground. The wall behind you'd do. You press the button on the side and it shoots forever."

Allen stared eye to eye at the smaller man. "You're lying," he said. With the beginning of a smile, the leader touched the back of the stylus against the wall and pressed the button. The tip was centered on Lacey's breast.

The ground conduction signal shivered into the rock. Nothing visible occurred in the room.

Lacey relaxed. He smiled like a shark feeding. Bill Allen blinked in surprise, not at the failure of the 'weapon' but at the hunter's reaction to his attempted murder. "This far away, there's maybe a ten-second delay," Lacey said. He dropped flat on the floor beside the safe.

"What—" Allen began. He groped for the powergun in his belt. The shock wave from the explosion in Black May's quarters reached him before he could draw. The wave front drove the mahogany bar at an angle before it, pulping all of Allen's body between neck and his diaphragm.

Lacey did not really expect to live through the blast. It drove down the hundreds of kilometers of tunnels like a multi-crowned piston, shattering

whatever stood in its way. The Boxcars and everything in it was gone, driven meters or kilometers down the tunnel in a tangle of plastic and splinters and blood; everything but Lacey and the safe that shielded him.

There was no sound, but Lacey found he could see after the ground stopped quivering like a harpooned manta. A hundred meters of tunnel roof had been lifted by the blast. It collapsed when it fell back, close enough to Lacey that his feet touched the concrete moraine when he tried to straighten from the ball into which instinct had curled him.

The air was choking, but with dust and not K2—yet. The rebounding shock waves of the blast would suck the stockpiled gas into every cranny of the tunnel system soon, but at least the lethal cargo had not ridden the initial wave front. Even with the safe to turn it, the blast had pounded Lacey like a rain of fine lead shot. He rose slowly, sucking air through the hard fabric of his sleeve. Once the ground beside him came into focus, he saw a dropped powergun. Lacey picked it up and began to stagger toward an unblocked staircase.

Those who knew Jed Lacey best thought he was merciless. They were wrong. He used his weapon repeatedly before he climbed to the street. That was the only mercy desired or available to the hideously mangled forms who mewled at Lacey in agony.

The guards at the anteroom of Level 20 were nervous and confused, like everyone else in the City. The lower levels of some buildings had burst upward, killing thousands. Long sections of traffic-laden streets had collapsed, adding their loads to the death tolls. K2 was denser than air, but the swirling currents raised by the explosion had blown tendrils of the gas to the surface in many places. Where the odorless hemotoxin touched, skin blackened and

flesh swelled until it sloughed. Red Teams wearing atmosphere suits were patrolling streets that were otherwise deserted by the living.

Lacey pushed through the shouting clot of newshawks. He was gaunt and cold. His suit had been shredded into the garb of a jester mocking the Plague. No one who looked at Lacey stayed in his way.

The door from the Commission Room slid open to pass a uniformed captain in full riot harness. "Max!" Lacey croaked. His fingers brushed the heavy man's wrist to keep him from leveling the slung needle gun.

"Where the hell did you come from, Lacey?" Nootbaar grunted. The guards stood tense and featureless behind their faceplates.

Lacey grinned horribly. "That's right, Max," he said. "Now I need to see the brass—" he thumbed toward the closed door—"bad. I know what happened."

Nootbaar bit a knuckle. "Okay," he said, and held the door open for Lacey.

Commission staff and uniformed police made the room itself seem alive with their motion. Lacey slipped among them, headed for the three desks in the middle. A projection sphere was relaying the horror of a dwelling unit where three levels had sunk into a pool of K2.

Characteristically, it was Lemba who first noticed Lacey's approach. He spoke silently to his implant. A klaxon hooted and the projection sphere pulsed red for attention. The Chief Commissioner's voice boomed from ceiling speakers, "Clear the room! Clear the room!"

"What the—" Commissioner Kuhn began, but she too saw the ragged figure and understood. "Did he—"

"Silence!" Lemba growled. "Until the room's cleared." The woman glared but accepted the logic of secrecy. Her gown was a frothy ball of red. It was much the same shade that Lacey's suit had once been.

The door closed behind the last pair of armed guards.

"I've done what you wanted," Lacey lied. But he had done what the world needed instead, protected one seed of civilization against the day when it could sprout . . . "Now give me a pardon for what I did for you. Then you'll never have to see me again."

"Nothing was said about a pardon," Arcadio muttered over tented fingers.

"I did what you wanted!" Lacey repeated. He did not raise his voice, but his eyes were balefires licking the bones of each Commissioner. "Give me a pardon and no one will ever know about it. Even you won't have to learn."

"The explosion, the gas . . .," Commissioner Kuhn whispered. "All these people dead in the streets—"

"They died!" Lacey snarled. "It was cheap at the price, do you see? You've got your city back now, because the scum below blew themselves apart. The ones down there who were tougher than you and smarter than you worms'll be—but they're dead. Don't clear the K2, just seal all the openings. You're safe forever now—from Underground. You're safe from the dead."

"We aren't going to turn that loose, are we?" Kuhn asked slowly. There was nothing rhetorical in her question.

"The alternative is to try to keep it caged," Lemba noted. He shrugged toward Arcadio. "I doubt that would be a profitable undertaking. And we have a great deal else to concern ourselves with at the moment."

"All those dead," Kuhn said. "And we directed. . . ."

The Chief Commissioner coughed. Neither of the others spoke. "Citizen Lacey," Lemba said, "by virtue of the powers civil and criminal vested in me by the Charter of this City, and with the concurrence of

my co-commissioners—" he looked at each of them. Arcadio nodded minusculely; Kuhn did not, her cheeks as bright as her garments, but she did not gainsay Lemba—"I do hereby pardon you for all crimes, actual or alleged, which you may have committed within this subregion to the present date."

Lacey nodded. "That pardon's the only thing I'll take with me from this City, then," he said, "besides my mind." He slipped the powergun from beneath his tunic and laid it on the smooth floor. His toes sent it spinning toward the frozen Commissioners. At the door, Lacey called over his shoulder, "Careful of that. There's still one up the spout and two more behind it."

The door closed behind him.

The six-year-old was blind with tears as she ran into his legs. Lacey lifted her one-handed. "Can I help?" he asked.

"The street fell!" she sobbed. "I can't go home because the *street* fell!"

"Umm. What building?" By now the gas would have seeped back into Underground, but a window of blackening bodies kept the thoroughfare empty. The dead did not touch Lacey any more. Only the living mattered.

"Three-oh-three-oh forty-ninth street level ten," the child parroted, her arms locking about Lacey's neck.

"Sure, Level 10, no problem," the Southerner said. He glanced around to get his bearings. "Your parents'll be looking for you, so we better get you home, hey?"

Humming to himself and the girl, Lacey skirted a wrecked truck still lapped with burning alcohol. Lacey was alive, maybe for the first time in fifteen years. It was going to take work, but he thought he liked being a human being again.

—David Drake

What will really happen to this planet when
there is Standing Room Only?

Unisave

By Axel Madsen

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In closed sessions attended by members of the Unisave Council, leaders must vote on a proposition called Geriatric Bingo: death for one in three among "eligibles". No one wants to do it. But no one has an alternative...

