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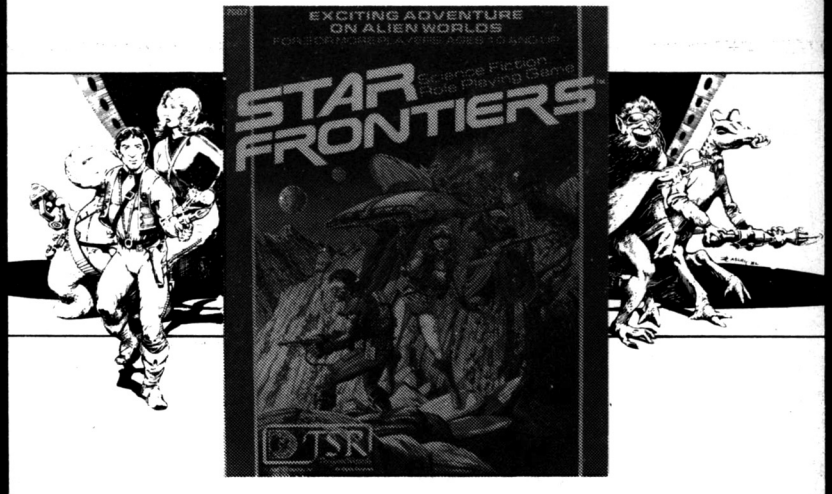

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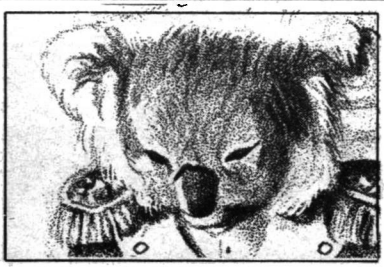

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Guest Editorial

Future Shapes:

The Relation between Science & Technology

Charles Sheffield

Science and technology, technology and science; the words fit together as easily and naturally as bacon and eggs. This is as it should be, for today they cannot exist without each other. The data for every new scientific advance comes from the use of powerful technological tools, and the scientific breakthroughs in their turn are the seeds from which new technology will grow.

To many people, "science" is good and glamorous; "technology" is bad, the source of most of our modern miseries. We hear of atomic weapons, industrial wastes, and air pollution; our minds are filled with fears for the ozone layer, for dying species, for the very existence of Earth's biosphere. And most of the blame is laid at technology's doorstep.

We will be looking here at science

and technology, and at the unique and intricate way that together they have shaped our past and will shape our future. But before we begin, let us make sure that we have the correct perspective on "mere technology."

Image that you had been taken ill, a hundred and fifty years ago. The ailment is one that we now regard as little more than a temporary nuisance—something like a gall bladder infection, or a nasty abscess. The modern approach: antibiotics and painkillers, until you can be taken for surgery; then a brief and painless operation, a few days in the hospital, and back to work.

And a century and a half ago?

Recall: anesthetics came to medicine little more than a century ago. Ether was first used in 1842, and chloroform in 1847; cocaine as a local anesthetic didn't make its appearance until 1884. Lister pioneered the use of antiseptics in surgery a little before that, with his experiments with carbolic acid in 1865. A hundred and fifty years ago there was agony that could not be relieved, infections that ran wild through the hospitals carried by the hands of the doctors themselves. Patients wept and said goodbye to their families when they went for operations. They knew it was a probable death sentence.

To read an account of surgery before anesthesia and antisepsis is to develop a rapid and profound respect for the importance of "mere technology."

Today we take miracles for granted, so much so that, to many U.S. commentators on world events, the 1970s appeared as a "dull decade"—a ten-year period in which little happened, with most of that little tedious or bad. The negative evaluation probably refers more to politics, literature, music, and entertainment than to science; for after all, to many observers science is, by definition, dull—all the time. In any case, science—especially in its *beginnings*—is not news. The publicity, such as it is, is reserved for the technological consequences of basic research. And that publicity is, as often as not, unfavorable.

We live at a time when scientific progress and technological change occur faster than ever before. And yet in a curious way that onrush of events remains invisible to us, as though a perfectly clear stream is running by us. We cannot see the important origins, or separate them from the trivial and the false. Yet although the search for beginnings in science is not an easy task, it is an important and interesting one. We will explore the search process itself. It is not clear *a priori* that anything meaningful can be said.

Were the 1970s a "dull decade"? Will 1982 be remembered as a "dull year"?

Some components of the answer to such questions will not be available to us for a long time. Last year, 1982, may be a "dull year" in the same way as 1564 was a dull year; it was hard to point to significant events at the time, but in that year Galileo and Shakespeare were born. We will not look around us and recognize the infant Archimedes as he lies in his crib sucking his thumb. That perspective of 1982 can come only from the future.

Other lines of inquiry may be more

fruitful. To explore them, let us again look backward through the centuries. Let us survey the scene to see what we can learn a hundred, two hundred, or three hundred years ago.

One hundred years ago: what were the scientific beginnings of 1882?

In 1882 Einstein was three years old. No one could be ashamed that they did not recognize his potential; in any case there were plenty of great scientific achievements for 19th-century scientists to marvel at and applaud. Darwin and Wallace's synthesis of evolution and the theory of natural selection was only two decades old. It was already suffering its first attacks at the hands of Fleeming Jenkin and Lord Kelvin; Jenkin because of well-founded and logical arguments on the dilution of changes occurring in a species; Kelvin because the lack of knowledge of nuclear energies demanded a cooling Earth and a short lifetime for the Sun. Darwin was unable to rebut either criticism.

By 1882 Maxwell had published the great treatise on electricity and magnetism that would revolutionize physics. He died an early death in 1879 at the age of 47, before he could see the profound practical results of his work. The discovery of the electron, and the cascade of technology that led to radio, computers, television, and lasers, were still in the future.

By 1882 the "ether" that formed the background medium for Maxwell's wave motions was already under investigation. Michelson in 1881 conducted the preliminary experiments on propagation through the ether, later refined by Michelson and Morley in 1887. (It is interesting to speculate on the direction that physics and cosmology might have taken if the three-degree background radiation could have somehow been discovered in 1865, rather than 1965. We can detect our motion through this omnipresent radiation sea. Would the theory of relativity have been delayed, at this evidence of "absolute" space?)

The work of Darwin, Wallace, Maxwell, Hertz, Kelvin, and Pasteur were very visible and clearly important scientific beginnings. Yet they do not tell us the whole story of science in 1882. One century ago, Gregor Mendel's work establishing the basis for genetics was already seventeen years old, and quietly gathering dust in the library at Brünn. Mendel knew the secrets that would have allowed Darwin to reply to Fleeming Jenkin's attack on the theory of natural selection, but no one else knew. A great scientific beginning had been made, and it lay hidden for thirty-five years.

Could it be that a paper written in 1965 now languishes in some journal, waiting for a recognition of its significance in the year 2000? The chances of that are at least as good now as they were then. We are drowning in new publications.

By 1882 Charles Babbage had died an embittered old man. For forty years he had struggled to build his Analytical Engine, the machine whose working principles were so clearly established in his head. He failed not because of lack of scientific ingenuity, but because the *technological* tools he needed had not yet been developed. They depended for their existence on the theories that Max-

well was creating. One longs to be able to go back to 1850, to say, "Look, Babbage, you really can't make a practical computer out of this stuff. You're trying to work with cogs and levers and gears and pulleys. What you need will come in the next century—vacuum tubes, ferrite cores, transistors, and Josephson junctions. Spend your time on something else."

No one in 1882 enjoyed the gift of prophecy needed to recognize that Babbage's odd ideas would be changing the world by 1982. Like Mendel's work, Babbage's great beginning was lost for generations.

Perhaps 1882 was an unusual time, one of hidden events and lost discoveries. Would we do better to look at scientific events in 1782? In that year, the world's attention had been distracted from the recent uprising in the American colonies and the gathering storm in France by a great discovery in the heavens. William Herschel's announcement of the finding of a new planet, Uranus, had been made just the previous year. He did it with new technology, the telescope of superior quality that he had built with his own hands. Laplace's work on the stability of the "universe" — which to men of that time meant mainly the solar system—would not be published in full for another thirty years, but he had already made it clear, in great papers published as early as 1773, that he knew exactly where he was going. The pioneer work of Priestley and Lavoisier in exploration of the chemical elements was well advanced by 1782, and it was already recognized as important by their contemporaries. Beginning in 1782, Lavoisier had started to place the vocabulary of chemistry on a rational basis.

These were known beginnings. Were there neglected or unknown beginnings, comparable to those of Mendel or Babbage?

To find our example, we must look to a different field. By 1782 James Hutton already possessed all the concepts and evidence needed to display an Earth of vast age. Although it went contrary to all scriptural authority, Hutton recognized that winds, waters, and volcanic action served as the shapers of continents, and that to achieve those results eons of time previously undreamed of would be needed. He had his theories formulated by 1782, and in 1785 they were presented to the Royal Society of Edinburgh.

And how was his "Theory of the Earth" received? It was first ridiculed and vilified, then ignored by his contemporaries. Not until two decades later, when in 1802 John Playfair wrote his "Illustrations of the Huttonian Theory of the Earth," did Hutton's ideas begin to have their deserved impact.

(It is ironic that, two hundred years after Hutton's efforts, the question of the age of the Earth is being raised again in the pseudo-science of the "scientific" creationists. Kelvin criticized evolution because the age thereby required for the planet was inconsistent with the rate of cooling of Earth and Sun given by 19th-century physics. Writing of this, Loren Eiseley commented ".
it is part of the confused intellectual climate out of which emerged a momentary anti-Darwinian trend . Dar-

win died before the new trend culminated." Eiseley himself died too soon to learn that the trend has not yet culminated, and that the argument continues.)

As we move farther back in time, the records of scientific progress and its associated technology are less complete; but we know that in 1682 the Europe of Charles the Second and Louis the Fourteenth had its own scientific marvels. Physiologists were exploring the human body, stimulated by William Harvey's discovery of the circulation of the blood, and his later theories on reproduction. Leeuwenhoek, through sheer instrumentation technique and endless patience, had carried microscopic investigation to new levels, and by 1675 had become the first person to see protozoa and bacteria. In the same year, Roemer made his determination of the speed of light from the occultations of Jupiter's satellites. The invention of the reflecting telescope now offered astronomers an escape from the unwieldy consequences of chromatic aberration. (Before the reflecting telescope, astronomers employed telescopes of longer and longer focal length to minimize chromatic aberration problems. Constantyn Huygens used a device two hundred and twenty three feet long with an 8.75-inch objective lens.)

Technology and science were blossoming. The first Royal Observatory at Greenwich had been built by Sir Christopher Wren in 1675, and the Royal Society, created in 1660, was flourishing.

And yet, three hundred years ago we still find evidence of a great, hidden beginning. It was tucked away in the mind of one man: Isaac Newton. He had his laws of motion, the calculus, and the principle of universal gravitation back in the 1660s. With their aid he was already in possession of his System of the World. He had even given lectures on the subject, to small groups of bored and indifferent students at the University of Cambridge. There had been no response or recognition. (Here is another sobering thought. Have we been present when some momentous idea was first proposed, and completely failed to grasp its significance?)

In any case, by 1682 Newton had everything he needed to write the "Principia." He would probably never have thought to write out and publish a systematic exposition had not Edmund Halley, in a famous visit to Cambridge in 1684, learned of the extent of Newton's researches, persuaded him to write of them, and paid to have the work printed in 1687.

Perhaps it would be a mistake to go back much further. Everyone can make his own list of scientific events, just as we can all, based on our personal perceptions of what is important, point to great discoveries that were overlooked, neglected, or scoffed at when they were first introduced.

Everyone will create his or her own list. The specifics do not matter. The point to note is that, although new technology is usually (unless deliberately concealed) highly visible and well recognized, this is not true of scientific beginnings. In fact, we should distin-

guish three kinds of scientific beginnings:

• The birth of great scientists, which no one can hope to recognize when it happens;

• The "public" discovery that everyone knows will revolutionize a whole field of science; as, for example, the discovery of the structure of DNA has changed molecular biology; and

• The true surprise, the lightning-flash which reveals a landscape to one man before others are looking for it.

Having come this far, let us take one step more. The true adventure may be in the lightning-flash, but we can peek at a couple of the "public" beginnings—areas where there should be great advances, scientific and technological, over the next twenty to thirty years.

The arguments for such advances derive from very general observations rather than constructive suggestions. Given the subject matter, that shouldn't be too surprising.

The first candidate for an area where staggering breakthroughs will soon take place would probably be on everyone's list. The use of restriction enzymes for the cleaving and recombining of DNA fragments, together with the use of plasmids as cloning agents for amplifying those fragments, has to produce awe-inspiring results in the next generation. It calls for powerful techniques of both scientific and technological method, and it will be well worth the effort. The splitting of the gene, thought of forty years ago as indivisible, will rank in the record of history with the splitting of the atom. If eugenics is a frightening word, the eradication of genetic defects may sound more palatable; but it can be much the same thing, perhaps by selection during fertilization, when defective eggs and sperms will be screened out.

It is not too surprising that the second

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candidate also comes from the biological sciences. Physics has moved so far and so fast for eighty years that some other field demands center stage. The rate of progress in understanding the chemical/neurological interfaces in the human brain and central nervous system is bewildering. There are significant new discoveries every month. The short-term effects are easy to predict: better treatments for Parkinson's disease, for Alzheimer's disease, and other curses of old age. A few years farther out, we can also see ailments that we now characterize under the general and unhelpful heading of "mental illnesses" being treated and cured in a delicate balance of natural and synthetic neurotransmitters.

The "mere technology" that may stem from such work could be intriguing. If we understand the causes of senility, we may be able to arrest it. At the very least, we may be able to delay the onset of the symptoms of old age until closer to the maximum lifespan potential for humans (about a hundred and twenty years). The social consequences of such progress are incalculable. But if mankind has doubled its lifespan in the past four or five million years, why should it not double again?