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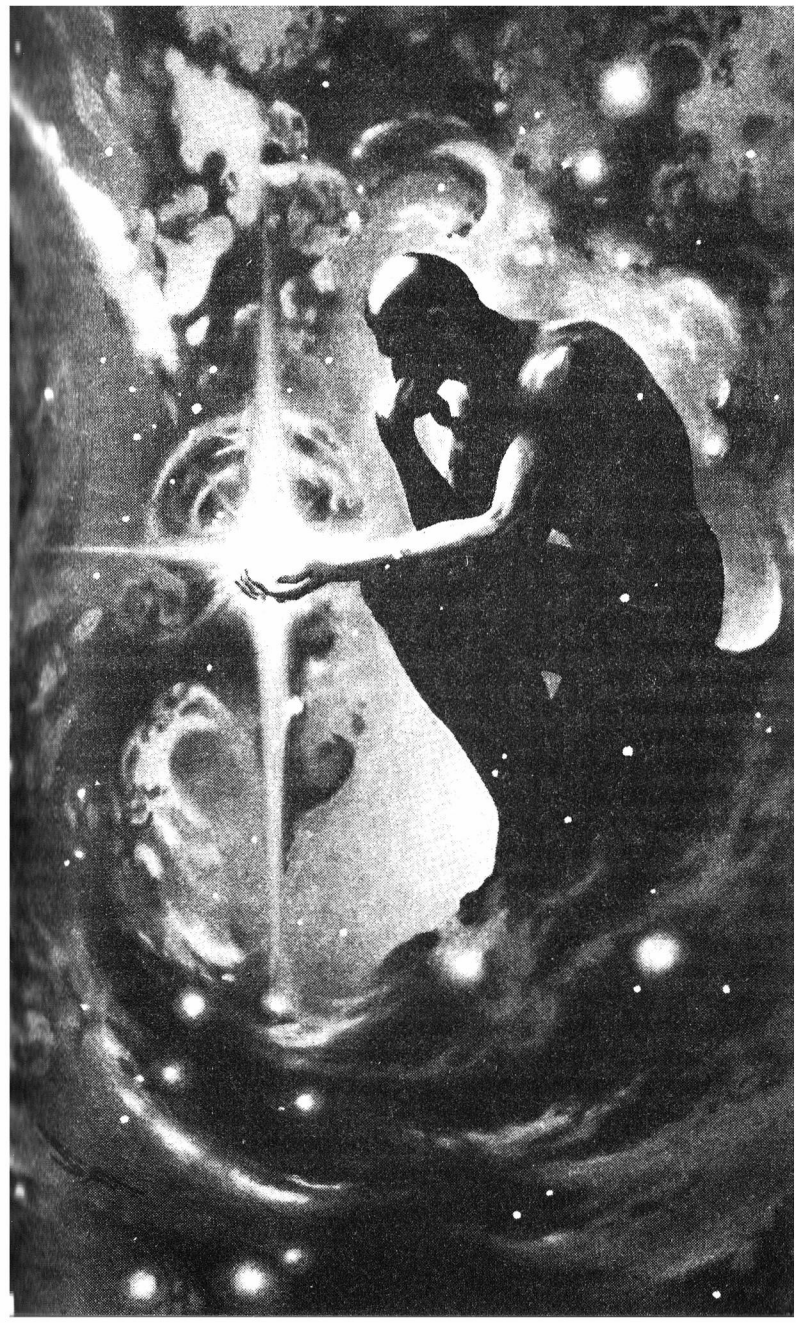
BY G. HARRY STINE

**EINSTEIN WAS NOT
TOTALLY WRONG.**

1979 was the "Year of Einstein," celebrating the 100th anniversary of the great theoretician's birth.

Doesn't it seem rather incongruous to have celebrated the centennial of a man whose theories appear to deny the stars to mankind?

The theoretical denial of star flight at speeds approaching that of light or exceeding the speed of light



is not really Einstein's fault, however. His theories of relativity and his General Field Equations may have been misinterpreted by other theorists; it has happened in the past to others, and it is undoubtedly happening again today. One of the big problems is the simple fact that most people, including many scientists, labor under the delusion that "science" is an irrefutable collection of facts derived from observation of the way the Universe works. There is no room for doubt, and relationships are stated in forthright terms without equivocation.

Upon closer inspection, however, the edifice of science that seems so monumental and solid when viewed from a distance is, in reality, a cracked and sagging structure resting on the constantly shifting sands of ephemeral theory, with gaping holes all over it. Some scientists spend their entire careers trying to stuff these holes with paper, which really doesn't add to the structural integrity of the system at all. "Theories" turn out to be guesses or hypotheses based on incomplete experiments or datum that is carefully screened and selected. There is only one thing we know for certain: modern physics is wrong (or at least incomplete). It is indeed relative because facts, data, theories, and laws turn out to be highly dependent upon the way you look at the Universe. It is also quantized, proceeding in definite bursts of new insights when someone comes along with a new, more general theory in which the old theory is seen to be a special case.

Einstein was not totally wrong; he was indeed partly right, as the results of many experiments have tended to point out. The same holds true for Newton, Ptolemy, Copernicus, Maxwell, Planck, and others.

Science writers, theoreticians, and pedagogues will quickly point out that the theories of relativity prohibit any object in the Universe from exceeding the speed of light. They are only partly right. Their

opinions are based upon data from experiments using very small electrically-charged particles whose mass has been determined by the reaction to applied magnetic fields or to momentum transfer by impact with other charged particles.

This should not be labelled as a criticism of science or the Scientific Method, because it is not. Science is a democratic system; as such, it is often very sloppy and prone to bureaucratization by "political" scientists with an authoritarian bent. It is a criticism of these authoritarian Keepers of the Faith. But we can't fault the Scientific Method because it is a workable method, the best method we've got, and spectacularly successful when it operates free of dogma.

At the moment, it is up to its armpits in dogma, and this dogma denies us the stars.

But don't blame Einstein. He had to fight the same sort of dogmatic authority with his own theoretical work, and he was exceedingly clever in the way he went about it so that he threatened no established authority. He was not only a theoretician and philosopher; he was also a cracking good politician. Right now, there are a lot of books and articles available in which you can read all about how Einstein arranged this scientific coup; some are more objective about it than others. One of the problems involved in writing about Einstein and his work is the simple fact that Einstein has been elevated almost to godhood status by liberal philosophers who defend Einstein and their untrammelled support of him by using Einstein's own concepts of relative points of view! Einstein's work is a masterpiece of detached, speculative hypothesizing with its point of departure lying in some of the paradoxes he found in the work of James Clerk Maxwell.

Maxwell has had a greater pragmatic effect upon our everyday lives in late Century-20 than Einstein. But Maxwell's work has not received the attention

of scientific publicists to the extent of Einstein's. In his 1873 *Treatise on Electricity and Magnetism*, Maxwell made a sweeping generalization that tied together the fields of electricity, magnetism, and light. He demonstrated that electromagnetic activity capable of producing action at a distance travelled through space with the same velocity as light. He advanced the hypothesis that light and electromagnetism are the same in their ultimate nature.

Maxwell developed a set of equations that accounted for the electric field and the magnetic field. Maxwell's work states that (a) an electrically-charged particle at rest possesses an electric field; (b) when said particle with an electric field is given a velocity, a magnetic field is created; and (c) when said particle's velocity is changed and it is accelerated, all of the energy put into accelerating the particle is not observed in the resulting motion of the particle. Some of the energy becomes apparent *later* in the motion of the particle, but some of the energy doesn't show up at all and apparently *leaves the system* by some hitherto unknown means.

Maxwell invoked the concept of "electromagnetic radiation" to account for the energy that had left the system . . . and everything balanced out in a very neat fashion. This provided a perfectly rational explanation for light, infra-red, ultra-violet, and the yet-to-be discovered X-rays and gamma rays.

Heinrich Rudolph Hertz performed the critical and elegant experiment in about 1886 that confirmed Maxwell's hypothesis of electromagnetic radiation. Hertz measured the speed of this electromagnetic radiation, and Albert Abraham Michelson's pioneer experiment in measuring the speed of light in 1880 confirmed the fact that light and electromagnetic radiation were one and the same, travelling with the same velocity through space. The speed of light varies, depending upon the material through which the

light passes and is a function of the dielectric constant of the material. This provides the theoretical foundation for the science of optics. In a pure vacuum, electromagnetic radiation has a velocity of propagation of about 300,000 kilometers per second, give or take a few km/sec.

Now we are going to make a simple experiment, one that is performed in nearly every freshman physics lecture demonstration at some point during the course. Suspend a light pith ball, paper ball, or foil ball from a thread. Rub a glass rod with a silk handkerchief and bring the rod near the pith ball. The ball will exhibit motion in space toward the glass rod.

But the pith ball did *not* move instantaneously once the rod was brought near it. The "message" that the rod was nearby took a finite period of time to traverse the space between the rod and the ball, travelling at the speed of light. When the "message" denoting the presence of the rod's electric field reached the ball, and when the ball as a whole could respond to the orders of the message and rearrange its electric charges, it was accelerated toward the rod.

This simple experiment illustrates the principle of "action at a distance," a concept which greatly bothered the scientists of a century ago. It was exceedingly difficult for them to conceive of any action being produced without a medium through which the force could travel. Therefore, they came up with the concept of the "luminiferous ether," a general property of space that would permit the transmission of force through a vacuum to produce action at a distance.

In 1887, Dr. Albert Abraham Michelson and Edward Williams Morley performed their renowned experiment to confirm the existence of the luminiferous ether by measuring the "ether drift." If the speed of light through the ether was constant, there should

be a difference between the speed of light reaching the surface of the Earth at 6 A.M. and at 6 P.M. due to the Earth's orbital velocity of 30 kilometers per second around the Sun. The difference was anticipated to be 60 kilometers per second, twice Earth's orbital velocity.

As nearly any physical scientist will tell you, this Michelson-Morley experiment formed the basis for Einstein to formulate his theories of relativity because the experiment showed *no* difference in light speed with respect to the Earth's orbital velocity and, hence, no ether.

This is an untruth. It is not correct. But one must dig pretty deep to discover the facts.

Albert Einstein himself publicly stated that the Michelson-Morley experiment "had no role in the foundation of the theory." However, the dogma of modern physics would have the public believe otherwise, in spite of Einstein's own disclaimer!

It is true that Michelson and Morley did not find the expected 60 kilometers per second differential that would have confirmed the ether drift. *But they did find a difference of about 8 kilometers per second!*

This is not highly-selected and isolated data. D. C. Miller and his colleagues repeated the Michelson-Morley experiment with more precise instruments more than 25,000 times between 1902 and 1926. They came up with the same result. Miller, who was president of the prestigious American Physical Society in 1926, announced the results to the Society in his presidential address of 29 December 1925.

You would think that this announcement from a scientist of obvious integrity and high reputation would have aroused considerable interest among physicists. You would think that they would have, at the very least, held both theories of relativity in question until Miller's confirmation of the results of Michelson and Morley could have been accounted for

by modifications to Einstein's theories.

But scientists, then as now, have completely closed their minds to anything that even suggests a threat to their rationality derived from Einstein's concept of the Universe. According to M. Polanyi in 1958, "Little attention was paid to the experiments, the evidence being set aside in the hope that it would one day turn out to be wrong."

Well, it's still there, even if buried and neglected. And it keeps popping up, much to the consternation of relativists. In the 1940's, W. Kantor at the U. S. Naval Electronics Laboratory repeated the experiments again with even better instrumentation. And again, Kantor confirmed the apparent fact that the speed of light is *not* independent of the motion of the observer.

This doesn't sound reasonable, does it? After all, the public is told that science is based upon the free exchange of ideas and open publication. As recently as 1965, a colleague of mine was told by the editors of the *Physical Review* and *Physical Review Letters* that they would not publish any material that offered any contradiction to Einstein's work. In 1977, another colleague of mine was told by a world-renowned relativistic physicist and director of one of the greatest research laboratories in the world that he hoped some recent work in which I had been involved would never be published at all!

If controversial information cannot be reported and published in established scientific journals, it can and must be published elsewhere instead until the current Brahmins in charge of Protecting the Faith are retired or replaced by those with more open minds and less pretentious prestige to protect . . . One knows how Gallileo must have felt.

Regardless of the fact that some of it is dogma, we do possess an exceptionally accurate and rational explanation of electromagnetic phenomena today

that meets the criterion stated by Lancelot Hogben, "A scientific explanation is one that is vindicated by practice." Radio transmitters transmit, and radio receivers receive. Lasers lase. Nuclear reactors react. Semi-conductors occasionally conduct. Tunnel diodes, LED's, SQUIDS, and other electromagnetic devices based on quantum mechanics do their thing repeatedly and reliably. So we're obviously doing *something* right! And we don't dare throw away the theoretical base on which these gadgets work for the simple reason that the gadgets do indeed work. We can and should modify the theoretical base as necessary, but we can't throw it away. Any new theories of the universe must be compatible with the old ones or at least permit logical and rational modifications in order to shoe-horn the old theories into the new ones.

But we do not yet have a really good explanation or theory concerning gravity, or we wouldn't be using rocket reaction propulsion to get off this planet.

Yes, I know about the "quantitative confirmation of the existence of gravitational radiation at the level predicted by general relativity" announced recently by Taylor, Fowler and McCulloch as a result of their measurements of the only radio pulsar known to be a binary: PSR1913+16. But, even as they announced, their data is being seriously questioned. According to critics, the formula used is an approximation and the mathematical complexities of the theory leave considerable doubt as to the accuracy of the calculations.

And this is basically the state of relativistic gravitational research today. It is in a morass of conflicting hypotheses, theories, data, and concepts. There is no clear line of progress. It lacks the "elegant simplicity" that is the hallmark of all great basic breakthroughs in our knowledge of the universe.

We *know* that a gravitational field is very strong and very persistent because we live in a gravitational field strong enough to accelerate any mass at a rate

of 980.6 centimeters per second per second on the Earth's surface at sea level and 45-degrees latitude. It requires an extremely strong magnetic field to counteract the Earth's gravitational field on the Earth's surface. If gravitational information is being propagated through space from body to body by gravitational radiation and a gravitational field, it is strange that gravitational radiation should be so weak as to be nearly undetectable. Are the gravitational relativists looking at the wrong parameter? They appear to be seeing *something*, but is that "something" really what they believe it to be?

At this point, the engineers who are reading this are probably nodding their heads in partial agreement and wondering where this is going to lead . . . while the physicists are probably tearing their hair out (if they haven't already quit reading this heresy because I suggested that there might be another way of looking at things and dared to question their increasingly messy relativistic view of the Universe). I know that I may have glossed-over, dashed by, or apparently forgotten certain Elements of Truth and other principles of modern physics for which there is a "reasonable explanation," if only between physicists. Perhaps I am being hasty in my assessments or in the way I have charged ahead.

"There is nothing particularly scientific about excessive caution," Hogben tells us. "Science thrives on daring generalizations."

Very well, let us generalize a little bit. Physicists, nobody told you it was not perfectly all right to speculate on your own time in private, so why not continue and perhaps enjoy playing "let's suppose." Your colleagues won't find out!

Let's start by conducting a short review leading to some postulates:

A charged particle (+ or -) at rest possesses an electric field. If a charged particle is set in motion, it

creates a magnetic field as both Biot and Savart pointed out early in the 19th Century. If the charged particle is accelerated, Maxwell found that it radiated at some frequency in the electromagnetic spectrum with a propagation velocity of the speed of light.

In his General Field Equations, Einstein theorized on the direct analogy of this, postulating that a gravitational "charge" (i.e., a mass) would produce a gravitational field analogous to a magnetic field when in motion. By direct analogy to the Maxwell equations, a gravitational charge should then produce gravitational radiation when it is accelerated. However, the predicted strength of this type of gravitational radiation would be very small . . . as searchers have discovered. If this is true, any spinning gravitational charge should radiate gravitationally, and there should be little problem detecting such radiation in a Hertzian experiment. Gyros have peculiar modes of operation, but no scientist seems to have bothered to check a gyro for gravitational radiation . . . even when a gyro can be built to spin fast enough so that the acceleration of the mass particles making it up overcomes the intermolecular forces holding it together. As a matter of fact, what is the nature of the force that holds the gyro locked in a space inertial reference? All of the second derivative Newtonian forces (the forces proportional to acceleration, or $F=ma$, or $F=m \, d^2x/dt^2$) are accounted for because the gravitational charges in the gyro wheel are undergoing a constant angular acceleration. (Yes, I know that I wrote the equation for the linear case, but it is illustrative only.)

Sweeping generalization: There is a Newtonian-like force that is proportional to rate-of-change of acceleration, a third derivative force. Newton could not have seen it in his astronomical data from which he derived his Laws of Motion; the rate of change of

acceleration of astronomical bodies is very small, at least those bodies that Newton could observe. Is there such a third-derivative force proportional to *surge*, and is that what can be felt with your own hand when you attempt to precess even a toy gyroscope?

Another sweeping generalization: Q.E.D., perhaps the phenomena connected with chargeless mass particles or "gravitational charges" exists one derivative step up from its analogous phenomena in the charged domain?

An isolated gravitational charge at rest therefore possesses no mass. Why not? Because to measure mass, you must accelerate it. However, a gravitational charge in motion does possess a gravitational field analogous to the electric field of an electrically-charged particle. Accelerate the gravitational charge, and it creates an *inertial field* analogous to the magnetic field of an electrically-charged particle.

This is the field that locks a spinning gyro into an inertial frame of reference. It is as though the fundamental "charge" in this case were momentum.

The accelerating gravitational charge now possesses both a gravitational field and an inertial field with analogies one derivative step down in the electromagnetic domain.

Applying the gravitational analogy of the Maxwell equations, a gravitational charge should then radiate in the gravito-inertial spectrum (GI) when subjected to a rate-of-change of acceleration (*surge*).

This is *not* the gravitational radiation predicted by the General Field Equations. It is not simply a consequence of a gravitational field. It requires the presence of a new field, the inertial field, which we have known about, measured, and experienced for a long time, but which we have not synthesized into any outlook on the Universe. This new gravito-inertial (GI) radiation, if it does indeed exist, will have quite different qualities than EM radiation. First of all, the

field equations that have been derived thus far indicate that GI radiation will be "monopole" in nature as opposed to the dipole nature of EM radiation. Thus, GI radiation would not be continuous but would be quantum-like in nature, each period of changing acceleration producing a quantum of GI radiation.

This brings us to another hypothesis, one that is difficult to argue against: It is not possible to change the energy of a given system in zero time. It requires a finite period of time between the application of energy and the acceptance of that energy by the system as a whole.

Working through the Hamiltonian and Lagrangian energy balance equations, when energy is introduced into a system faster than the system as a whole can accept it, three forms of energy become apparent: (a) observed energy which caused an observable change in the system, (b) virtual energy which is "stored" by the system and gradually converts to observed energy, and (c) radiant energy which cannot be utilized or stored by the system and must therefore leave the system. In spite of the fact that modern physics has worked itself in such a dither that it now talks about "slightly broken laws of energy conservation," energy appears to be conserved just as money is conserved by a bank. You can "slightly" overdraw the account for a short period of time, but sooner or later the bank's computer will catch up to you. (As a matter of fact, another consequence of what we are talking about is the fact that you can do anything you want to do and get away with it *provided* you do it in less time than the system can respond and that you either leave the system or change the system shortly thereafter.)