There are other potentials. Why do some people sleep for only three hours a night, while others need eight or nine to feel rested? We don't know, and most of us mightily resent the fact that we are in the wrong group. But the way in which the reticular network's signals affect and are affected by the neurotransmitters again suggests that we may see a time, a few years hence, when sleep will be under our control, rather than *vice versa*.

The same understanding of human metabolism may enable us to do at will what many animals do already under environmental pressure: hibernate. There are many good occasions when we might like to slow down our rate of living—on long journeys, perhaps in space; during medical treatment; or perhaps merely when we want time to pass quickly (we have all sat in such meetings).

Along much the same line of research, if the neurotransmitters look more and more important for the functioning of the brain, the immune reaction system seems increasingly important to the body. Everything from arthritis to cancer to toothache appears linked to our immunological responses. It will be most surprising if the next twenty years fails to produce a great increase in understanding. The rate of progress is too fast to justify any other assumption.

The next item on the list sits on the vague border between science and technology, but it is so important that the classification is irrelevant. It is the interface between electronic equipment and the human mind and body. We do not need to look for the "cyborgs" of conventional science fiction, but we can certainly expect modes of man/machine coupling that go far beyond our present clumsy methods of fingers and keyboards.

We will also see the line blurring between "organic" and "non-organic." Is an implanted tissue nodule, containing tailored bacteria and producing insulin at a rate determined by the body's

needs under the control of a microprocessor, an organic component or not? We neither know nor care. The value of such an artificial organ makes the question irrelevant. Who wouldn't prefer a foolproof, computer-controlled, battery-powered lens to the inconvenience of external eyeglasses?

Conversely, why should not the self-replicating properties we find throughout the living world teach us how to make exact copies of, for example, computer circuits? It is difficult to find a case in modern machinery where the *hardware* instrument that is used in fabrication is itself one copy of the desired final product.

With computer *software*, on the other hand, we have already reached the era of self-replicating systems. For example, most Disk Operating Systems have a section of code that allows a copy of the data files on any disk to be made on a blank disk. That includes the copying of the Disk Operating System itself. Just as in humans, the section of code that is needed to make a disk copy is a very small part of the total code that the disk contains. But unlike humans, the Disk Operating System does not occupy much of its free time thinking about the replication process.

The extension from software to hardware replication seems natural and inevitable. The goal would be a computer than can copy itself, perhaps with permissible "mutations" to allow for the possibility of improvement (to call it "evolution" at once gives rise to anthropocentric worries). We don't know how far in the future this capability may lie, but the fact that we know for sure it can be done ought to encourage a continuing attempt.

Moving to another field, in physics we seem to be ready to tame the neutrino. For half a century we have accepted it as an elusive particle—no rest mass, no charge; uncatchable, almost undetectable, and as near to nothing as a particle can get. But the electron must have seemed almost as hard to handle when it was first discovered, and from some points of view the neutrino could be a uniquely useful particle. It alone has the penetrating power to provide us—if we knew how to do it—with a look at the center of the Earth, the middle of the sun, or regions of the galaxy hidden to other particles and radiation by obscuring dust and gases. The neutrino's tiny interaction cross-section is usually quoted to prove that it cannot be harnessed. That same cross-section is also one of its possible long-term values. Neutrino communication has already been proposed as a technique for sending messages to submarines that are blind to conventional signal channels. We may see a time when neutrinos permit us to construct detailed pictures of the inside of large objects, just as X-rays allow us to study small objects. The problems in harnessing neutrinos, according to some physicists, are not scientific any more—they are "just engineering."

The search for the unified field theory is close to center stage now, with Grand Unified Theories one of the hottest areas in physics. It is usually assumed that the four basic interactions now known to us (weak, strong, electromagnetic, and gravitational) are all we need to worry

about. A look back might be salutary here. Three hundred years ago, Newton was puzzling out the laws governing the gravitational interaction. A hundred and fifty years ago, Ampere and Oersted were taking the first tentative steps towards the laws of electricity and magnetism. A hundred years ago we still had only those two of our present "basic" forces. It ought to surprise no one if a hundred years from now the number has increased again, to five or six. If there is a proof that four and only four force laws govern the universe, we have yet to find it. And if today's four are all expressions of some single unified force, then other expressions as yet unknown may occur.

We can stop here, though this gives no more than a flavor of the possibilities in just a couple of fields of knowledge. Other fields follow the same pattern. The complex, mysterious feedback and reinforcement of science and technology permeate all our lives on an increasing basis, and we struggle to predict the social consequences.

Before closing, let us note one problem with this type of analysis. Quite often, basic advances consist not so much in the discovery of new things, but in the discovery that *previously sacred truths are no such thing*. To quote Thomas Huxley, "It is the customary fate of new truths to begin as heresies."

What we should be doing is looking at all the things that are nonsense in our current philosophies, and imagining the world which would result if one of them turns out to have a basis of truth.

Here is a handful of things that may arouse skepticism: telepathy; psychokinesis; astrology; clairvoyance; UFOs; reincarnation; voodoo; ancient astronauts; ghosts; scientology; the superior intelligence of dolphins and whales; prescience; pyramidology; and palmistry.

Can we broaden our minds enough to evaluate the consequences, should any or all of these wild ideas turn out to be true? Perhaps not; but perhaps we are then overlooking the greatest scientific discovery of the next century. ■

•Promotion from within: A system of moving incompetents up to the policy-making level where they can't foul up operations.

•Reappraisal: An abrupt change of mind after being found out.

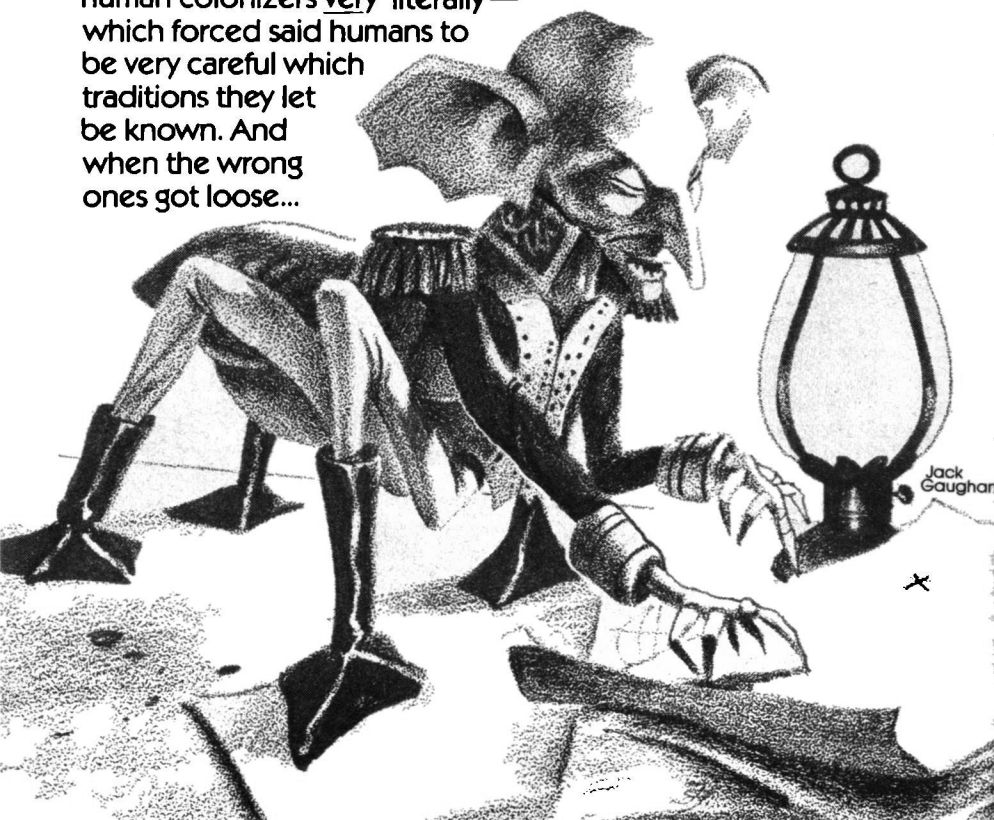
•"Take forceful action": Do something that should have been done a long time ago.

The Management Dictionary, Kelvin Throop III

THE NAPOLEON CRIME

Poul Anderson and Gordon R. Dickson

The Hokas embraced the traditions of their human colonizers very literally — which forced said humans to be very careful which traditions they let be known. And when the wrong ones got loose...



Be it understood at the outset, the disaster was in no way the fault of Tanni Hostrup Jones. Afterward she blamed herself bitterly, but most unfairly. She was overburdened with other matters, hence unable to concentrate on this one. She had no reason whatsoever to suspect evil of Leopold Ormen; after all, he was a Dane like herself, as well as being a famous journalist. Furthermore, while Tanni was chaste, she was a full-blooded woman; her husband had been gone for days and might not return for weeks; and Ormen had a great deal of masculine charm.

Having arrived on Toka by private spacecraft and settled into the Mixumaxu Hilton, he made an appointment to see her and at the time agreed on arrived at the plenipotentiary's residence. The day was beautiful and the walk through the quaint streets a delight. Native Hokas swarmed about, their exuberance often becoming deference when they saw the human. He smiled benignly and patted an occasional cub on the head. The adults looked just as cuddly: rather like bipedal, meter-tall koala bears with golden fur and stubby hands, attired in a wild variety of costumes, everything from a barbarian's leather and iron to the elegant gray doublet and hose of his little companion, as well as Roman, Mandarin, cowboy, and other garb. Yet with few exceptions the squeaky voices chattered in English.

Thus, when he reached his destination, Ormen was not unduly surprised to be greeted at the door by a Hoka wearing coarse medieval-like clothes, hobnailed boots, a yellow hood, and a long white false beard tucked into a broad belt from which hung a geologist's hammer, a coil of rope, and a lantern. "Hello," the man said, and gave his name. "Mrs. Jones is expecting me."

The Hoka bowed, careful to do so in a fashion that showed he was not accustomed to bowing. "Gimli the dwarf, at your service," he replied, as gruffly as his larynx allowed. "Welcome to Rivendell. The Lady Galadriel did indeed make known to me that— Ah, ha! Hold!" Both his hands shot out and seized Ormen's left.

"What off Earth?" exclaimed the journalist.

"Begging your pardon, but that ring you're wearing. You'll have to check it before you go in."

"Why?" Ormen stared down at the gold band and its synthetic diamond. "It's only an ornament."

"I doubt not your faith, good sir," declared Gimli, "but you may conceivably have been tricked. This *could* be the One Ring under a false seeming—you not even invisible. Can't be too careful in these darkling times, right? You'll get it back when you leave."

Ormen tried to pull free, but the native was too strong. Suppressing an oath, the visitor yielded. Gimli turned the ring over to an elderly Hoka who had shown up, also white-bearded, but attired in a blue robe and pointed hat and bearing a staff. Thereafter the self-styled dwarf ceremoniously conducted Ormen through the door. The entryroom beyond had been hung with tapestries that appeared to have been very hastily woven; colored tissue glued on the windowpanes imitated stained glass, while candlelight relieved the dimness. Elsewhere the house remained a normal ter-

restrial-type place, divided between living quarters and offices.

Tanni Jones received the newcomer graciously in her parlor. She was tall, blond, and comely, as was he, and eager to see anybody from the home planet. "Please sit down, Mr. Ormen," she invited. "Would you care for coffee, tea, or perhaps something alcoholic?"

"Well, I've heard about the liquor they make here, and confess to being curious," he said.

She shuddered a bit. "I don't recommend you investigate. What about a Scotch and soda?" When he accepted, she rang for a servant, who appeared with churchwarden pipe in hand and bare feet on which the hair had been combed upward. "We'll have the happy hour usual, Gamgee," she said. "*Scotch* Scotch, mind you."

The humans began to talk in earnest. "What's happening?" Ormen inquired. "I mean, well, isn't your staff acting rather oddly?"

Tanni sighed. "They've discovered *The Lord of the Rings*. I can only hope they get over it before the fashion spreads further. Not that it would upset Alex—my husband, that is, the plenipotentiary—to be hailed as the rightful King when he returns. He's used to that sort of thing, after all our years in this post. But meanwhile—oh, for example, we get visitors from other worlds, nonhumans, and many of them are important — officials of the League, representatives of firms whose cooperation we need to modernize Toka, and so on." She shuddered again. "I can just imagine the Hokas deciding some such party must be orcs or trolls or Ring-Wraiths."

"I sympathize. You inhabit a powder keg, don't you?"

"M-m, not really. The Hokas do take on any role that strikes their fancy, and act it out—live it—with an uncompromising literal-mindedness. But they're not insane. They've never yet gotten violent, for instance; and they continue to work, meet their responsibilities, even if it is in some fantasy style. In fact," said Tanni anxiously, "their reputation for craziness is quite undeserved. It's going to handicap my husband on his mission. I suppose you know he's gone to Earth to negotiate an upgrading in status for Toka. If he doesn't succeed in convincing the authorities our wards are ready for that, we may never in our lifetimes see them become full members of the Interbeing League; and that is our dearest dream."

Leopold Ormen nodded. "I do know all this, Mrs. Jones, and I believe I can help." He leaned forward, though he resisted the temptation to stroke her hand. "Not that I'm an altruist. I have my own living to make, and I think there's a tremendous documentary to be done about this planet. But if it conveys the truth, in depth, to civilized viewers throughout the galaxy—yes, and readers too, because I'd also like to write a book—public opinion should change. Wouldn't that be good for your cause?"

Tanni glowed. "It certainly would!"

Ormen leaned back. She was hooked, he knew; now he must play his line so carefully that she remained unaware of the fact. "I can't do it unless I have complete freedom," he stated. "I realize your husband's duty requires him to impose various restrictions on outsiders, who might otherwise cause ter-

rible trouble. But I hope you—in his absence, you are the acting plenipotentiary, aren't you?—I hope you'll authorize me to go anywhere, see anything and anybody, for as long as I'll need to get the whole story. I warn you, that may take quite a while, and I'll be setting my aircar down in places where the Hokas aren't accustomed to such a sight."