Therefore, monopolar GI radiation's quantum will be equal to the change in virtual energy of the system. Nobody has proved this wild hypothesis yet because

nobody has detected GI radiation or performed the "Hertzian" experiment for GI radiation. If it is indeed real, there's a Nobel prize waiting right there.

We will now perform a relativistic experiment. We accelerate a charged particle. In order to weigh it and determine its mass, we accelerate it in a magnetic field or observe the effect of one or more collisions involving transfer of momentum. A charged particle therefore has energy stored in both its magnetic field and its inertial field because the electric and gravitational fields are constant properties of the charged particle. As the velocity of the charged particle nears the speed of light (Mike One, named after Albert A. Michelson), it will attempt to dispose of some of its energy by radiating it in the EM spectrum. But as the velocity approaches Mike One, energy cannot escape rapidly enough into the EM spectrum; therefore, energy is stored in the inertial field instead.

This, of course, gives rise to the apparent mass increase of the Lorentz equations!

We will now perform the same experiment with an uncharged gravitational particle. It cannot radiate in the EM spectrum because it has no charge. Its mass can be determined only by momentum transfer during impact, which also involves a very high rate-of-change of acceleration. If you do not know that there is a force proportional to surge, it's going to appear that the gravitational particle at or near Mike One has exceedingly large mass. However, as the gravitational particle approaches Mike One, it will experience an apparent mass increase due to storage of energy in its inertial field.

The fact that the relativistic mass increase has been observed and well-documented leads to the conclusion that the speed of GI radiation must exceed that of EM radiation by a substantial amount. Otherwise, energy would be radiated from the inertial field, resulting in a decrease in apparent mass. This leads to

the obvious conclusion that only a *charged particle* is limited by the speed of light. An uncharged gravitational particle will have a limiting velocity determined by the yet-to-be-determined velocity of propagation of GI radiation.

How much? Because nobody has yet performed the Hertizian experiment or the Michelson speed of light experiment for GI radiation, we can perhaps get some handle on this by looking at the Universe around us.

Small systems up to and including the Solar System appear to be relatively stable. The next level of large systems is the binary star system where Star A "knows" where Star B was at a finite period of time in the past. But Star A can never know exactly where Star B is at any given moment. If the gravitational "image" of Star B were the same as the electromagnetic "image" of Star B as seen from Star A, most binary systems would be totally unstable. They would tend to exhibit hyperbolic behavior in a short (observable) period of time. We should have seen this happen, but we haven't. Therefore, we must conclude that the speed of GI radiation must be greater than the speed of EM radiation.

Go up another step in systems size. The "critical action time" of the galaxy is obviously very large, even in terms of EM radiation that takes a mere 60,000 years to cross the disc. Thus, insofar as the galaxy knows, it requires at least 120,000 years before one edge knows what the other edge is doing and can respond to it in terms of a "message" at the speed of EM radiation. During this time, the Sun—which is only about halfway out on the disc—has moved 110 light years. It is quite obvious that the galaxy would be quite hyperbolic if its critical action time were 120,000 years. It's not, or it does not appear to be. We've only observed it for about half a century, which is considerably less than its critical action time. But it does appear to be very dynamic.

The Universe, on the other hand, behaves as one would expect any extremely large system to behave where the critical action time is exceedingly large and in which any event always takes place in less time than the system can react as a whole. The main characteristic of such systems is their dynamically hyperbolic nature . . . and that's exactly the way the Universe appears to be acting! Once started, it should go hyperbolic, and it apparently has.

In 1961, Davis, Korff and Victory made an estimate of the velocity of GI radiation based on the facts that systems up to the size of binary star systems appear to be stable, systems the size of the galaxy have questionable stability because we have not been observing long enough, and the system of the Universe is demonstrably unstable and hyperbolic. This rough estimate with a very large potential margin of error resulted in the speed of GI radiation being somewhere in the range of $30,000 \times c$ (that's Warp Factor 2080 for *Star Trek* experts).

If this is right, one should be able to achieve FTL star ship speeds of 10,000 to 15,000 Mikes before running into any relativistic effects from GI radiation. This would allow you to go across the galaxy in a couple of years.

Very well, suppose this is correct and that it is indeed possible to go FTL with a star ship. What happens to all of the forecast relativistic effects such as mass increase (we've talked a bit about this one), time dialation, energy requirements, shortening of everything until it becomes a single EM wave front, etc. I don't know. But permit me to point out that all of relativistic phenomena that have been corroborated to date have involved the use of various charged nuclear and subnuclear particles where measurements were made under conditions of extremely high rate-of-change of acceleration. Particle physicists have had to go to extreme lengths to account for all

the energy and have therefore invoked strange and wonderful new charged particles possessing strange and wonderful characteristics such as "charm" and "flavor" and even, yes, "strangeness." One is reminded of the Medieval King of Spain who remarked, after listening to a lecture on the structure of the Universe from his Court Astrologer—there being no astronomers in those days—"If I were God, I would have made it simpler."

Well, is the hypothetical Four Field Universe consisting of electric, magnetic, gravitic, and inertial fields a simpler approximation to reality? First of all, is it real? Our basic hypothesis concerning the ability of a system to accept energy in a finite time period leads logically to the concept of a third derivative force, the surge, which leads to the concept of the inertial field, which leads in turn to the concept of gravito-inertial radiation (not just plain gravitational radiation) which in turn leads to the conclusion that the velocity of GI radiation is better than four orders of magnitude greater than EM radiation which leads to the conclusion that a Four Field Universe will behave quite differently than a Three Field Universe. However, in the hypothetical Four Field Universe, Newtonian physics, relativistic physics, and quantum mechanics are alive and well. We think. We need to find out.

What experiment or experiments can be designed to test these wild hypotheses and to either prove or disprove them? Let's don't talk about it; let us ask the Universe whether or not we are right. And let us not invoke the ghosts of experiments already done which prove it wrong . . . because those experiments may have been asking quite a different question *or* the results may be slightly biased by a different outlook on the Universe.

What experiment can be conducted to prove or disprove the existence of the hypothesized GI radia-

tion? We also need a Hertzian experiment with GI radiation. Don't talk about it; try it.

Lastly, who will take the Copernican Risk of defying the Keepers of the Faith, especially in this Year of Einstein? Who will dare to try, even though he/she may be wrong?

Who will dare to challenge those who would deny mankind the stars?

The results, if positive, will not topple the relativistic physicists any more than the relativists toppled the Newtonian physicists . . . because Newtonian physics still works very well for solving the engineering problems of the world.

The results, if positive, will show that Newton, Maxwell, Lorentz, Fitzgerald, Michelson, Einstein, Planck, Dirac, Schroedinger, Hertz, Heisenberg, and all the others really were not wrong but that they were all seeing the same thing from a slightly different point of view. Their work will be seen to be a "special case" of the new general theory. The only people who would get hurt would be those who dogmatically oppose it.

And, if the results prove that this is all a grand speculation wherein the mathematics led us down the garden path to the logical consequence of the incorrect initial assumptions, so be it. We should not permit any approximation of reality to deny us the Universe, and we should then go on and look for another way to allow us the stars. Only children will sit and whine, "I want it! I want it!" when they have been told they cannot have it. Adults will figure out a way to solve the problem and get it. And, by this time, both the human race and its scientists should have reached that stage of maturity.

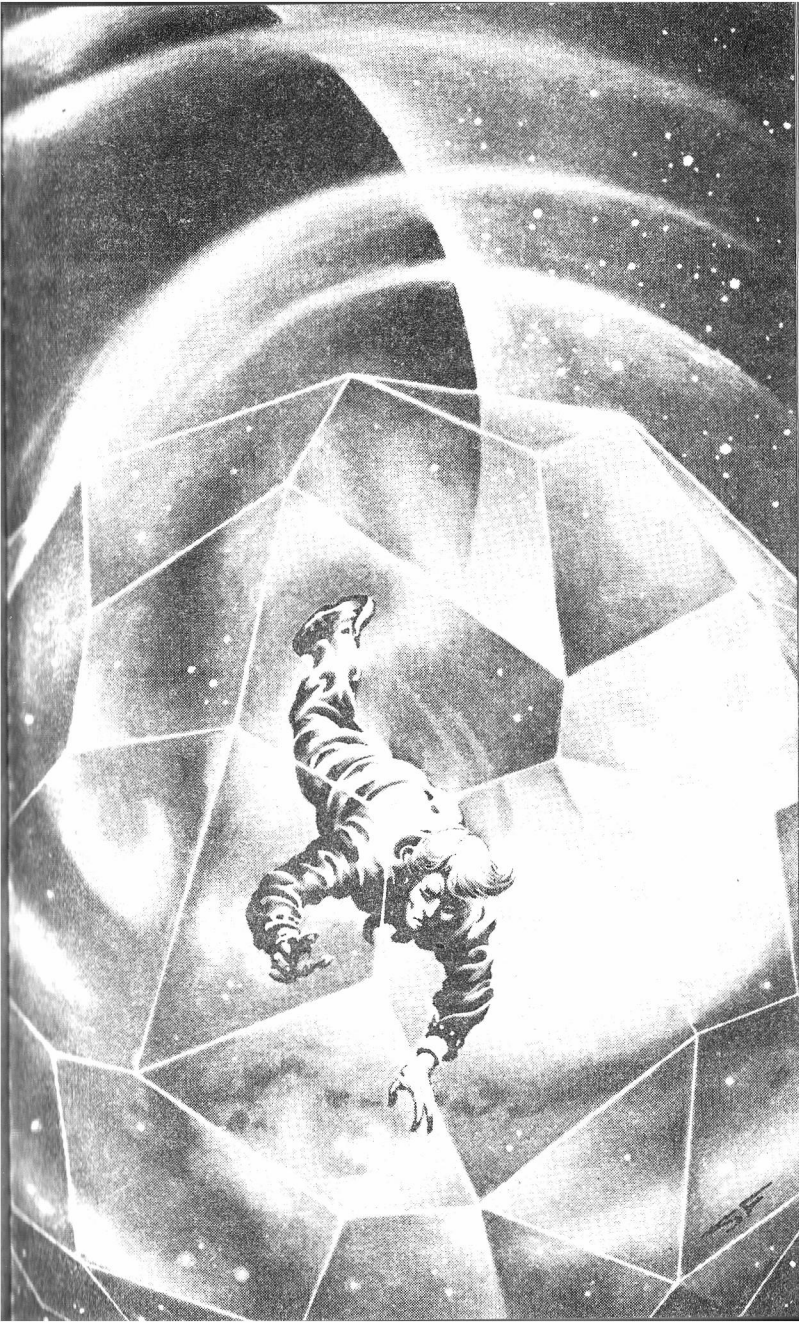
One way or another, people will figure out a way to reach the stars.

—G. Harry Stine



INSIGHT

by
Ian Watson



One small step for Sammy . . .

"Don't be alarmed," says the voice. "You're safe. You're travelling through time. Don't be alarmed." Where does the voice come from?

Whirling through rings of rainbow light speeds the thing that trapped me. It is a hollow crystal the size of a small garden greenhouse: a polyhedron with forty or fifty faces that dapple me with coloured light. I am a fly trapped in amber. There's no gravity in here, nothing to hold on to. I rotate amniotically. I shut my eyes, feeling sea-sick, space-sick, every way sick. I ball up tight. A light formed around me as I walked along the road. It hardened; I was whirled away . . .

"Where am I? What are you?"

"You're safe. The journey will not last long." It's only an answering service, after all. A verbal tranquilliser. It doesn't really respond to me.

Travelling through time . . . It's a concept I can come to terms with. Indeed I imprint on it as rapidly as a newly-hatched chick imprints on the mother hen. Relax, Sammy Fisher. You've been fished . . . out of your time. Yes, out of it, from outside. Surely nowhere in 1985 was there any hint of time travel. Besides, what would I have had to do with it, if there was?

I run a computer dating service. I'm thirty, single, a bit of a philanderer. Jacky is my girl friend of the moment. (Out of, on average, some ten thousand female entries I programme my own pick; and now I've been picked up, it seems.)

The rainbows flash by. The voice placates me.

Crash. A place, a large room, walls. Gravity again. I hit the deck. The floor's softly padded at this point. It's no worse than taking a tumble on the judo mat.

And the crystal is gone. One of the walls of the room is all glass; and people stare through the glass—four people dressed in red and yellow cloaks that reach right down to the ground, hiding any shoes they wear. One woman, three men, their hair billowing down in shoulder-length tresses, men and women alike. (How does one tell a woman's or a man's face at a glance? It must be instinctive, genetic knowledge. Do giraffes automatically know a female giraffe's face? Does a dog instantly recognize a bitch? I wonder.) Where I have fallen is a padded oval, but the rest of the floor seems harder. Facilities are tucked away around three walls: toilet, shower stall, a food dispenser? Beyond the four watchers, a couple of cloaked figures with their backs to me stand tending equipment in a larger hall.

Roll over, Sammy, scramble up. Confront the future (which this must be). I'm isolated, sealed off from them. To keep cold germs at bay from an antiseptic world? There seems to be no door or airlock or way out.

The woman smiles. That is, her muscles distort her mouth and cheeks. There's something queer about the smile, more enigmatic than any Mona Lisa. How beautiful they all are; such perfect people. They should show their bodies; they should go naked. What figures they must have.

"Welcome to you." The woman has yellow-blond hair. Her palms part beyond the glass as though to surrender to me. No, it's a gesture I don't understand. Though her lips move, the voice comes from above, through hidden microphones.

"Where is this? *When* is it? Why did you bring me?"

"This is the year three thousand, forty-fifteen."

"Wait. Is that 4015 or 3000?"

Her brow creases. Is that a frown of the future?

The man with flowing brown hair says, "Forty-fifteen is forty and fifteen."

Ah, so they count in twenties, not tens. It is the year 3055. I guess they mean A.D.

"Is this some experiment? Is it research into the past?"

"We congratulate you on your composure," smiles the woman. (Smiles?) "My name is Jen Ashya. This building is the Time Center." What else? Composure, eh? I'm imprinting furiously. Chickens can even imprint on old boots if that's the first thing they see. Thereafter Mother is a boot.

"Can you send me back again afterwards?"

"Wait. Please tell us about yourself. When we know what you are, we can explain better." (What I am? Not who?)

What, come to think of it, did I ever really imprint on in the old world? After my Mother died giving birth to me there were many nurses; and since I've grown up it's been a case of easy come, easy go. I even programme the arrivals and departures from my life, fixing up spent girl friends with their perfect match—a form of free-love alimony highly convenient to me. If I imprint readily, I unimprint quite as readily . . . The boot becomes an old boot once again.

For a while, the more knowledgable future becomes my parent, teaching me . . .

I don't go out into the world of 3055. I may not see it, only these cloaked, perfect humans. My reception room is self-sufficient in all things, and they can't crack it open as long as I'm here. I'm an anomalous temporal mass, a fingertip poking into yet not through the balloon skin of their own time. Were I to poke right through there would be an almighty explosion. I would lose my link with my own time (besides being blown to pieces). So here I stay and learn (a little) and tell them about myself (a lot).

The world has come a long way in a thousand years (or is it really such a long way, I wonder?). We've

colonised the Moon and Mars and the asteroids and the outer moons. We have fusion power and solar collectors hanging in space. We have longevity and physical excellence. Languages have converged and become mere dialects of a computer-designed universal panglossa. Robot probes have left for the stars and returned again; soon we shall be going there ourselves, if we choose. This choice, though they don't say as much openly, seems somehow bound up with this experimental snatching of myself from the deep past . . .

For the third morning in succession I rise from my oval bed-patch, take a shower, get dressed, fix breakfast (something synthetic tasting like omelette, and a hot drink like a cross between leek soup and lemonade). Now it's time for the morning shift with lovely, strange-toned Jen Ashya, of the odd facial language. Her on that side, me on this one.

They haven't thought to provide chairs in here, so I sit cross-legged on the floor. She remains standing, as do the three observers. (And the two technicians, at their instruments.) From my place on the floor I look up to her, in more than one sense.

"Good morning, Sammy. Are you ready to begin?"

"Raring to go. Why don't you sit down, Jen?"

"We like to stand. Does it discomfort you?"

"Me sitting down? Or you lot standing over me?" (I see deeper into your questions now. They're all aimed at one thing: What Makes Sammy Run? I feel pleasantly self-important. But then, I always have. So many mother hens, so many nursemaids, so many hand-maidens and body-maidens—provided by the computer.)

"Do you feel that mine is a superior position?"

"I can stand it." I chuckle at my joke. (You aren't really my parents; you're my distant children—children whom I haven't yet sired. Perhaps I would resent the competition?)

"Do you feel frustrated at being confined in there?"

"What, in a room with a view—upon the future? On such a lovely future as you, Jen?" (The old charm, the old talent.)

"Aren't you annoyed that you can never step outside?"

"Sure, that would be a nice bonus. But, well, the things you've told me! Mars colonies, star probes. The future actually works! That's plenty for me. I'd be greedy to want more."

She considers. "What if we'd told you, instead, that the human race is as confined as you are? Confined to its immediate environment, even confined in its faculty of vision? If it only sees through one single window, instead of an all round view? If this wall—" She gestures. The wall suddenly opaqueness and I'm staring foolishly into a blank wall as though pretending I have X-ray eyes. "—was untransparent," her voice continues from above, "how would you feel? Would you feel a sense of claustrophobia?"