As said, Tanni cannot be blamed. She did not rush into her decision. In the course of the following week, she had several meetings with him, including a couple of dinners where he was a fascinating, impeccably courteous guest. She inquired among the local folk, who all spoke well of him. She studied recordings of his previous work from the data file, and found it excellent. When at last she did give him *carte blanche*, she expected to keep track of what he was doing, and call a halt if a blunder seemed imminent. Besides, Alex should be back presently, to apply the sixth sense he had perforce developed for problems abrew.

That none of these reasonable considerations worked out was simply in the nature of Hoka things.

First she was kept busy distracting the natives, lest a Tolkien craze sweep through thousands of them. That was less difficult than it might have been elsewhere on the globe. Most of the human-derived societies were still rather isolated and naive. This was a result of policy on Alex's part. Not only did he fear the unforeseeable consequences of cross-fertilization—suppose, for example, that the Vikings came into close contact with the Bedouins—but a set of ongoing, albeit uncontrolled psychohistorical experiments gave him hints about what was best for the race as a whole. Nevertheless, it did leave those cultures vulnerable to any new influence that happened by.

As the seat of the plenipotentiary and therefore, in effect, the capital city of the planet, Mixumaxu was cosmopolitan. Its residents and those of its hinterland were, so to speak, immunized. This did not mean that any individual stuck to any given role throughout his life. On the contrary, he was prone to overnight changes. But by the same token, these made no fundamental difference to him; and therefore the Jones household continued to function well in a bewildering succession of guises.

Soon after she had headed off the War of the Rings, Tanni got caught up in the *Jungle Books* affair. Since that involved beings of status, and a scandal which must not become common knowledge lest the tranquility of the galaxy be disturbed, the sequel kept her occupied for weeks. She handled her end of the business with a competence which caused the Grand Theocrat of Sanussi, in an elaborate honors ceremony years later, to award her a cast-off skin of his.

Meanwhile a cruel disappointment arrived, in the form of a letter from Alex. Complications had developed; the delegation from Kratch was, for some reason known only to their nasty little selves, using every parliamentary trick to delay the upgrading of Toka; he must stay and fight the matter through to a successful conclusion; he didn't know how long it would take; he missed her immeasurably, and enclosed one of his poems to prove it.

Tanni refrained from weeping in front

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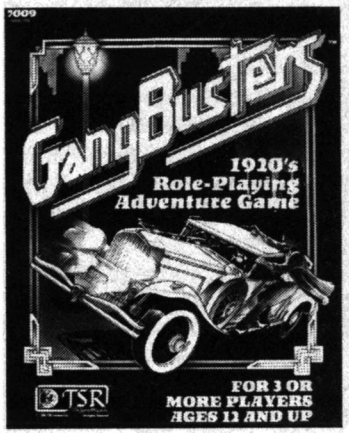

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of their children. She did utter a few swear words. Afterward she plunged into work. Suddenly there seemed to be a great deal of it. Information-gathering facilities were stretched thin at best, so that she was seldom fully apprised of events on other continents; but such reports as came in were increasingly ominous. They told of unrest, strange new ideas, revolutionary changes—

No wonder that she lacked time to follow what Leopold Ormen was about. Events moved far too fast. All at once she saw catastrophe looming before her. The single thing she could think to do was send a frantic, although enciphered, message to her husband; and indeed, this was the single thing she could have done.

An airbus took Alexander Jones from League headquarters in New Zealand to the spaceport on Campbell Island. There he walked past sleek, gleaming starships to the far end of the field, where sat a craft larger than most, but battered and corrosion-pocked. Its bulbous lines proclaimed it to be of nonhuman manufacture, and its registration emblem to be a tramp freighter. Beneath the name etched on the bows was a translation into the English of the spaceways: *Thousand-Year Bird*. Alex mounted the movable ramp that led to the main personnel lock and pressed the buzzer button.

A gentle, if mechanical, voice sounded from the speaker grille: "Is someone present? The valve isn't secured. Come in, do, and make yourself at home."

Alex pushed on the metal. Nothing happened. "Brob, it's me, Alexander Jones," he said into the intercom. "It won't open. The valve won't, I mean."

"Oh, dear, I *am* sorry. I forgot I had left it on manual. One moment, please. I beg your pardon for the inconvenience."

Something like a minor earthquake shivered through hull and ramp. The valve swung aside, revealing an oversized airlock chamber and the being who had the strength to move so ponderous an object. "How pleasant to see you again, dear fellow," said the transponder hanging from his neck. Meanwhile his real voice, which the device rendered into frequencies a human could hear, vibrated subsonically out of his feet and up into the man's bones. "Welcome to my humble vessel. Come in, let me make you a cup of tea; tell me how I may serve you."

The 'sponder likewise converted Alex's tones into impulses Brob sensed through his skin. On their airless world, his species had never developed ears. "I've got a hell of a request to make, and you don't really know me well enough, but I'm desperate and you seem to be my only possible help."

Eyes that were soft and brown, despite their lack of moisture, looked thirty centimeters downward to Alex's lanky height. "Sir, it has been a pleasure and an enlightenment making your acquaintance. Furthermore, I feel certain that your purpose is not selfish, but for some public good. If so, whatever small assistance I can perhaps render will earn me merit, which I sorely need. Therefore it shall be I who enter into your debt. Now do come in and tell me about this."

Brob led the way, moving gracefully despite his bulk; but then, Earth gravity was a mere one-third of his planet's. For

that matter, had he been short like a Hoka, he would have been considered even more cute. He too possessed a pair of arms, his thicker than a gorilla's and terminating in enormous four-fingered hands, and a pair of stout legs, ending in feet that were a meter long and half as wide; their soles enclosed the tympani with which his race listened and spoke. The torso was so rotund as to be almost globular. The head was equally round; though it naturally lacked a nose, it had a blunt snout whose lipless mouth was shaped into a permanent smile. All in all, he suggested a harp seal puppy. Baby-blue fur covered him, save on the hands and feet; there it was white, which gave him an appearance of wearing mittens and booties. His actual clothing consisted of the 'sponder and a belt with pockets full of assorted tools.

The saloon of the ship whose owner, captain, and crew he was seemed less alien than might have been expected, considering how unlike Earth was the planet which humans called Brobdingnag. That world had begun as a body more massive than Jupiter. A nearby supernova had blown away its gas and deposited vast quantities of heavy elements over the solidifying core. They included radioactives. Somehow life had evolved, making use of this source of energy rather than the feeble red sun. Plants concentrated isotopes which animals then ate. Brob, as Alex dubbed him for lack of ability to pronounce his real name, did not live by oxidizing organic materials like most creatures in known space, but by fissioning nuclei. His physical strength was corresponding.

The metabolism posed no hazard to anyone else. The fission process worked at a far lower level than in a power plant, and whatever radiation it gave off was absorbed by the dense tissues around the "stomach." Brobdingnagians traveling abroad needed merely take certain precautions in disposal of their body wastes. Regardless, many beings feared and shunned them. Having delivered a cargo to Earth, Brob found himself unable to get another, and the waiting time while his broker searched for one grew lonely as well as long. Chancing to meet Alex in a Christchurch pub, where he had gone in hopes that somebody would talk to him, he was pathetically grateful when the man not only did, but pursued the acquaintance afterward.

For his part, Alex enjoyed Brob's tales of distant worlds. Sometimes he grew bored, because the alien had fallen in love with Japanese culture and would drone on for hours about calligraphy, flower arranging, and other such arts. Yet even that was better than sitting around yearning for Tanni and his children, cursing the abominable Kratch, and wondering how many more weeks it would take to complete his business.

Brob did his best to bow as he gestured his visitor to sit down on a tatami mat, politely ignoring the shoes that the human had not removed. He left Alex to meditate upon a lily and a stone, placed in a bowl of water beneath a scroll depicting Mount Fuji, while he occupied himself preparing for a tea ceremony. This was necessarily modified since, as he sipped the aqueous substance, it turned to steam. Serenely, he contemplated the white clouds swirling out of his mouth, before at last he inquired what he could do for his friend.

Alex had learned not to be boorishly direct in Brob's presence. "Let me review the situation, though you do know why I'm stuck here on Earth," he said. "The Chief Cultural Commissioner had approved Toka's advancement, the vote looked like being a pure formality, and then the Kratch delegation objected. They couldn't just be voted down, because they leveled charges of misgovernment. Nothing as simple as tyranny or corruption. I could easily have disproved that. No, they claim my entire policy has been wrong and is bound to cause disaster."

Brob nodded gravely. "You have explained to me," he replied; the teapot and cups trembled. "I have admired your restraint in not dwelling upon it in conversation."

Alex shrugged. "What use would that be? The fact is, I've often had to do things on Toka that, well, played kind of fast and loose with the letter of the law. I had no choice. The Hokas are like that. You know; I've told you a bundle about them. Ordinarily no one sees anything wrong in a plenipotentiary exercising broad discretion. After all, every planet is unique. Nothing really counts except results, and I pride myself that mine have been good. But how can I argue against the claim that I've created the *potential* for calamity?"

"I should think a look at your record, and a modicum of common sense, would suffice to make the legislators decide in your favor."

"Oh, yes. But you see, after they'd raised this issue, the Kratch promptly raised a host of others, and got mine postponed. It's blatant obstruction on their part. Most of the delegates recognize that and are as disgusted as I am. But the Constitution forces them to go through the motions—and forces me to sit idle, waiting for whatever instant it will be that the case of Toka is opened to debate.

"It's enough to make a paranoid out of a saint," Alex sighed. "One set of villains after another, year after year—the Slissii, the Pornians, the Sarennians, the Worbenites, the Chakbans—my wife wrote me about those—conspiring and conniving. I've really begun to wonder if some evil masterminds aren't at work behind the scenes, and I wouldn't be surprised but what they're Kratch." He sighed again. "It's either believe that, or else believe we're only characters in a series of stories being written by a couple of hacks who need the money."

"It may be sheer accident," Brob suggested. "Mortal fallibility. There is a great deal of wisdom in the universe; unfortunately, it is divided up among individuals."

Alex ran a hand through his already rumpled brown hair. His snub-nosed countenance grew stark. "Okay," he said, "what I've come to you about is a a sort of dreadful climax. I've received a letter from my wife and—Toka really is about to explode. I've got to get back at once and see if I can do anything to save the situation."

"Well, yes, I should imagine that that would be indicated," Brob murmured and rumbled. "Can you describe the problem a little more fully?"

Alex pulled the letter out of his tunic. "She sent it by message torpedo; it's that urgent. It's coded, too, but by now the words are burned into my brain. Let me give you a sample." He read aloud:

SCIENCE FICTION
analog

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" 'Somehow, our policy of keeping the different Hoka societies relatively isolated has broken down. Suddenly they have been introduced to concepts of each other. And this hasn't been in the casual way of individuals traveling around, like that sweet little Viking you met when you'd been press-ganged onto that 18th-century British frigate. We've always allowed for that degree of contact. No, what's happened this time must have been deliberately caused. Besides, ideas totally new to the planet, dangerous ideas, have been appearing. I've had agents in the field collecting books, video tapes—but the damage has already been done, and the Hokas themselves don't know or care how it happened. A fire like that is fatally easy to start; then it spreads of itself.

" 'For instance, right on the plains of this continent, the Wild West has been introduced to the biography of Genghis Khan. Of course the cowboys promptly went overboard for being ferocious Mongols—' Er, Tanni ordinarily handles her figures of speech better than that; but anyway—'So far it's been harmless. The Mongols ride around to every cow town demanding it surrender to the will of the Kha Khan, and explaining that they don't stutter but "Kha Khan" really is his title. The town is always happy to yield, because they make this the occasion of a drunken party. As one mayor said to me when I flew there to question him, it's better to bottle a place than sack it. But the potential is terrifying, because the cowboys out Montana way have decided they're European knights who must resist any heathen who invade their country.

" 'And the Russian Hokas are no longer content to sit around strumming balalaikas and singing sad songs; they have elected a Czar and babble about the Third Rome. Over in the United States, Abolitionists are feverishly looking for slaves to set free—and beginning to get volunteer Uncle Tom types—while the Virginia Gentlemen talk of secession. In the South Sea, a King Kamehameha has appeared, and war clubs are replacing ukuleles, and I'm afraid they'll see use. It goes on and on around the globe, this sort of dangerous nonsense.

" 'What frightens me worst, and causes me to write this, is Napoleon.' " Alex cleared his throat. "You realize, Brob, that a Hoka can be perfectly sane and still claim he is Napoleon. Umm. 'He has displaced the King of France. He is organizing and equipping his Grand Army. Even after my experience of Hoka energy and enthusiasm, I am surprised at how fast the workshops in their country are producing weapons.

" 'Inevitably, those 18th-century British have gotten alarmed and are arming, too. Their island is right across a strait from that continent, you remember. I might have been able to calm them down, except that lengthy biographies of humans who lived in that period have been circulating to inflame their imaginations. I was in London, trying to argue them out of it, and threatening to expose them to the ridicule of the galaxy. I couldn't think what else to do. The Hoka who calls himself the Duke of Wellington drew himself up to his full height, fixed me with a steely eye, and barked, "Publish and be damned!"

" 'Oh, darling, I'm afraid! I think

these play-acting prophecies of wars to come will soon fulfill themselves. And once Hokas actually start getting maimed and killed—well, I believe you'll agree that they'll go berserk, as bad as ever our species was in the past, and the whole planet will be drenched in blood.

" 'Alex, could you possibly return?' "

The man's voice broke. He stuffed the letter back into his pocket and dabbed at his eyes. "You see I've got to go," he said.

"Do you expect that you can accomplish anything?" Brob asked, as softly as he was able.