Experimental psychology time! I consider this rationally, since this is no Edgar Allen Poe dungeon, and the walls aren't going to creep in towards me. "I'd feel . . . much less trust in what you've told me, Jen." (Add her name, to maintain the bond.)

Before I can grow apprehensive, the wall trans-luces once again.

"So seeing is believing," she quasi-smiles. "But what if you could not see? Would you take on trust?"

"People believed in God for long enough."

"No longer, though?"

"I don't believe. Many people still do, in my time. How about now?"

"The universe doesn't reveal its totality, Sammy, so there must always be belief in something beyond what is known, *or can be known*. At each stage there must remain something beyond any possible knowledge, which you might call 'God'."

"He'll be a diminishing God, then! The more you know, the less room there is for him."

"On the contrary, Sammy, an expanding God. For each stage of knowledge reveals more mystery, not less. So far as we know. When you encounter a mode of knowledge that knows more than you can possibly know, that stage could easily be God to you. How would you tell the difference? The future is like God, Sammy—it's something alien, something to take on trust. At this moment your knowledge is limited to a little room with one window, on a larger room, and beyond . . . who knows? *We* see through the window to outside. You can't, though."

"This is getting kind of metaphysical, Jen."

"We can't let you out to look," she hints.

A moment of inspiration: "Ah, but can I let myself out?"

She muses. "Would it explode our world—or yours?"

Yes, there's a deeper undertow to all her remarks today. I grin. "I'll tell you an old joke. A balloon has two sides to it. So what are they? An inside and an outside! Ha, ha."

"Topologically this is correct," interrupts the brown-haired man, called Lek Sander. "Perhaps this is consoling to those inside the balloon, but who would notice the implosion of a balloon in a huge room?"

Increasingly I get the impression that I'm supposed to find some way out of this reception room I'm sealed up in, by my own ingenuity . . . Hints are dropped. And, yes, I get the impression that whether humans shall choose to go to the alien stars somehow hangs upon my finding a way out!

Something is seriously wrong here. My presence here isn't merely an interview with somebody from the past, to fill these people in on the folkways of the twentieth century. It's . . . a test. These future hu-

mans are testing their own past, to see whether they are worthy. Giving me an I.Q. test, only it isn't I.Q. they're testing, it's my level of understanding. U.Q.: an Understanding Quotient. A.Q.: an Awareness Quotient. If I continue to imprint on them as my only source of knowledge, I can't *see* this. I'm still in the eggshell. Ah, but where is the beak tooth or whatever, that all chicks are provided with to crack their shell? If indeed the shell is this room . . .

There's something false about you, lovely Jen, handsome Lek. I shall take this in my stride. I shall get out. And if I blow the lab to Kingdom Come? Surely it's foolproof. Unless, perhaps . . . I cease to be a fool.

The strange interview stops in the evening (by my watch, which I keep well wound up, believe me). Two technicians are still standing out there, but they pay no attention to me unless it's by way of their instruments. Standing! We used to fancy that the human race might lose the use of their legs some day—but hardly that they would forget how to sit down. Do these people have anti-gravity implants? Or cyborg bodies underneath their cloaks?

(People? A doubt begins to fester.)

I do look for the way out—in the shower cabinet, behind the food machine, down the latrine. No, no and no.

Lying on the bed pad, staring up at the ceiling, it occurs to me with stupendous banality that I'm only looking at what I can already see. Ceiling, see . . . 'See' is a roof on vision; beyond may be the stars . . .

The way out is where I cannot see it. But where's that? When is a door not a door? When it's a-jar .

'Morning' comes.

Jen and Lek and other two come, too. I regard them through the glass. Steadily. And I accuse them. "You

aren't human, are you? That isn't a question, it's a statement. Elapsed time to work it out: a hundred and some hours. Is that too long for you? Well, that's how long it took. My imprinting has worn off. Don't say anything, Jen. No need. I don't believe a word you said about the future. You're aliens."

A little voice whispers, don't make a fool of yourself. Shut up, little voice. I shall unfool myself.

The way out? The window itself is a possibility, but that's rather too obvious. I must think at right angles to the obvious. I orient myself, instead, at the angle between the window and the blank wall. (The little voice taunts me, Dunce, get thee into a corner. Shut up.) And I shut my eyes. I walk ahead. "I'm coming out," I call; no one says anything.

Ahead. Surely I must be there by now? (Don't think about it. Do it.) Ahead. (Surely by now.)

Crash. I hit something.

Utter chagrin.

But no, my God I've collided with the far wall *outside*. I *am* outside. The aliens are all watching, all in the same room with me. They smell musty, or is it the room itself?

Suddenly Jen laughs. (An approximation of a laugh.) "You walked all the way out, Sammy. And you just kept on going!" She comes to me.

I reach out to touch her hair, as I have reached out to many fair heads. Instead of a caress, I tug it roughly. The hair all comes away in one piece. Her skull is quite bald. It has a deep seam in it. I press my fingers into the seam and pull. Her face peels off: her eyes, nose, lips. Her head unravels: layer within layer of an onion till there's nothing left there at all, only a long tapeworm of some plastic-rubbery flesh stuff trailing along the floor. She had no head at all, only a long flaring cloak, and this will neither pull open nor pull up off the ground. Inside the neck of the cloak is blackness.

Intrigued, exhilarated, I unwind the heads of all the others. They accept this impassively, in silence; and afterwards of course there is utter silence, for I have unpeeled the mouths that spoke to me. Six cloaks stand facing me. (Can one say 'facing me,' of the faceless?)

Now they flow towards the outer door; and I go with them. That door opens, then another. Blackness is outside. Not space, with stars and worlds. Not night. Simply blackness.

One by one they glide into that blackness where nothing can be seen, each disappearing abruptly.

"Wait! Hang on!"

But they don't hear me; I've unpeeled their ears.

"Stop!" I hang on to the last cloak—is it Jen's? I no longer know. The cloak flows through my fingers effortlessly. And goes, becomes one with the darkness. And I'm left alone in this larger room, which contains my smaller reception room within it.

I should have asked. I shouldn't have unpeeled them all. I was intoxicated. Then nothing could see or hear or speak to me any more . . . Fool! The flesh stuff lies on the floor, unrotting, and I try to reform a head, salvage a mouth, an ear, but no.

With eyes closed, I pass through into my old room and lie down on my bed pad to await the polyhedron of light, the crystal thing that whirled me here. I wait a long long time.

It does not come.

Because no one operates the controls now? Is that it? I pass back and try to understand them. I activate them at random, hurrying back to the oval pad in case my presence will trigger something. I do this many times. Nothing happens, though food and drink, air and toilet are still available.

Yes, I have met the alien, which is God to me. I have known it for what it is, sufficiently to render it un-



knowable. I only know what it is, no more.

Whole days pass. The door on darkness, beyond this room beyond a room, stands open still. There's no one to close it. Except me. If I close it, will the machinery work? Will the crystal come? Or will I be imprisoned forever?

Should I follow them through it? If I unpeeled my own eyes, lips and ears, would I see what is beyond?

And what hangs on my choice? Does it decide whether humanity shall go to the stars, whether people shall meet the alien and know it? Or whether we shall stay in our little room of a world?

Finally, for the tenth time or the fiftieth, I go right up to that open door, if it is indeed a door in any normal sense. This time, yes. Though there is only blackness beyond, I close my eyes. One little step for Sammy. Unknowing, I take that step.