Alex gulped. "I've got to try."

"But you are compelled to remain here on Earth, waiting for the unpredictable moment at which you will be called upon to justify your actions as plenipotentiary and urge the upgrading of your wards."

"That's no good if meanwhile everything else I'm responsible for goes down the drain. In fact, a horror like that would throw the whole system of guidance for backward worlds into question. It could open the way for old-fashioned imperialism and exploitation."

"If you departed for Toka," Brob said, "the Kratch would doubtless seize that opportunity to bring up the matter of your stewardship—when you are not present to defend yourself—and win custody of the planet for one of their own, who could then work toward the end of discrediting the present protective laws, as you suggest." He made a sign. "If this hypothesis maligns the motives of the Kratch, I apologize and abase myself."

"You needn't, I'm sure."-Alex leaned forward. His index finger prodded Brob's mountainous chest. "I've been collecting information about them. Their government is totalitarian, and has expansionist ambitions. It's been engaged in all sorts of shenanigans — which have been hushed up by nicenelly types in the League who hope that if you ignore a villain he'll go away: This whole thing on Toka can't be simple coincidence. It's too well orchestrated. The likelihood of war arises precisely when I can't be on hand— Do you see?"

"What then do you propose?" asked Brob, calm as ever.

"Why, this," Alex said. "Look. Toka's a backwater. No passenger liners call there. If I left on my official ship, it would be known; I need clearance for departure, and the Kratch must have somebody keeping watch on this port. They'd immediately move to get their accusations onto the floor, and probably have their agents do their best to hasten the debacle on Toka. But if they don't *know* I've gone—if they assume I'm hanging around waiting and drinking too much as I have been—they'll let matters continue to ripen while they continue to stall. And maybe I can do something about the whole miserable affair. Do you see?"

Brob nodded. "I believe I do," he answered. "You wish me to furnish clandestine transportation."

"I don't know who else can," Alex pleaded. "As for payment, well, I have discretionary funds in my exchequer, and if I can get this mess straightened out—"

Brob swept an arm in a grand gesture which smashed the tea table. "Oh, dear," he murmured; and then, almost

briskly: "Say no more. We need not discuss crass cash. I will tell my broker that I have lost patience and am departing empty. Your task will be to smuggle yourself and your rations aboard. Do you not prefer ham sandwiches?"

Despite its down-at-the-heels appearance, the *Thousand-Year Bird* was a speedster, power plant equal to a dreadnaught's and superlight drive as finely tuned as an express courier's. It made the passage from Sol to Brackney's Star in scarcely more than a week. Alex supposed that Brobdingnagians had an innate talent for that kind of engineering; or maybe it was just that they could work on a nuclear reactor as casually as a human could tinker with an aircar engine, and thus acquired a knack for it.

Quite aside from the crisis, Alex had reason to be glad of such a high pseudovelocity. It wasn't so much that Brob, profusely apologizing, kept the artificial gravity at that of his home world. His health required a spell of this, in between his long stay on Earth and his prospective stay on Toka. Given a daily dose of baryol, Alex could tolerate the condition for a while, though soon his lean frame grew stiff and sore under its weight of 240 kilos and he spent most of the time stretched out on an enormous bunk. The real trouble was that Brob, having little else to do under way, spent most of same time keeping him company and trying to cheer him up; and Brob's bedside manner left something to be desired.

The alien's intentions were of the kindliest. His race had no natural enemies even on its own planet; if he chose, he could have pulled apart the collapsed metal armor of a warcraft, rather like a man ripping a newsfax sheet in half. Hence he had no reason not to be full of love for all life forms, and—while he knew from experience that it was not always true—his tendency was to assume that all of them felt likewise.

After a few sermons on the moral necessity of giving the Kratch the benefit of the doubt, since they were probably only misguided, Alex lost his temper. "You'll find out different when they bring an end to a hundred years of peace!" he yelled. "Let me alone about it, will you?"

An apologetic quiver went through the hull. "Forgive me," Brob said. "I am sorry. I didn't mean to raise thoughts you must find painful. Shall we discuss flower arrangements?"

"Oh, no, not that again! Tell me about some more of your adventures."

The 'sponder burbled, which perhaps corresponded to a sigh. "Actually, I have had few. For the most part I have simply plodded among the stars, returning home to my little wife and our young ones, where we cultivate our garden and engage in various activities for civic betterment. Of course, I have seen remarkable sights on my travels, but you don't appreciate how outstanding among them are those of Earth. Why, in Kyoto I found a garden which absolutely inspired me. I am certain my wife will agree that we must remodel ours along similar lines. And an arrangement of our very own glowbranch, ion weed, and lightning blossoms would—" Brob was off afresh on his favorite subject.

Alex composed his soul in patience.

Animals wouldn't burn your home.
Don't burn theirs.

Only you
can prevent
forest fires.

The Hokas had given him plenty of practice at that.

The ship set down on Mixumaxu spaceport, Brob turned off the interior fields, and suddenly Alex was under blessed terrestrial-like weight again. Whooping, he sprang from his bunk, landed on the deck, and collapsed as if his legs had turned to boiled spaghetti.

"Dear me," said his companion. "Your system must be more exhausted than we realized. How I regret the necessity I was under. Let me offer you assistance." Reaching down, he took a fold of the man's tunic between thumb and forefinger, lifted him daintily, and bore him off to the airlock, not noticing that Alex's feet dangled several centimeters in the air.

After taking parking orbit around the planet, he had radioed for permission to land. He had mentioned that the plenipotentiary was aboard, but forgotten to say anything about himself; and nobody on Toka had heard about his race, whose trade lanes did not bring them into this sector. Thus the ground crew who had brought the ramp, and Tanni who had sped from her home, were treated to the sight of their man feebly asprawl in the grip of a leering, blue-furred ogre.

A native security guard whipped out a pistol. "Hold still, sir!" he squeaked. "I'll kill that monster for you."

"No, no, don't shoot," Alex managed to croak.

"Why not?"

"Well, in the first place," said Alex, making his tone as reasonable as possible under the circumstances, "he wouldn't notice. But mainly, he's a good person, and—and— Hi, there, honey."

The ramp, which had not been constructed for the likes of Brob, shivered and buckled as he descended, but somehow he made it safely. Meanwhile Alex thought the poison must have spread far and deep, if a Hoka—in sophisticated Mixumaxu, at that—was so quick to resort to a lethal weapon.

Tanni's passionate embrace proved remarkably restorative. He wished they could go home, just the two of them, at once, before the children got back from school. However, politeness required that they invite Brob to come along, and when they were at the house, Alex's fears resurged and he demanded an account of the latest developments.

Woe clouded Tanni's loveliness. "Worse every day," she answered. "Especially in Europe—our Europe, I mean," she added to Brob, "though don't confuse it with that Europe that the ex-cowboys in what used to be Montana have— Never mind." She drew breath and started over:

"Napoleon's filled the French Hokas with dreams of *la gloire*, and the German Hokas are flocking to become his grenadiers—except in Prussia, where I've heard about a General Blücher—and three days ago, the Grand Army invaded Spain. You see, Napoleon wants to give the Spanish throne to his cousin Claud. That's caused British Hokas—the British circa 1800 A.D., that is—thank God, so far the Victorian British on their own island have kept their senses, maybe because of Sherlock Holmes — anyway, yesterday they declared war, and are raising a fleet and an army of their own for a Peninsular campaign.

And we won't even be able to handle the matter discreetly. I got hold of Leopold Ormen by phone and begged him to clear his stories with me, but he refused—insisted on his right of a free press, and in such a gloating way, too. I'd taken him for a nice man, but—" Her voice broke. She huddled down in her chair and covered her face.

"Leopold Ormen? The journalist?" inquired Alex. "What's this?"

Tanni explained, adding that the man had since gone elsewhere, quite out of contact.

Alex cursed. "As if we didn't have troubles enough!" Suspicion struck fangs into his spirit. "Could his presence here be simple coincidence? I wonder. I wonder very much."

"Do you imply that Mr. Ormen may have stirred up this imbroglio?" asked Brob, appalled. "If so, and if you are correct, I fear he is no gentlebeing."

Alex sprang from his seat and paced. "Well, he can scarcely have accomplished everything alone," he thought aloud. "But he can sure have helped a lot to get it started, flitting freely around with the prestige of being a human, and that glib manner I recall from his broadcasts. Don't cry, darling."

"I shan't," Brob said. "My species does not produce tears. However, I am deeply moved by your expression of affection."

Tanni had not begun sobbing. That was not her way. Grimly, she raised her glance and said, "Okay, he tricked me. At least, we've sufficient grounds for suspicion to order his arrest. Though he has his own flyer and could be anywhere on the planet."

Alex continued to prowl the carpet. "I doubt that that would be any use at this stage," he responded. "Arresting him, I mean. Unless we had absolute proof that he was engaged in subversion, which we don't, we'd lay ourselves open to countercharges of suppression. Besides, our first duty is not to save our reputations, but to prevent bloodshed."

He struck fist in palm, again and again. "How *could* matters have gotten so out of hand, so fast?" he wondered. "Even for Hokas, this is extreme, and it's happened damn near overnight. Around the globe, too, you tell me; the Napoleon business is just the most immediate danger. Somebody, some group, must be at work, propagandizing, offering evil advice. They wouldn't have to be humans, either. Hokas would be ready to believe whatever they heard from members of any technologically advanced society. In fact, humans have gotten to be rather old hat. Somebody different, exotic, would have more glamor, and find it easier to mislead them."

"Yes, I've thought along the same lines, dear," Tanni said. "Naturally, I forbade the French to mobilize, but the only reply I got was something about 'The Old Guard dies, it does not surrender.' The British—well, they ignored my countermanding of their declaration of war, but I don't think they have been directly subverted. They're simply reacting as one would expect them to."

Alex nodded. "That sounds likely. The enemy can't have agents everywhere. That'd be too conspicuous, and give too many chances for something

to go wrong. A few operatives, in key areas, are better."

He stopped in midstride, tugged his chin, rumpled his hair, and decided: "Britain is the place to start, then. I'm off to see what I can do. After all, I am their plenipotentiary, whom they've known for years, and if I appear in person, they'll at least listen to me."

"Shall I accompany you?" offered Brob. "On Toka I am, if not glamorous, surely exotic. Thus my presence may lend weight."

"It will that!" Alex agreed. He supposed his aircar could lift the other being.

Numerous Georgian houses graced the city renamed London. Though the Hokas could not afford to replace every older building at once, they had decorated many a wall with fake half-timbering, put dummy dormers onto round roofs, and cut fanlights into doors. Top-hatted, tailcoated Regency bucks swaggered through the streets, escorting ladies in hoop skirts; seeing Alex and Brob, such males would raise their quizzing glasses for a closer look. Inspired by Hogarth, the commoners who swarmed about were more vocal at sight of the newcomers. Luckily, the dinosaurian animals hitched to wagons and carriages were not as excitable as terrestrial horses. In general, this place was more safe and sanitary than its model had been; Alex had managed to bring that about in every society that his wards adopted.

Thus far. Today he saw a high proportion of red-coated soldiers who shouldered muskets with bayonets attached. He overheard a plaintive voice through a tavern window: "Please, matey, do resist us like a good lad. 'Ow can we be a proper press gang h'if h'everybody *volunteers*?"

Proceeding afoot, since Brob would have broken the axles of any local vehicle, Alex and his companion reached Whitehall. There a guard of Royal Marines saluted and led them to the First Lord of the Admiralty. The man had called ahead for this appointment; even the most archaic-minded Hokas maintained essential modern equipment in their more important offices, although in the present case the visiphone was disguised as a Chippendale cabinet. The native behind the desk rose. He had attired his portly form in brown small-clothes and set a wig on his head. It didn't fit well, and rather distracted from the fine old-world courtesy of his bow by slipping down over his muzzle.

"A pleasure to meet you again, my dear fellow, 'pon my word it is," he said in calm, clipped accents while he readjusted the wig. "And to make your acquaintance, sir," he added to Brob, "as I trust I shall have the honor of doing. Be seated and take refreshment." He tinkled a bell. The staff were prepared, for a liveried servant entered immediately, bearing a tray with three glasses and a dusty bottle. "Fine port, this, if I do say so myself." Indignantly: "To think that Boney would cut us off from the source of supply! Infernal bounder, eh, what? Well, damme, he'll whistle a different tune, and out of a dry throat, when we've put him on St. Helena."

Alex settled down and took a cautious sip from his goblet. The drink was the same fiery distillation that was known

as claret, sherry, brandy, rum, whisky, or whatever else a role might call for. "I am afraid, Lord Oakheart, that Bonaparte has no intention of going to St. Helena," he replied. "Instead—" He broke off, because the Hoka's jaw had dropped. Turning about to see what was wrong, he spied Brob. The giant spacefarer, careful to remain standing, had politely swallowed the drink given him. Blue flames gushed out of his mouth.

"Er, this is my associate, from Brobdingnag," Alex explained.

"From where?" asked Oakheart. "I mean to say, that Swift chap does have several interesting ideas, but I wasn't aware anybody had put 'em into effect yet." Recovering his British aplomb, he took a pinch of snuff.

Alex braced himself. "Milord," he said, "you know why we've come. Armed conflict cannot be allowed. The differences between the governments of His Majesty and the Emperor shall have to be negotiated peacefully. To that end, my good offices are available, and I must insist they be accepted. The first step is for you people to take: namely, cancelling your expedition to Spain."

"Impossible, sir, impossible," huffed the Hoka. "Lord Nelson sails from Plymouth tomorrow. True, at present he has only the Home Fleet under his command, but dispatches are on their way to the colonies, summoning all our strength afloat to join him at Trafalgar. How can we stop 'em, eh? No, the British Lion is off to crush the knavish Frogs."

Alex thought fast. A leaderless armada, milling about, would have still more potential for causing disaster than one which was assembled under its respected admiral. "Wait a minute," he said. "It'll take two or three weeks for those windjammers to reach the rendezvous, whereas Spain's only two or three days' sail from here. Why is Nelson leaving this early?"

Oakheart confirmed his guess: "A reconnaissance, sir, a reconnaissance in force, to gather intelligence on the enemy's movements and chivvy him wherever he shows his cowardly face with fewer ships than ours."

"In that case, suppose I ride along. I could, well, maybe give Lord Nelson some helpful advice. More importantly, being on the scene, I could attempt to open negotiations with the French."

Oakheart frowned. "Most irregular. Danger of violation of the Absolutely Extreme Secrets Act. I am afraid I cannot countenance—"

Alex had learned how to turn Hoka logic against itself. "See here, milord, I am the accredited representative of a sovereign state with which your own has treaties and trade relations. I am sure His Majesty's government will accord me the usual diplomatic courtesies."

"Well ah but if you must talk to that Bonaparte rascal, why don't you simply fly to his camp, eh?"

Alex stiffened and replied coldly: "Sir, I am shocked to hear you propose that His Majesty's government should have no part in a vital proceeding like this."

Oakheart capitulated. "I beg your pardon, sir! No such intention, I assure you. Roger me if there was. Here, I'll give you a letter of introduction to the admiral, in my own hand, by Jove!" He reached for a goosequill, imported at considerable expense from Earth. As he

wrote, he grew visibly more and more eager. Alex wished he could see what was going down on the paper, but no gentleman would read someone else's mail.

The human had excellent reasons—he hoped—for taking this course. While the Hoka Napoleon himself was doubtless well-intentioned, whatever persons had inflated his vainglory until he was ready for war were, just as doubtless, not. They would be prepared for the contingency of a direct approach by a League authority. A blaster could shoot his aircar down as it neared, or he could be assassinated or kidnapped after he landed, and the Hokas led to believe he had been the victim of a tragic accident.

Traveling with Nelson, he had a better chance of getting to the Emperor, unbeknownst to the conspirators. Whether or not he succeeded in that, he expected to gather more information about how matters actually stood than he could in any other fashion.

Tanni would never let him take the risk. If nothing else, she'd fly out in her own car and snatch him right off the ship.

Reluctantly, he decided to tell her, when he phoned, that he was engaged in delicate business which would keep him away for an indefinite time.

Since their ancient Slissii rivals departed, Hokas had had no need of military or naval forces, except to provide colorful uniforms and ceremonies. Hence the Home Fleet gathered at Plymouth was unimpressive. There were about a dozen Coast Guard cutters, hitherto employed in marine rescue work. There were half as many commandeered merchant ships, though these, being square-riggers of the Regency period, naturally bore cannon. There were three minor warcraft, the pinnace *Fore*, the bark *Umbrageous*, and the frigate *Falcon*. And finally there was a line-of-battle ship, the admiral's pennant at its masthead and the name *Victory* on its bows.

Leaving Brob ashore, lest the gangplank break beneath him, Alex boarded the latter. Two sailors who noticed him whipped fifes out of their jackets and played a tune, as befitted a visitor of his rank. This caused crewmen elsewhere on deck to break into a hornpipe. A Hoka in blue coat and cocked hat, telescope tucked beneath his left arm, hurried across the tarry-smelling planks.

"Welcome, Your Excellency, welcome," he said, and gave Alex a firm handshake. "Bligh's the name, Captain William Bligh, sir, at your service."

"What? I thought—"

"Well, H.M.S. *Bounty* is being careened, and besides, Lord Nelson required a sterner master in wartime than Captain Cook. Aye, a great seaman, Cook, but far too easy with the cat. What can I do for Your Excellency?"

Alex realized that a fleet admiral would not occupy himself with the ordinary duties of a skipper on his flagship. "I must see His Lordship. I have an important message for him."

Bligh looked embarrassed. He shuffled his feet. "His Lordship is resting in his stateroom, sir. Indisposed. Frail health, you know, after the rigors of Egypt."

Alex knew full well. Horatio Lord Nelson's public appearances were few and short. The nuisance of having to

wear an eyepatch and keep his right arm inside his coat was too much.

Bligh recovered his spirit. He lowered his voice. "Although I'd say, myself, Lady Hamilton's had a bit to do with his weariness. *You* understand, sir." He gave Alex a wink, a leer, and a nudge in the ribs that sent the human staggering.

Instantly contrite, he offered to convey the letter. Alex gave him the sealed envelope, wishing again that he knew just what Oakheart had written. Hoka helpfulness often took strange forms. Bligh trotted aft. Alex spent the time arranging for his luggage to be fetched from his aircar. He saw Brob standing near it on the dock, surrounded by curious townsfolk, and wondered how he could do the same for his friend.

Bligh returned, twice as excited as before. "We shall have the honor of dining with His Lordship this evening," he announced. "Meanwhile, the squadron must be off on the afternoon tide. But we've time for a tot of rum in my cabin, Commodore, to welcome you into our company."

"Commodore? Huh?" Alex asked.

Bligh winked anew, though he kept his thumb to himself and, instead, took the man's elbow. "Ah, yes, I know full well. Ashore, the walls have ears. Mustn't let the Frenchies learn Commodore Hornblower is on a secret mission in disguise, damme, no. When we're safe at sea, I'll inform the men, by your leave, sir. Brace 'em up for certain, the news will, scurvy lot though they be." Walking along, he shrilled right and left at the crew: "Avast, ye lubbers! Look lively there! Flogging's too good for the likes o' ye! Keelhauling, aye, scuttle my bones if I don't keelhaul the first mutinous dog who soldiers on the job! Marines excepted, of course," he added more quietly.

In his quarters he poured, proposed the health of the King and the damnation of Boney, and fell into a long jeremiad about his lack of able officers. "The weak, piping times of peace, that's what's done it, Commodore." Alex listened with half an ear. If Oakheart's fantasy had appointed him Hornblower, maybe he could turn the situation to his advantage. Hornblower certainly rated more respect from Hoka mariners than any mere plenipotentiary—

A knock sounded on the door. "Come in, if ye've proper business," Bligh barked. "If not, beware! That's all I say, beware."

The door opened. A sailor in the usual striped shirt, bell-bottomed trousers, and straw hat saluted. A truncheon hung from his belt. "Bosun Bush, sir, press gang, reporting," he said. "We've caught us a big 'un. Does the captain want to see him?"

"Aye, what else?" Bligh snapped. "Got to set these pressed men right from the start, eh, Commo— eh, Your Excellency?"

The boatswain beckoned. Flanked by a couple of redcoated marines, Brob's enormous form made the deck creak and tremble as he approached. "What the hell?" burst from Alex. "How did they ever get you aboard?"

"They rigged a derrick," Brob answered. "Most kind of them, no? I had not even requested it when suddenly there they were, instructing me in what to do."

"Stout fella, this, hey, sir?" beamed the boatswain.

Captain Bligh peered dubiously at the acquisition. "He does look strong—" His ebullience returned to him. "Nevertheless, he'll soon find that aboard a King's ship is no life of ease." To Brob: "You'll work 'round the clock, me hearty, swab the planks, climb the ratlines, fist canvas along with the rest of 'em, or you'll hang from a yardarm. D'ye understand?"

Alex had a horrible vision of what would happen to the *Victory* if Brob tried to climb its rigging. His memory came to the rescue. Once he too had been impressed onto a ship out of this very England.

"Here's the first mate you said you lack, Captain Bligh," he declared in haste.

"What?" The skipper blinked at him.

"Pressed man always appointed first mate," said Alex, "in spite of his well-known sympathy for the crew."

"Of course, sir, of course," Bush chimed in happily.

"Well—" Bligh scratched his head. "Far be it from a simple old seaman like me to question the wisdom of Commodore Hornblower—"

"Commodore Hornblower!" The boatswain's eyes grew large. He tugged his forelock, or rather the fur where a human would have had a forelock. "Begging your pardon, sir, I didn't recognize you, but that's a clever disguise you're wearing, shiver me timbers if it ain't."

Bristling, Bligh turned his attention to Brob. "Well?" he snarled. "What're you waiting for, Mr. Christian? Turn out the crew. Put 'em to work like a proper bucko mate. We've the tide to make, and a fair wind for Spain."

"But I don't know how," Brob stammered.

"Don't try to cozen me with your sly ways, Fletcher Christian!" Bligh shouted. "Out on deck with you and get us moving!"

"Excuse me," Alex said. "I know this man of old, Captain. I can explain." He stepped forth, drew Brob aside, and whispered:

"Listen, this is typical Hoka dramatics. The crew are perfectly competent. They don't expect anything but a show out of the officers, as far as actual seamanship goes. You need only stand around, look impressive, and issue an occasional order—any order that comes to mind. They'll interpret it as being a command to do the right thing. Meanwhile I'll handle the details for both of us." Luckily, he reflected, that need not include rations. He could eat Tokan food, though it was preferable he supplement it with a few terrestrial vitamin pills from his kit. He always carried some on his person. Brob had eaten before they left Mixumaxu, and one of his nuclear meals kept him fuelled for weeks.

Bemused, the alien wandered off after Bosun Bush, rather like an ocean liner behind a small tugboat. Alex was taken to a vacant cabin and installed. It was reasonably comfortable, except that a human given a Hoka bed must sleep sitting up. One by one, the ships warped from the docks, set sail, and caught the breeze. When Alex reemerged, *Victory* was rolling along over chill greenish waters, under a cloud of canvas like those that elsewhere covered

the sea. Air sang in the rigging and carried a tang of salt. Crewmen went about their tasks—which included, ominously, the polishing of cannon as heavy as Brob himself—or, off watch, sat around telling each other how French blood would redden the ocean. Land was already low on the northern horizon.

Alex didn't stay topside long. He had had a difficult time of late, and faced a dinner with Lord Nelson, Captain Bligh, and heaven knew who else, in his role as Hornblower. Let him get some rest while he was able.

Shouts, trumpet calls, drumbeats, the thud of running feet roused him from an uneasy night's sleep. He stumbled forth in his pajamas. Pandemonium reigned, Hokas scurrying everywhere to and fro. Aloft, a lookout cried, "Thar she blows—I mean to say, Frogs ahead, two p'ints t' starboard!"

"Stand by to engage!" yelled Captain Bligh from the quarterdeck.

Alex scrambled up the ladder to join him. Nelson was there already, the empty sleeve of his dressing gown aflap in the wind, a telescope clapped to his patchless eye. "We've the weather gauge of them," he said. "They'll not escape us, I trow. Run up the signal flags: England expects every man will do his duty."

Aghast, Alex stared forward, past the bowsprit and across the whitecaps. Dawnlight showed him three large sailing vessels on the rim of sight. Despite the distance, he identified the Tricolor proudly flying at each staff. Louis XIV had built a navy too. (The Hoka France had never had a Revolution, merely an annual Bastille Day fête. At the most recent of these, Napoleon had taken advantage of the usual chaos to depose the king, who cooperated because it would be more fun being a field marshal. The excitement delighted the whole nation and charged it with enthusiasm. Only in Africa was this ignored, the Foreign Legion preferring to stay in its romantic, if desolate, outposts.)

"No danger of their escape, milord." Bligh rubbed his hands. "See, they're coming about. They mean to meet us. We outnumber 'em, aye, but those are three capital ships. Ah, a jolly little fight it'll be."

Down on the main deck, and on the gun decks below, sailors were readying their armament. The sardonic old prayer drifted thence to Alex's ears: "For that which we are about to receive, Lord, make us duly grateful." Marine sharpshooters swarmed into the masts. He shuddered. Like children at play, the Hokas had no idea what shot and shell would inflict on them. They would find out, once the broadsides began, but then it would be too late. Nor would they recoil. He knew well how much courage dwelt in them.

Feeling ill, he mumbled, "Admiral, wouldn't it be best if we—er—avoided commitment in favor of proceeding on our mission? Preserve the King's property, you know."

Nelson was shocked. "Commodore Hornblower! Do you imagine British seamen would turn tail like a . like a crew of tailturners? Egad, no! Britannia rules the waves! Westminster Abbey or victory!"

Captain Bligh smiled. "I'm sure the commodore is no craven, but has some

ruse in mind," he said cunningly. "What is it, sir?"

"I—well, I—" Desperate, Alex looked downward from the rail which his white-knuckled hands gripped. Brob stood like a rock in a surf of Hokas. "Can you do anything, anything at all?" the human wailed to him.

"As a matter of fact," Brob responded diffidently, "I believe I may see a perhaps useful course of action."

"Then for mercy's sake, *do* it! Though we can't take French lives either, do you realize?"

"I would never dream of it." Brob fanned himself, as if the very thought made him feel faint. "You shall have to lower me over the side." He looked around him. "Possibly with one of those—er—spars to keep me afloat."

"Do you hear that?" Alex exclaimed to Nelson and Bligh. "Brob—uh, Mr. Christian can save the day." They stared blankly at him. He saw he must give them an impression of total calm, complete mastery of the situation. Somehow, he grinned and winked. "Gentlemen, I do indeed have a ruse, but there isn't time now to explain it. Please ready a cargo boom and drop the mate overboard."

Nelson grew distressed. "I do not recall, sir, that any precedent exists in the annals of war for jettisoning the mate. If we should be defeated, it would count heavily against us at our courts martial."

Bligh was quicker-witted. "Not if he's mutinied," he said. "Do you follow me, Christian, you treacherous scoundrel? Don't just stand there. Do something mutinous."

"Well, er—" With a mighty effort, against his every inclination, Brob raised a cable-thick middle finger in the air. "Up yours, sir. A rusty grapnel, sir, sideways. I do require a grapnel."

"Ah, hah! D'ye hear what he was plotting? Next thing we knew, we'd be adrift in an open boat 4,000 miles from Timor. Overboard he goes!" bellowed Bligh in his shrill soprano.