—Ian Watson

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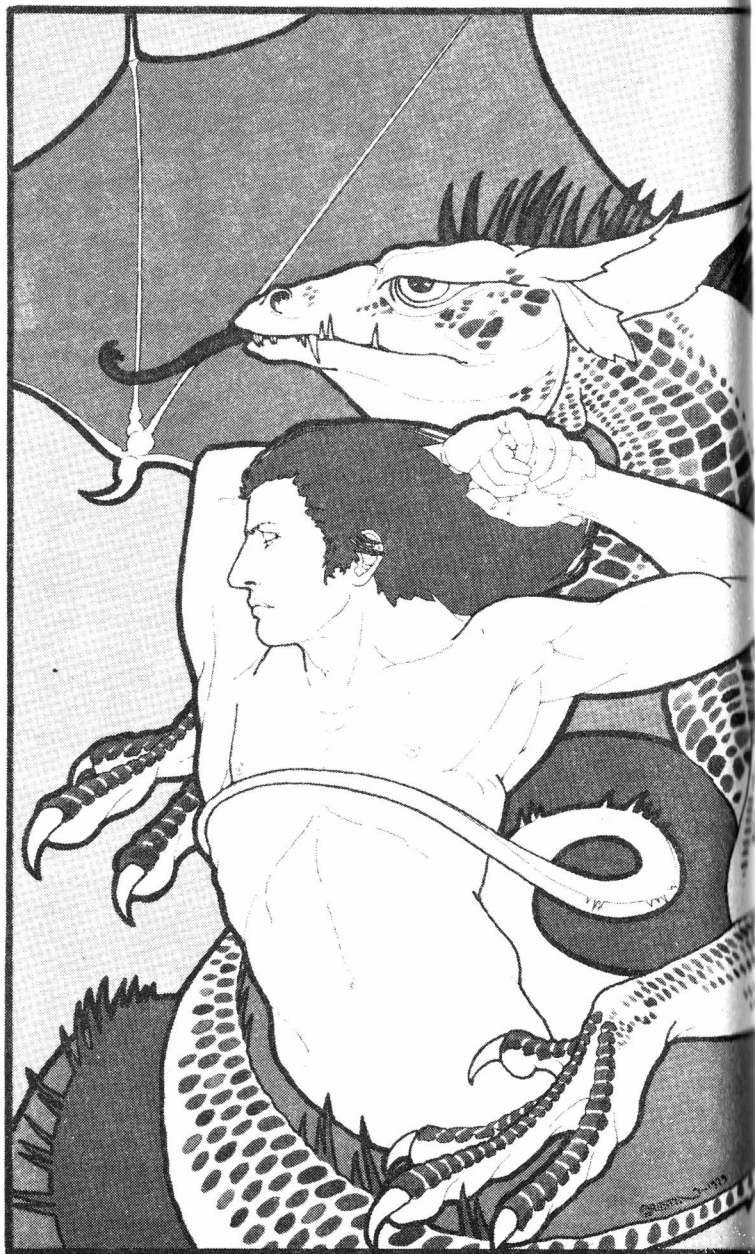
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A Dragon in the Man

by Kevin Christensen



His own worst enemy? Perhaps. More than friend, certainly.

I am dragon.

The blade penetrates the chamber in my breast. I writhe and roar as if I am to die.

The lenses of the man-shaped mailed figure record the participant visual for branch F, track sixteen.

Off to the right, other cameras record the full scene for those who will be waiting in line for a turn on the Dragon's Cavern darkride.

"All right, that's good," Cassandra called. "Sechin, park that thing and take a break." She stood at a safe distance, and I felt her straining to be polite. And well she should. Last time she berated me for a performance, I ate her.

I got up, plucked the sword from my breast and handed it to the mailed telefactor. Then I flew the short distance to the stocks beside the set, poked my head and limbs into the holes, and flicked at the lock with my tail. Then I shifted my awareness to the day's wardrobe.

I brought Danseur today. Cassandra wore her

Hitchcock. There is really no point. She wears them all the same. Once she managed to make my dragon look like a man in a funny suit. How she raged when I ate her. Not only did she neglect to shift out until she had passed out from the pain, but the Wertmuller was her favorite.

I sat a moment to adjust to the new perspectives, and lack of tail and wings. I also checked silently for any signs of tampering. Cassandra is an imaginative sort, and is likely to seek some further revenge. The fine I had to pay was worth it though. She still looks small to me, even from this perspective.

The break in filming looked to be a general one. The technical crews, production people, and directors sorted themselves into cliques for brews and smoke. Tanya moved the telefactor to the starting point, and shut it down. I saw someone helping her from the exoskel tactile transceiver assembly she uses to control the telefactor's motions. The cavern set is designed to restrict a rube's motions, and simplify the recording process to a manageable level. The final effect of matching the rube's course and actions to the dragon responses is nigh undistinguishable from participant reality.

Tanya always takes the time for a token conversation. She moved gracefully in the low-g at the production level of the habitat, considering the adjustment she must make after being encased in a one-g simulation. I can't shake the impression that her motivation is totally professional. After asking my impression of her moves, she inquired after chances of seeing me at the party this evening. Though I made no firm answer, she said she'd pick me up.

Cassandra called for everyone to get back to work. I sat Danseur comfortably and shifted back to the dragon. In a ride like this one, there are certain points in each encounter that will result in branchings. Between crucial points it makes little difference what a

rube does; he is given visual and tactile feedback according to his own moves. At a branching, we act out various possible consequences.

The mailed figure stumbles over a stalactite and I grip the writhing figure in my jaws.

Tanya had never come to my house before. I discovered that she has a habit of entering without knocking. I was wearing Zulu.

"Sechin?"

I nodded.

"Are you ready?"

"I'm deciding who to wear." I gestured to the booths which nourished my wardrobe.

"How many do you have?"

"Only these six." I gestured to the five opaque doors, and Zulu's opened booth. The blank-brained bodies were fed and exercised when not in use, as was my real self.

"Which is the real you?" She had seen Danseur, Zulu, Abdul, and blandman. But neither Aphrodite, nor myself. I was reluctant to show her Aphrodite, not sure why I had purchased her. So I stepped into Zulu's booth, shifted to myself, and stepped out.

Tanya drew her hand quickly to her mouth, then relaxed and tried to smile. "This must be why you are the best."

I turned around completely for her. Then I dropped to all fours, flicked out my long tongue, swished my tail, then rose from the floor with a beat of my leathery wings.

I am human, but genetically altered and given cyborg capacity to transmit my awareness. My neck is thirty centimeters long and very flexible. My arms and legs are articulated so I can walk on all fours as easily as upright. A dragonman.

After hovering briefly, I dropped to the floor and did my human impression.

"My parents were showbiz people. They foresaw the market for these attributes."

"You've done well," Tanya said.

"I can imagine them discussing it. How to insure Sechin's well-being? Well, we could make him a freak."

"Were there many altered people when you grew up?"

"Lots more cyborgs than genetics." I stepped toward the booth. "And not many of them either."

"I may yet go cyborg. If the ride franchises well."

I selected Danseur. We walked down through the sand and cypress around my house, and on to a fliverport. Then we took the flight across the habitat interior, making a Coriolis curve toward the party.

Once at the party, Tanya wandered off to chat with the more talkative types. I drifted among the gathered dancers, diners, gamers, and high-headers. I can usually find a sofa in the fringes. I prefer to think of parties as a trip to a zoo. I detach myself from the tempo and amuse myself with voyeurism. A glitter-boy started to pal up to me. Wearing Danseur turned out to be a mistake. From the corner of my eye, I noticed a man winding his way across the floor with two flaming skewers. The glitter-boy asked me if I really ate Cassandra. I had seen Cassandra here, wearing Merrian C. Cooper. I've often wondered what she really looks like.

I felt a terrible pain in my side. The glitter-boy screamed in a high soprano. I jerked and turned to rise. A skewer hung from my ribs, and flames began licking over my clothing. The man swung the other skewer at my head. I tried to block it, and lost my hand. He struck towards me again, and I shifted home. The last sight I knew from those eyes was his face. Zulu.

I stepped from blandman's booth, panting. I flicked

on the light, and stepped over to check. Zulu's booth was empty. I heard a tone from the visiterminal. It was Tanya calling from the party to see if I was okay.

I asked what had happened to Danseur and Zulu. She said Danseur was a horrid mess, cut and burned. Zulu collapsed after carving me. She said that Sepol had been contacted. I told her Zulu was mine and I was coming back for him. I stepped back into the booth and shifted into Zulu.

As I rose the glitter-boy started screaming again. Someone soon quieted him. Tanya approached me hesitantly. Next to her Cassandra gave a ghostly smile.

"It is I, Sechin Hanna."

Someone had put a cover over Danseur. I lifted it.

"Please don't," Tanya said. She held back, paled.

"Cassandra, come look," I said. "You've done at least as well as I."

"Don't slander me Sechin."

"Who else shall I accuse? Now that you've had your fun, perhaps you'll tell us how you broke my band."

"I'm not as petty as you like to think," she replied. "As far as I'm concerned the matter is finished. You paid. In cash."

"You had it done." I plucked one of the skewers from the corpse. At that moment, the Sepols walked in. One of them scowled at me. "You worried about fingerprints?" I handed the skewer over.

We were all on a first name basis after the prior incident. I formally accused Cassandra. They were half-inclined to agree, but found no evidence of any tampering with my wardrobe coding. After they finished I varied all the bands, and increased my securing.

Work went well the next day; the hostility was appropriate to the theme. After I parked and fed the dragon I headed straight home, where I found Tanya.

She ran up beside me and asked if I'd gotten any word on who might have intruded on my wardrobe.

"I don't often have visitors."

"Why am I here?" she started laughing. Then she saw my look. Perhaps she also reflected on my viciousness today. "I'm your friend."

"Define friend. I can teach you. Cassandra can pay you."

"Sechin, please."

"Sechin, please," I mocked. She left.