A work detail was promptly organized. To the sound of a lusty chanty, Brob, a spare spar firmly lashed to his massive body and carrying his implement, went on high, swung above the gunwale, and dropped into the waves. An enormous splash followed. Fearful of the outcome, yet intensely curious himself, Alex watched his friend swim off to meet the French.

They were still well out of gunshot range. Windjammers can't maneuver fast. The sight of the monster nearing them alarmed the crews, who opened fire on him. Two of the cannonballs struck, but bounced harmlessly off.

Coming to the nearest vessel, Brob trod water while he whirled his hook at the end of a long chain. He let fly. It bit hard into a mast and snugged itself against a yard. Brob dived and began to haul. Drawn by the chain, the ship canted over—and over—and over—The sea rushed in through gunports and hatches.

Brob came back to the surface. A deft yank on the chain dislodged the grapnel and brought it to him again, along with a portion of the mast that he had snapped across. The war craft wallowed low. It was not sinking, quite, and nobody had been hurt, but its powder was drenched, leaving it helpless.

Brob gave a similar treatment to the

next. The third showed a clean pair of heels, followed by hoots of British derision.

Brob returned to the *Victory*, where his sailors winched him on deck to the tune of "Way, hey, and up he rises, ear-lie in the morning." Lord Nelson magnanimously issued him a pardon for his insubordinate conduct and Captain Bligh ordered an extra ration of grog for everybody.

Indeed, beneath their boasting, the Hokas seemed glad to have avoided combat. That gave Alex a faint hope.

Whether or not the entire naval strength available to France in these parts at this time had been routed, none was on hand when the flotilla from England dropped anchor two days afterward. Sunset light streamed over a hush broken only by the mildest of breezes and the squeals of leathery-winged seafowl. The bay here was wide and calm. Above it loomed the Iberian peninsula. Like its namesake on Earth, this land was rugged, though lushly green. A village, whitewashed walls and red tile roofs, nestled behind a wharf where fishing boats lay moored.

Also red were the coats of marines ashore. They had occupied the place as a precaution against anyone going off to inform the enemy of their arrival. It turned out that there was no danger of that. These isolated local folk were unconcerned about politics. Rather, they were overjoyed to have another set of foreign visitors. They had already seen Napoleon's Grand Army pass through.

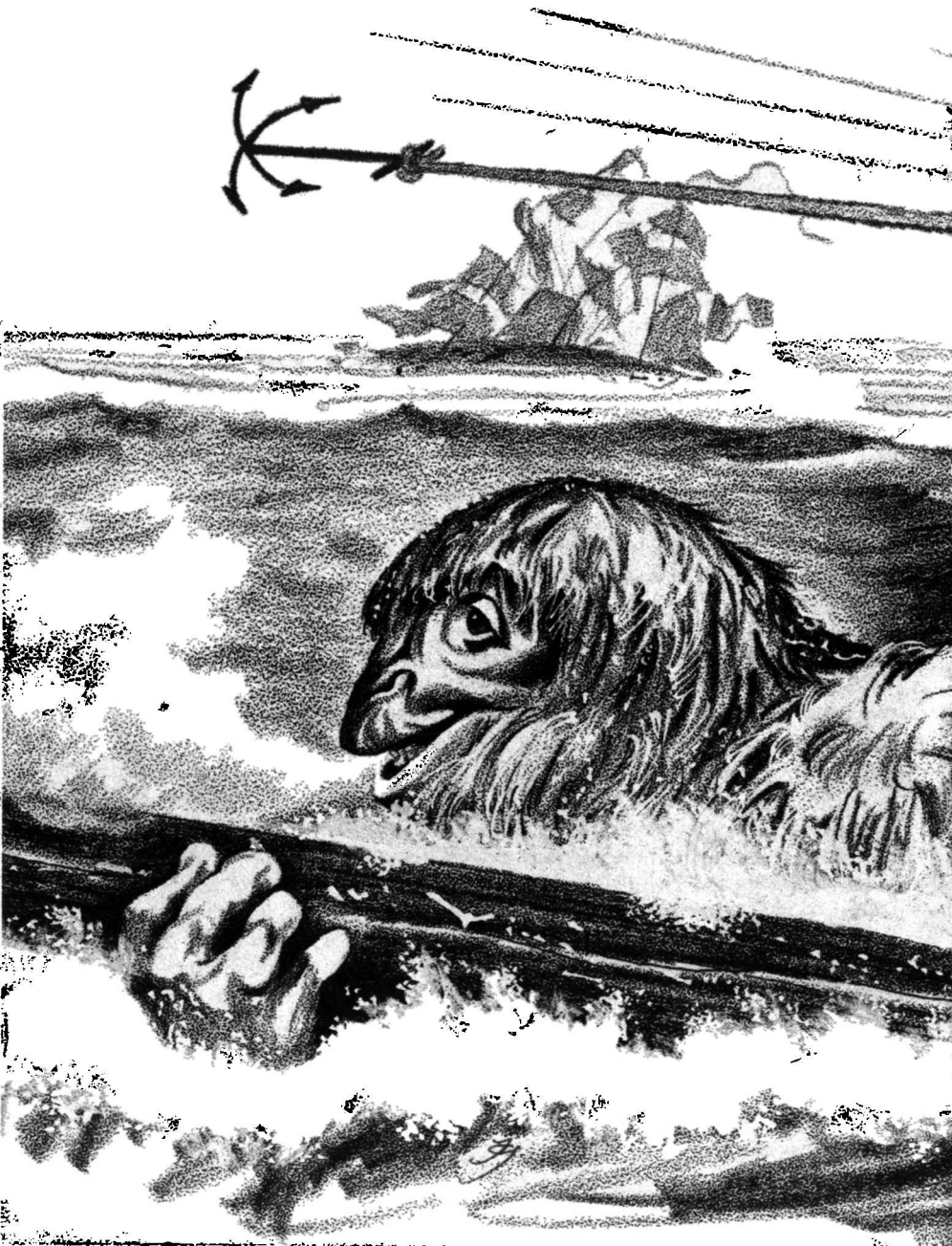
Indeed, that host was encamped about ten kilometers off, beyond a high ridge to the southeast, alongside a river which emptied into the bay. Alex supposed the Emperor had chosen that site in order to be safe from surprise attack and bombardment out of the sea. He saw the smoke of camp fires drift above trees, into the cool evening air.

Standing on the quarterdeck between Nelson and Bligh, he said fervently, "Gentlemen, I thank you for your cooperation in this secret mission of mine. Tonight I'll go ashore, alone, to, er, get the cut of the Frenchman's jib. Kindly remain while I'm gone, and please refrain from any untoward action that might warn him."

His plan was to steal into yonder camp, find Napoleon, identify himself, and demand a cease-fire (not that firing had begun, except for target practice, but the principle was the same). It should be less risky than an outsider would think. Hokas would scarcely shoot at a human, especially one whom various among them would recognize as the plenipotentiary. Instead, they would take him to their leader, who if nothing else would respect his person and let him go after they had talked.

This was the more likely because he had had the sailmaker sew him an impressive set of clothes. Gold braid covered his tunic, gold stripes went down his trousers, his boots bore spurs and his belt a saber. From the cocked hat on his head blossomed fake ostrich plumes. From his shoulders, unfastened, swung a coat reaching halfway down his calves, whose elbow-deep pockets sported huge brass buttons. Borrowed medals jingled across his left breast.

The main hazard was that the subversives would discover his presence



before he had had his meeting. To minimize this chance, he meant to sneak as far as he could.

He might actually make it undetected to the Emperor's tent. On such short notice as they had had, even fast-learning Hokas could not have developed a very effective military tradition. Sentries would tend to doze at their posts, or join each other for a swig of *ordinaire* and a conversation about the exploits of Brigadier Gerard.

Nelson frowned around his eyepatch. "Chancy," he said. "Were it anybody but you, milord, I'd forbid it, I would. Still, I expect Your Grace knows what he's about."

"My Grace?" Alex asked, bewildered. "But I haven't been made a lord yet—that is, I'm plain Commodore Hornblower—" Seeing the look on the two furry faces, he gulped. "I am. Am I not?"

Captain Bligh chuckled. "Ah, milord, you're more than the bluff soldier they think of when they say 'Wellington.' That's clear. You couldn't have routed 'em as you did—as you're going to do, here in the Peninsula and so on till Waterloo—you couldn't do that if your mind weren't shrewd."

Admiration shone in Nelson's eyes. "I'll wager the playing fields of Eton had somewhat to do with that," he said. "Have no fears, Your Grace. Your secret is safe with us, until you've completed your task of gathering intelligence and are ready to take command of your troops."

"Scum of the earth, they are," Bligh muttered. "Just like my sailors. But we'll show those Frenchies what Britons are worth, eh, milord?"

Alex clutched his temples. "Omigawd, no!" He stifled further groans. Whether Oakheart had included the assertion in his letter, or whether these officers had concluded on their own account, now that he was going ashore in his gaudy uniform, that he must really be the Duke of Wellington, traveling under the alias of Horatio Hornblower — did it make any difference?

To be sure, somewhere in England a Hoka bore the same name. Tanni had mentioned him. That mattered naught, in his absence, to the elastic imaginations of the natives.

Alex struggled to remember something, anything, concerning the original Wellington. Little came to him. He had only read casually about the Napoleonic period, never studied it, for it was not an era whose re-enactment he would have allowed on Toka, if he had had any say in the matter. At one time, Alex recalled, somebody had tried to blackmail the great man, threatening to publish an account of his involvement with a woman not his wife. Drawing himself up to his full height and fixing the blackmailer with a steely eye, the Iron Duke had snapped, "Publish and be damned!" It seemed rather a useless piece of information now, especially for a happily married man who cherished no desire for illicit affairs.

Alex blanched at the prospect of being swept along by events until he in fact commanded the British army in outright combat. That would certainly put an end to his career, and earn him a long prison sentence as well.

He rallied his resolution. The thing must not happen. Wasn't that his entire

purpose? Why else would he be dressed like this?

Having reassured an anxious Brob, he went ashore in a dinghy rowed by two marines, and struck off inland. Night fell as he strode, but a moon and a half illuminated the dirt road for him. Apart from the warmth and scratchiness of his clothes, the uphill walk was no hardship; he was still young, and always had been athletic—formerly a champion in both track and basketball.

Loneliness did begin to oppress him. Save for farmsteads scattered over the landscape, the coziness of whose lamplit windows reminded him far too much of home, he walked among trees and through pastures. Shadows bulked, menacing. He almost wished he had brought a firearm. But no, that might be construed as a threat, and generate resistance to his arguments. Persuasion seemed his solitary hope.

In due course he entered a forest, but soon he welcomed its darkness, when he stood looking down into a valley ablaze with camp fires. Campaigning or not, Hokas liked to keep late hours. Tents, more or less in rows, lined the river banks; he saw fieldpieces gleam, the bulks of the "horses" that drew them, a large and flag-topped pavilion which must house Napoleon; he heard a murmur of movement down there, and occasional snatches of song. While this Grand Army did not compare with the original, it must number thousands.

Having picked a route, Alex began the stealthy part of his trip. His pulse was loud in his ears, but his feet were silent. The stalking and photographing of wild animals had long been a sport he followed.

Eventually he passed a couple of pickets, who were too busy comparing amorous notes to observe him. His limited French gave him the impression that Madeleine was quite a female—unless she was a pure fiction, which was not unlikely. Farther on, he belly-crawled around fires where soldiers sat tossing dice or singing ballads that all seemed to have the refrain "*Rataplan! Rataplan!*" Lanes between tents offered better concealment yet.

And thus he did, indeed, come to the outsize shelter at the heart of the encampment. From its centerpole a flag fluttered in the night wind, bearing a golden *N* within a wreath. Moonlight sheened off the muskets and bayonets of half a dozen sentries who stood in blue uniforms and high shakoes before the entrance. A brighter glow spilled from inside, out of an opened window flap at the rear. Alex decided to peek through it before he declared himself.

He did—and drew a gasp of amazement.

Luxuriously furnished, the pavilion held a table on which lay the remnants of a dinner (it seemed to have been an attempt at turning a native flying reptiloid into chicken Marengo) and several empty bottles. Perhaps this was the reason why a rather small and stout Hoka kept a hand thrust inside his epauletted coat. He stood at another table, covered with maps and notes, around which four spectacularly uniformed officers of his race were gathered. It was the alien squatting on top, next to the oil lamp, who shocked Alex.

Had he straightened on his grasshopper-like legs, that being would not have reached a Hoka chin. His two arms were equally long and skinny, his torso a mere lump which his black, silver-ornamented clothes did nothing to make impressive. Gray-skinned and hairless, his head was a caricature of a man's — batwing ears, beady eyes, needle-sharp teeth, and a nose ten centimeters long, that waggled as he spoke in a voice suggestive of fingernails scratching a blackboard.

He was employing English, the most widespread language on Toka, as it was throughout the spaceways. Probably he knew less French than Alex did, whereas Napoleon and his staff would have had abundant contact with humanity before they assumed their present identities.

"You must seize the moment, sire," he urged. "Audacity, always audacity! What have we done hitherto, we and the Spanish troops, but march and countermarch? Not a single shot fired in anger. Madness! We must seek them out, attack and destroy them, at once. Else we will have them at our backs when the English, that nation of shopkeepers, arrive in force."

The Hoka Napoleon gestured with his free hand. "But we don't want to hurt the Spaniards," he objected. "After all, they are supposed to become my loyal subjects, under my cousin. *Du sublime au ridicule il n'y a qu'un pas*, as my distinguished predecessor put it after the retreat from Moscow."

"Nonetheless," hissed the alien, "we must take decisive action or else undergo an even worse disaster than that same retreat. What is the use of your military genius, my Emperor, if you won't exercise it?" He turned to another Hoka, whose fur was red rather than golden. "Marshal Ney, you've talked enough about your wish to lead gallant cavalry charges. Do you never propose to get out there and *do* it?"

"*Oui, Monsieur* Snith," replied that one, "although I had, um-m, seen myself as an avenger, or better yet a defender, and the Spanish haven't done us any actual harm."

So, thought Alex, the alien's name was Snith. He had already recognized whence the being hailed. As he had suspected, this was a member of the Kratch. Now he knew, beyond doubt, that the Universal Nationalist Party which held power on their world had begun actively to undermine the wardship system and thus weaken the entire Interbeing League. Out of discord among the stars could come war; out of war, chaos; out of chaos, hegemony for those who had anticipated events.

"Hear me," the Krat was saying. "Has not my counsel put you on the way to power and glory? Do you not want to bring your species under a single rule, and so prepare it to deal equally with those who now dominate space? Then you must be prepared to follow my plans to the end." He lowered his voice. "Else, my Emperor, I fear that my government must terminate its altruistic efforts on your behalf; and I go home, leaving you to your fate."

The Hokas exchanged glances, somewhat daunted. Clearly, Snith had instigated their grandiosity, and continued to inspire and guide it. For his part, Alex felt sickened. Well, he thought, he'd wait till the conference was over and Snith had sought his quarters, then rouse

Napoleon and set forth a quite different point of view—

A bayonet pricked his rump. "Yipe!" escaped from him. Turning, he confronted the sentries. They must have heard his heavy breathing and come to investigate.

"*Qui va là?*" demanded their corporal.

Alex mastered dismay. If the Hokas were reluctant to attack their fellow planetarians, they would be still more careful of a human. A face-to-face showdown with Snith might even change their minds. "Show some respect, *poilu!*" he rapped. "Don't you see who I am?"

"*Je ne suis pas—Monsieur*, I am not a *poilu*, I am an old *moustache*," said the corporal, offended. "And 'ere by my side is Karl Schmitt, a German grenadier lately returned from captivity in Russia—"

Alex's whirling thought was that these French could not have studied their Napoleonic history very closely either. The Emperor himself interrupted the discussion, by stumping over to the opening. "*Mon Dieu!*" he exclaimed. "*Mais c'est Monsieur le Plenipotentiaire* Jones! Sir, is this not irregular? The use of diplomatic channels is more in accord with the dignity of governments."

Snith reacted fast. "Ah, ha!" he shrilled. "There you see, my Emperor, how the Earthlings who have so long oppressed your world despise you. Avenge this insult to the honor of France!"

Alex reacted just as fast, although he was operating mainly on intuition. "Nonsense," he said. "In point of fact, I'm being—I mean I am none less than the Duke of Wellington, dispatched by none less than the Prince Regent, the Prime Minister, the First Lord of the Admiralty, Lord Nelson, and Commodore Hornblower, on a special mission to negotiate peace between our countries."

He drew himself up to his full height and did his best to fix Snith with a steely eye.

"*Hein?*" Napoleon gripped his stomach harder than before. "Now I am confused, me. Quick, a carafe of Courvoisier."

Snith jittered about on the table. "Where is your diplomatic accreditation, miserable Earthling?" he squealed, waving his tiny fists. "How can we be sure you are not a spy, or an assassin, or a—a—"

"A shopkeeper," suggested Marshal Ney.

"Thank you. A shopkeeper. My Emperor," said Snith more calmly, "a British ship must have brought him. Else he would have flown in like an honest plenipotentiary. Therefore he must be in collusion with perfidious Albion. Arrest him, sire, confine him, until we can discover what new threat lies in wait for you."

Under the gaze of his marshals, Napoleon could not but be strict. "Indeed," he said regretfully. "*Monsieur le Duc*, if such you are and if your intentions are sincere, you shall have a formal apology. Meanwhile, you will understand the necessity of detaining you. It shall be an honorable detention, whether or not we must afterward place you before a firing squad." To the soldiers: "*Enfermez-il, mes enfants.*"

In a kind of dull consternation, Alex

realized that his image required him to go off, a prisoner, too stoic to utter any protest.

First Napoleon took custody of his sword, and under Snith's waspish direction he was searched for hidden weapons, communications devices, and anything else of possible use. If only he had had a portable radio transceiver along, he could have called Brob at the instant when things went awry. The giant could gently but firmly have freed him. Why didn't he think of simple precautions like that beforehand? A fine secret agent he was! The excuse that he wasn't supposed to be a secret agent, and moreover had had a good deal else on his mind, rang false.

The squad conducted him to a nearby farmhouse. They turned the family out, but those didn't object, since the Emperor had ordered they be well paid for the inconvenience. Alex had often thought that the Hokas were basically a sweeter species than humankind. Perhaps a theologian would suppose they were without original sin. The trouble was, they had too much originality of other sorts.

The house was humble, actually a cottage. A door at either end gave on a living room, which doubled as the dining room, a kitchen and scullery, and two bedrooms, all in a row along a narrow hall. The floor was clay, the furnishings few and mostly homemade. When the windows had been shuttered and barred on the outside, Alex's sole light would be from some candles in wooden holders.

"I give myself, me, ze honor to stand first watch outside ze south door," said the squad leader. "Corporal Sans-Souci, at Your Lordship's service. Karl, *mon brave*, I reward your *esprit* and command of English by posting you at ze north end."

"*Viel Danke, mein tapfere Korporal*," replied the little German grenadier. "If *der Herzog* Vellington vould like to discuss de military sciences vit' me, please chust to open de door."

Jealousy made Sans-Souci bristle. "*Monsieur le Duc* is a man of ze most virile, *non?*" he countered. "If it should please 'im to describe 'is conquests in ze fields of love, and 'ear about mine, my door shall stand open too."

"No, thanks, to you both," Alex muttered, stumbled on into the cottage, and personally closed it up. He knew that, while either trooper would happily chatter for hours, exit would remain forbidden. Despite their size, Hokas were stronger than humans, and these must have a stubborn sense of duty.

Alex sank down onto a stool, put elbows on knees and face in hands. What a ghastly mess! Outnumbered as they were, the British could do nothing to rescue him. If they tried, they would be slaughtered, which was precisely what Snith wanted. Brob— No, Alex's idea about that being had been mistaken. Cannon and bullets meant nothing to Brob, but Snith undoubtedly had energy weapons against which not even the spacefarer could stand.

Could he, Alex, talk Napoleon into releasing him? Quite likely he could—for example, by an appeal to the Emperor's concern for the diplomatic niceties — except, again, for the ever-damned Snith. The Krat had the edge; he could out-argue the man, whose position was,

after all, a bit dubious in the eyes of the French (and in his own eyes, for that matter). Thus, if Alex was not actually shot, he would at least languish captive for weeks, probably after being moved to a secret locale. Meanwhile Snith would have egged Napoleon into an attack on the Spanish army, and shortly thereafter Nelson's assembled fleet would begin raiding the coasts and landing British troops, and before the League could do anything to prevent it, there would have been wholesale death and devastation. No doubt it would also occur elsewhere on Toka. Snith might be the leading Kratch agent, but obviously he had others doing the same kind of dirty work in chosen societies around the planet.

Wearily and drearily, Alex decided he might as well go to bed. In truth, that was his best course. Sometimes in the past, when he slept on a problem, his subconscious mind, uninhibited by the rationality of his waking self, had thrown up a solution crazy enough to work. The trouble now was, he doubted he could sleep.

He rose to his feet, and stopped cold. His glance had encountered an object hanging on the wall. It was a small leather bag, stoppered and bulging. This being a Spanish home, it must be a *bota*, and that word translated as "wineskin."

Alex snatched it to him, opened it and his mouth, and squeezed. A jet of raw, potent liquor laved his throat.

A deep buzz wakened him. Something brushed his nose. Blindly, aware mainly of a headache and a raging thirst, he swatted. The something bumbled away. Its drone continued. Soon it was back. Alex unlidded a bleary eye. Light trickled in through cracks and warps in the shutters across his bedroom window. A creature the size of his thumb fluttered clumsily, ever closer to him. Multiple legs brushed his skin again. "*Damn*," he mumbled, and once more made futile swatting motions.

The insectoid was as persistent as a terrestrial fly. Maybe an odor of booze on his breath attracted it. Alex would get no more rest while it was loose.

He forced himself to alertness. Craftily, he waited. The huge brown bug hummed nearer. Alex remained motionless. His tormentor drew within centimeters of him. He kept himself quiet while he studied its flying pattern. Back and forth it went, on spatulate wings. Uzz, uzz, uzz it went. Alex mentally rehearsed his move. Then, pantherlike, his hand pounced. Fingers closed on the creature. "Gotcha!" he rasped. A sorry triumph, no doubt, but better than no triumph at all.

The bug fluttered in his grip. He was about to crush it, but stopped. Poor thing, it had meant him no harm. Why must he add even this bit to the sum of tragedy that would soon engulf Toka? (What a metaphor! But he was hung over, as well as oppressed by the doom he foresaw.) At the same time, he was jolly well not going to let it disturb his sleep any more.

He could carry it to a door, have that door swung aside, and release his prisoner. But then the sentinel would be eager to talk to *his* prisoner, and that was just too much to face at this hour.

Alex swung his nude body out of bed. A chamber pot stood nearby. He raised the lid, thrust the bug inside, and

dropped the lid back in place. The bug flew about. Resonance made the vessel boom hollowly. Alex realized he had not done the most intelligent thing possible, unless the house contained another chamber pot.

He looked around him. Daylight must be very new, at sunrise or before, since it was weak and gray. In a while someone would bring him breakfast. He hoped it would include plenty of strong black coffee. Afterward he would insist on a hot bath. Damnation, here he was, unwashed, uncombed, unshaven, confined in a peasant's hovel. Was that any way to treat the Duke of Wellington?

As abruptly as the night before, Alex froze. Now his gaze did not stop at a leather flask, which in any case lay flaccid and empty. Figuratively, his vision pierced the wall and soared over valley and hills to the sea. Inspiration had, indeed, come to him.

It might be sheer lunacy. The chances were that it was. He had no time for Hamlet-like hesitation. Nor did he have much to lose. Seizing the pot, he hurried out of the room and down the hall to the north end of the cottage. He had changed his mind about conversation with his guards.

None the worse for a sleepless night, Karl flung wide the door when Alex knocked, though his muscular little form continued to block any way out. Mist had drenched his uniform and, as yet, blurred view of the camp below this farmstead, but reveilles had begun to sound through the chill air.

"*Gut Morgen, gut Morgen!*" the grenadier greeted. "Did de noble captiff shlumber vell? Mine duty ends soon, but I vill be glad to shtay and enchoy discourse *am Krieg*—"

He broke off, surprised. M-m-uzzz, oom, oom went the jar that Alex held in the crook of an arm.

"Mine lord," Karl said after a moment, in a tone of awe, "you iss a powerful man, t'rough and t'rough. I vill be honored to empty dot for you."

"No need." Alex took the lid off and tilted the vessel forward. The bug blundered forth. As it rose higher, sunrise light from behind the fog made it gleam like metal. Karl's astounded stare followed it till it was out of sight.

Thereafter he scratched his head with his bayonet and murmured, "I haff heard dey feed dem terrible on de English ships, but *vot* vas *dot?*"

Alex smiled smugly, laid a finger alongside his nose, and replied in a mysterious voice, "I'm afraid I can't tell you that, old chap. Military secrets, don't y' know."

Karl's eyes grew round. "*Mein Herr?* Zecrets? But ve gafe you a zearch last night."

"Ah, well, we humans—for I am human, you realize, as well as being the Duke of Wellington—we have our little tricks," Alex answered. He assumed a confidential manner. "You're familiar with the idea of carrier pigeons. Before you became a German grenadier, you may have heard about terrestrial technology—miniaturization, transistors—but I may say no more.

"Except this, because you're stout and true, Karl, whether or not you're on the wrong side in this war. No matter what happens later today, never blame yourself. You could not possibly have known."

He closed the door on the shaken Hoka, set the mug aside, and sought the south end of the house.

"*Bonjour, monsieur,*" hailed Sans-Souci. "I 'ope ze noble lord 'as slept well?"

"Frankly, no," said Alex. "I'm sure you can guess why."

The soldier cocked his ears beneath his shako. "*Eh, bien, ze* gentleman, 'e 'as been lonely, *n'cest-ce pas?*"

Alex winked, leered, and dug a thumb into the other's ribs. "We're men of the world, you and I, corporal. The difference in our stations makes no difference. Uh, I mean a man's a man's for a' that, and— Anyhow, if I'm to be detained, don't you agree I should have companionship?"

Sans-Souci grew ill at ease. " 'Ow true, 'ow sad. But Your Lordship, 'e is not of our species—"

Alex drew himself up to his full height. "What do you think I am?" he snapped. "I have nothing in mind but a lady of my race."

"Zat will not be so easy, I fear."

"Perhaps easier than you think, corporal. This is what I want you to do for me. When you're relieved, pass the word on to your lieutenant that, if the Emperor is virile enough to understand, which he undoubtedly is, why, then the Emperor will order a search for a nice, strapping wench. There are a number of humans on Toka, you recall—League personnel, scientists, journalists, lately even an occasional tourist. I happen to know that some are right in this area. It should not be difficult to contact them and— Well, corporal, if this works out, you'll find me not ungrateful."

Sans-Souci slapped his breast. "Ah, *monsieur*," he cried, "to 'elp love blossom, zat will be its own reward!"

A couple of new soldiers appeared out of the fog and announced that they were the next guards. Sans-Souci barely took time to introduce them to the distinguished detainee—a stolid, though hard-drinking, private from Normandy and a dashing Gascon sergeant of Zouaves—before hastening off. Alex heard a clatter from behind the house as Karl departed equally fast.

Returning inside, the man busied himself in preparations for that which he hoped would transpire. Whatever did, he should not have long to wait. Any collection of Hokas was an incredible rumor mill. What the sentries had to relate should be known to the whole Grand Army within the hour.

Excitement coursed through his blood and drove the pain out of his head. Win, lose, or draw, by gosh and by golly, he was back in action!