Mirrorshift gathered light from the habitat as I walked home. I live nearly parallel to the set, so there is little inertial change. At times I wished I could as myself, dragonman, fly free in the dark sky. But children might go into weeks of hysterical nightmares, so they forbid me. Perhaps when a few more people have moved to the larger structures. Already much of this habitat is left to grow wild.

My home is a kidney-shaped coral swelling in the cypress and sand forest in this area. A slow motion waterfall flows over the top and into a pool I rarely use.

I parked Abdul and stepped out as blandman. He seems to possess the best sense of taste, so I habitually use him for eating, even if I've no appetite. Across the room, I saw Abdul flashing his white teeth. He had pulled a long dagger from the heraldic set over the hearth.

"Cassandra!" I stepped back. Abdul crouched and moved forward. I looked to the v.t. The screen was shattered. I retreated into the booth as Abdul rushed me. I stepped from behind Abdul as Zulu. He turned, but I got across the room, and pulled the broadsword from the wall.

"Stay bitch." I held the heavy weapon in two hands. "Die again, and leave me alone."

Abdul pushed a chair in front of me, and ran across to dragonman's booth.

“No!” I threw the blade and lunged. The edge ran across Abdul’s back, leaving a red slash, and making him fumble with the door.

I grabbed him and pulled him away as the door opened. “Leave me alone,” I snarled. He jerked his head back violently into my nose, breaking it. I got my leg between his, and tripped him as I fell back. I heard the clatter of the dagger. We rolled and struggled. Then I struggled alone. Abdul had gone limp. I stood and turned.

The heavy broadsword fell in Aphrodite’s grip. The blade crashed through my collar bone, crushed into my ribs. My lungs filled with blood. “I’ll kill you,” I gurgled, and fell.

I came out as dragonman. Aphrodite was pale. She released the sword and fled outside. I skittered across the room on all fours.

She fell under one of the cypress trees near the pond. I flew and hovered over her. She was vegetable. I heard noise inside.

I flew back to the door to see Abdul pulling the sword from Zulu’s chest. I hissed. He looked up and ran through the door on the other side, carrying the stained blade. I flew over the house and above him as he ran. “I’ll give you nightmares,” I hissed.

Abdul fled into a copse of trees. I flitted around it and over it, shouting curses, insults, and threats. I found a stone. Then I flew up and landed atop one of the trees and crept silently down. Abdul held the sword easily in one hand. His back glistened wetly. I tossed the stone. Abdul glided silently towards the sound.

I dropped atop him, clutching the sword hand with my taloned feet and grabbing his throat with my hands. “See it through Cassandra,” I hissed. “You’ll need the practice.” Abdul went limp.

I cursed and released him. I took up the sword and flew up to make my way to her quarters.

A great shadow fell over me. I snaked my neck to see the dragon above me, dropping. I cried out involuntarily, maneuvered and twisted and thrust up at the heart. The sword slid into the chamber.

"No," I whimpered. I flew back. The dragon closed the distance easily and a whoosh of fire scorched over my back. The flesh of my wings withered and tore. I fell to the sand. The dragon hovered over me. I landed in a burnt and scarred heap. The dragon landed beside me. Its shadow loomed over me, its jaws descended, shimmering heat. I screamed. The terrible jaws lifted me, fangs penetrated flesh and crushed bone, and a fire surged up and over into horrible agony on and on and on . . . and I fled into my mind's last chambers and wept in darkness like a womb.

Without knowing in whose tender arms I rested I begged forgiveness and wept. Perhaps hatred is a way of hiding truth. In the horror of pain, the bitterness had fled from my mind, and I learned wonders.

I felt myself as blandman. Sechin Hanna. I was not in soul dragonman. I had known once, but had somehow forgotten. My parents forced cyborging into the dragonman awareness from a very young age.

It had not been Cassandra, nor could it had been. She wore them all the same. I had assumed her hatred, edited out her forgiveness.

I felt the arms to be Aphrodite's, but did not know who she was to weep over me and caress me. "Tanya?" I asked. "Do you hate me so much?"

Before the being within Aphrodite denies this, I know that I am wrong. Still, I want to flee from the truth.

"From within," she says mournfully. "I couldn't live in the dark, so very dark and deepening always. Like a storm seething always."

In its absence, purged by fire and fear, I knew what storm she referred to.

"I'm insane," I whispered.

"Could we expect otherwise?"

"Do you hate me so much?" I asked.

She shook her head. She let me go and stepped to the booth.

"No." I said, understanding some. I rose and walked to see light pouring through from dawn mirrorshift.

"Look," I whispered. "So lovely."

The room remained silent.

I walked over to the booth. When had I purchased this one? She had purchased me.

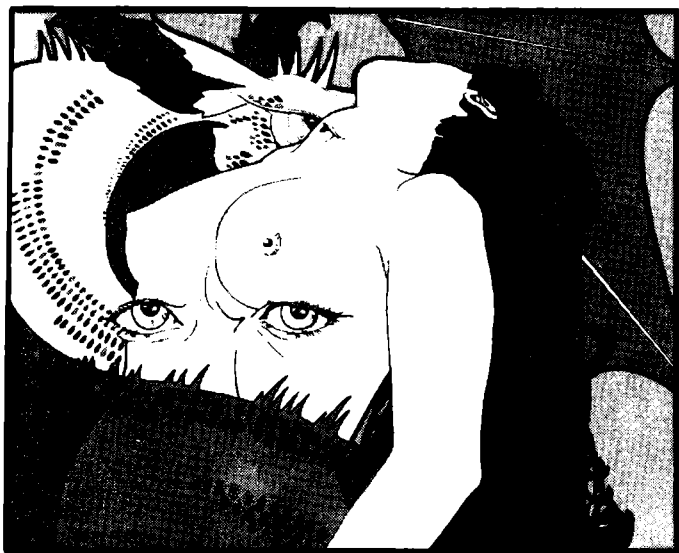
"Stay with me," I whispered. The room was quiet and lonely.

"Please." There was no sound or feeling.

"Stay with me."

Her eyes opened and glistened with the morning.

—Kevin Christensen



(... and then there was One ...)

FORWARD



by Steve Rasnic Tem





"Susa, Memphis, Athens may crumble: but an ever more highly organized awareness of the universe is passed on from hand to hand and increases with each successive stage in clarity and brilliance."

—Pierre Teilhard de Chardin

1

The sun was hot; it rained every day. He discovered that hard stone was better for tearing the hide of the large gray leaper. He dimly remembered a time when the leaper had been a brother to him, when his hands and legs had been closer to his thinking, and he hadn't been so alone. He raised the hard stone, began pounding the meat.

2

Rome's soldier was nearing his spot behind the tree. He hefted the shaft of his spear. When the soldier was only a foot or so away he leapt in front of the startled man, plunging the shaft into his abdomen. He tightened the grip with his hands, and pushed. He was fascinated by the look of the soldier, his face betraying surprise, then a sense of loss shared only between the two of them. He prodded the body with his foot when it fell, got down on his knees and rifled the clothing with trembling hands.

3

He leaped out of the foxhole, suddenly realizing his foolishness, and wanting to dive back in. But the German was on him at once. He barely had time to squeeze off one shot with his cold-numbered finger. The corpse knocked him back into the hole, and lay on him, pressing the side of his face, his hands into the mud.

4

The enemy had broken through into sector seven. He pushed Y-7, R-9, Q-5-20. Red switch. Green switch. Yellow. A haze of dots washed over the blips on the screen. When it passed, most of the blips had disappeared. He clenched and unclenched his wet hands.

5

He opened his hands as wide as possible, stretching thumbs and little fingers painfully. He danced them about the shimmering column of heat in proscribed movements. He watched his middle fingers, dipping them carefully into their proper, invisible positions. The complex rose on plasteel shafts, iridescent ramps, corruscating lines. At the end of the day he collapsed in exhaustion, but the city was done.

6

The man in the multi-layered robe clapped his hands once, twice, then floated two feet off the floor. He waved a hand to his pupils, and one, now three, now a dozen were following him out of the opening in the

middle of the ceiling. The sun was warm that day, so several pulled on their hoods.

7

The complex of circuits was light in his palm. He examined it gingerly. Under the scanner it was a seamless piece, both inside and out. To the untrained eye it appeared to be nothing more than an ordinary stone.

8

He stroked her cheeks lightly with his fingertips, whispering the syllables low, and without hurry. She began to growl, then mewl, then emitted a sharp rasping sound. Her eyelids were fluttering. She was a bird now, wondering what could be holding her down.

9

It is hot today; it has rained every day for months. He slides down the hard edge of rock, landing on two feet, then four points. Looking out on the plain he spies more movements of himself. The grass is low. The plain is almost empty except for distant stone ridges. He yawns and stretches back into dust that also seems himself. He is content to be cat, bovine, grass, and sun. His hands sleep when he sleeps. They grow larger in his dreams, become flatlands, streams, and mountain where animals hide, deeply within themselves.

—Steve Rasnic Tem