He estimated that a mere thirty minutes had passed when the door to the main room opened again, from outside. At first he assumed a trooper was bringing his breakfast, then he remembered that English aristocrats slept notoriously late and Napoleon would not want his guest disturbed without need. Then a being stepped through, closed the door behind him, and glared.

It was Snith.

"What's this?" the Krat screamed. The volume of the sound was slight, out of his minuscule lungs.

"What's what?" asked Alex, careful to move slowly. Though he towered a full meter above the alien, and probably outmassed him tenfold, Snith carried a

dart gun at his belt; and his race was more excitable, impatient, irascible than most.

"You know what's what, you wretch. That communication device of yours, and that camp of your abominable co-humans somewhere close by. Thought you'd sneak one over on me, did you? Ha! I'm sharper than you guessed, Jones. Already scouts have brought back word of those English in the bay and the village. We'll move on them this very day. But first I want to know what else to expect, Jones, and you'll tell me. Immediately!"

"Let's be reasonable," Alex temporized. While he had expected Snith to arrive alone, lest the Hokas learn too much, he could not predict the exact course of events—merely devise a set of contingency plans. "Don't you realize what harm you're doing on this planet? Not only to it, either. If ever word gets out about your government's part in this, you can be sure the rest of the League will move to have it replaced."

The Krat sneered upward at the human's naked height. "They won't know till far too late, those milksop pacifists. By then, Universal Nationalism will dominate a coalition so powerful that—Stand back, you! Not a centimeter closer, or I shoot." He touched the gun in its holster.

"What use would that be to you?" Alex argued. "Dead men tell no tales."

"Ah, but you wouldn't be dead, Jones. The venom in these darts doesn't kill unless it strikes near the heart. In a leg, say, it'll make you feel as though you're burning alive. Ah, you'll talk, you'll talk," responded Snith, obviously enjoying his own ruthlessness. "Why not save yourself the agony? But you'd better tell the truth, or else, afterward, you'll wish you had. How you'll wish you had!"

"Well, uh, well— Look, excuse me, I have to take a moment for nature. How can I concentrate unless I do?"

"Hurry up, then," Snith ordered.

Alex went to the chamber pot. He bent down as if to remove its lid. Both his hands closed on its body. Faster than when he had captured the bug, he hurled it. As a youth in the Naval Academy, he had been a basketball star. The old reflexes were still there. The lid fell free as the mug soared. Upside down, it descended on Snith. Too astonished to have moved, the Krat buckled beneath the impact. Alex made a flying tackle, landed on the pot, and held it secure.

Snith banged on it from within, boomlay, boomlay, boomlay, boom. "What's the meaning of this outrage?" came his muffled shriek. "Let me go, you fiend!"

"Heh, heh, heh," taunted Alex. He dragged the container over the floor to a chair whereon lay strips of cloth torn off garments left by the dwellers here. Reaching beneath, he hauled Snith out. Before the Krat could draw weapon, he was helpless in the grasp of a far stronger being. Alex disarmed him, folded him with knees below jaws, and began tying him.

"Help, murder, treason!" Snith cried. As expected, his thin tones did not penetrate the door.

He regained a measure of self-control. "You're mad, insane," he gabbled. "How do you imagine you can escape? What will Napoleon do if you've

harmed his his Talleyrand? Stop this, Jones, and we can reach some *modus vivendi*."

"Yeah, sure," grunted Alex. He gagged his captive and left him trussed on the floor.

Heart pounding, the man spread out the disguise he had improvised from raiment and bedding. Thus far his plan had succeeded better than he dared hope, but now it would depend on his years of practice at playing out roles before Hokas, for the costume would never have gotten by a human.

First he donned his Wellingtonian greatcoat. Into a capacious pocket he stuffed the weakly struggling Snith. Thereafter he wrapped his hips in a blanket, which simulated a skirt long enough to hide the boots he donned, and his upper body in a dress which had belonged to the housewife and which on him became a sort of blouse. Over all he pinned another blanket, to be a cloak with a cowl, and from that hood he hung a cheesecloth veil.

Here goes nothing, he thought, and minced daintily, for practice, through the cottage to the farther door. It opened at his knock. An astonished Sergeant Le Galant gaped at the spectacle which confronted him. He hefted his musket. "*Qui va là?*" he demanded in a slightly stunned voice.

Alex waved a languid hand. "Oh, sir," he answered falsetto, "please let me by. I'm so tired. His Grace the Duke is a a most vigorous gentleman. Oh, dear, and to think I forgot to bring my smelling salts."

The Hoka's suspicions dissolved in a burst of romanticism. Naturally, he took for granted that the lady had entered from the side opposite. "*Ah, ma belle petite*," he burbled, while he kissed Alex's hand, "zis is a service you 'ave done not only for *Monsieur le Duc*, but for France. We 'ave our reputation to maintain, *non? Mille remerciments. Adieu, et au revoir.*"

Sighing, he watched Alex sway off.

The mists had lifted, and everywhere Hoka soldiers stared at the strange figure, whispered, nudged each other, and nodded knowingly. A number of them blew kisses. Beneath his finery, Alex sweated. He must not move fast, or they would start to wonder; yet he must get clear soon, before word reached Napoleon and made *him* wonder.

His freedom was less important than the prisoner he carried, and had been set at double hazard for that exact reason. This, maybe, was the salvation of Toka. Maybe.

When he had climbed the ridge and entered the forest, Alex shouted for joy. Henceforward he, as a woodsman, would undertake to elude any pursuit. He cast the female garb from him. Attired in greatcoat and boots, the plenipotentiary of the Interbeing League marched onward to the sea.

At his insistence, the flotilla recalled its marines and sought open water before the French arrived. Nelson grumbled that retreat was not British, but the human mollified him by describing the move as a strategic withdrawal for purposes of consolidation.

In Alex's cabin, he and Brob confronted Snith. The diminutive Krat did not lack courage. He crouched on the bunk and spat defiance. "Never will I betray the cause! Do your worst! And

afterward, try to explain away my mangled body to your lily-livered superiors.''

''Torture is, needless to say, unthinkable,'' Brob agreed. ''Nevertheless, we must obtain the information that will enable us to thwart your plot against the peace. Would you consider a large bribe?''

Alex fingered his newly smooth chin and scowled. The ship heeled to the wind. Sunlight scythed through ports to glow on panels. He heard waves rumble and whoosh, timbers creak, a cheerful sound of music and dance from the deck; he caught a whiff of fresh salt air; not far off, if he flew, were Tanni and the kids. Yes, he thought, this was a lovely world in a splendid universe, and must be kept that way.

''Bribe?'' Snith was retorting indignantly. ''The bribe does not exist which can buy a true Universal Nationalist. No, you are doomed, you decadent libertarians. You may have kidnapped me, but elsewhere the sacred cause progresses apace. Soon the rest of this planet will explode, and blow you onto the ash heap of history.''

Alex nodded to himself. A nap had done wonders for him akin to those which had happened ashore. Pieces of the puzzle clicked together, almost audibly.

Conspirators were active in unknown places around the globe. They must be rather few, though; Snith appeared to have managed the entire Napoleonic phase by himself. They must, also, have some means of communication, a code; and they must be ready at any time to meet for consultation, in case of emergency. Yes. The basic problem was how to summon them. Snith knew the code and the recognition signals, but Snith wasn't telling. However, if you took into account the feverish Kratch temperament—

A slow grin spread across Alex's face. ''Brob,'' he murmured, ''we have an extra stateroom for our guest. But he should not be left to pine in isolation, should he? That would be cruel. I think I can get the captain to release you from your duties as mate, in order that you can stay full time with Mr. Snith.''

''What for?'' asked the spacefarer, surprised.

Alex rubbed his hands together. ''Oh, to try persuasion,'' he said. ''You're a good, kind soul, Brob. If anybody can convince Mr. Snith of the error of his ways, it's you. Keep him company. Talk to him. You might, for instance, tell him about flower arrangements.''

The planet had barely rotated through another of its 24.35-hour days when Snith, trembling and blubbering, yielded.

It was necessary to choose the rendezvous with care. The conspirators weren't stupid. Upon receiving their enciphered messages, which bore Snith's name and declared that unforeseen circumstances required an immediate conference, they would look at their maps. They would check records of whatever intelligence they had concerning human movements and capabilities at the designated spot. If anything appeared suspicious, they would stay away. Even if nothing did, they would fly in with such instruments as metal detectors wide open, alert for any indications of a trap.

Accordingly, Alex had made primitive arrangements. After picking up a

long-range transmitter in Plymouth, he directed *Victory*—alone—to an isolated Cornish cove, whence he issued his call. Inland lay nothing but a few small, widely scattered farms. Interstellar agents would think naught of a single windjammer anchored offshore, nor imagine that marines and bluejackets lurked around the field where they were supposed to land—when those Hokas were armed simply with truncheons and belaying pins.

Night fell. All three moons were aloft. Frost rings surrounded them. Trees hemmed in an expanse of several hectares, whereon haystacks rested hoar; the nearest dwelling was kilometers off. Silence prevailed, save when wildfowl hooted. Alex shivered where he crouched in the woods. Twigs prickled him. He wanted a drink.

Ashimmer beneath moons and stars, a teardrop shape descended, the first of the enemy vehicles. It grounded on a whisper of forcefield, but did not open at once. Whoever was inside must be satisfying himself that nothing of menace was here.

A haystack scuttled forward. It had been glued around Brob. Before anybody in the car could have reacted, he was there. His right fist smashed through its fuselage to the radio equipment. His left hand peeled back the metal around the engine and put that out of commission.

"At 'em, boys!" Alex yelled. His followers swarmed forth to make the arrest. They were scarcely necessary. Brob had been quick to disarm and secure the two beings within.

Afterward he tucked the car out of sight under a tree and returned to being a haystack, while Alex and the Hokas concealed themselves again.

In this wise, during the course of the night, they collected thirty prisoners, the entire ring. Its members were not all Kratch. Among them were two Slissii, a Pornian, a Sarennian, a Worbenite, three Chakbans; but the Kratch were preponderant, and had clearly been the leaders.

A glorious victory! Alex thought about the administrative details ahead of him, and moaned aloud.

Two weeks later, though, at home, rested and refreshed, he confronted Napoleon. The Empire was his most pressing problem. Mongols, Aztecs, Crusaders, and other troublesome types were rapidly reverting to an approximation of normal, now that the sources of their inspiration had been exposed and discredited. But Imperial France not only had a firmer base, it had the unrelenting hostility of Georgian Britain. The Peace of Amiens, which Alex had patched together, was fragile indeed.

Tanni was a gracious hostess and a marvelous cook. The plenipotentiary's household staff, and his children, were on their best behavior. Candlelight, polished silver, snowy linen, soft music had their mellowing effect. At the same time, the awesome presence of Brob reminded the Emperor—who was, after all, sane in his Hoka fashion—that other worlds were concerned about this one. The trick was to provide him and his followers an alternative to the excitement they had been enjoying.

"Messire," Alex urged over the cognac and cigars, "as a man of vision, you surely realize with especial clarity

that the future is different from the past. You yourself, a mover and shaker, have shown us that the old ways can never be the same again, but instead we must move on to new things, new opportunities—*la carrière ouverte aux talents*, as your illustrious namesake phrased it. If you will pardon my accent.''

Napoleon shifted in his chair and clutched his stomach. ''Yes, *mais oui*, I realize this in principle,'' he answered unhappily. ''I have some knowledge of history, myself. Forty centuries look down upon us. But you must realize in your turn, *Monsieur le Plenipotentiaire*, that a vast outpouring of energy has been released in France. The people will not return to their placid lives under the *ancien régime*. They have tasted adventure. They will always desire it.''

Alex wagged his forefinger. Tanni's glance reminded him that this might not be the perfect gesture to make at the Emperor, and he hastily took up his drink. ''Ah, but messire,'' he said, ''think further, I beg you. You ask what will engage the interest of your populace, should the Grand Army be disbanded. Why, what else but the natural successor to the Empire? The Republic!''

''*Qu'est-ce que vous dites?*'' asked Napoleon, and pricked up his ears.

''I comprehend, messire,'' Alex said. ''Cares of state have kept you from studying what happened to terrestrial France beyond your own period. Well, I have a number of books which I will gladly copy off for your perusal. I am sure you will find that French party politics can be more intricate and engaging than the most far-ranging military campaign.'' He paused. ''In fact, messire, if you should choose to abdicate and stand for elective office, you would find the challenge greater than any you might have encountered at Austerlitz. Should you win your election, you will find matters more complicated than ever at Berezina or Waterloo. But go forward, indomitable, *mon petit caporal!*'' he cried. ''*Toujours l'audace!*''

Napoleon leaned over the table, breathing heavily. Moisture glistened on his black nose. Alex saw that he had him hooked.

At Mixumaxu spaceport, the Joneses bade Brob an affectionate farewell. ''Do come back and see us,'' Tanni invited. ''You're an old darling, did anybody ever tell you?'' When he stooped to hug her, she kissed him full on his slightly radioactive mouth.

The couple returned to their residence in a less pleasant mood. Leopold Ormen had appeared at the city and applied for clearance to depart in his private spaceship.

Tanni begged to be excused from meeting him again. She felt too embarrassed. Alex insisted that she had made no mistake which he would not have made himself under the circumstances, but she refused anyway. Instead, she proposed, let her spend the time preparing a sumptuous dinner for the family; and then, after the children had gone to bed—

Thus Alex sat alone behind his desk when the journalist entered at the appointed hour. Ormen seemed to have lost none of his cockiness. ''Well, Jones,'' he said, as he lowered himself into a chair and lit a cigarette, ''why do I have to see you before I leave?''

"We've stuff to discuss," Alex answered, "like your involvement in the Kratch conspiracy."

Ormen gestured airily. "What are you talking about?" he laughed. "Me? I'm nothing but a reporter—and if perchance you get paranoid about me, that's a fact which I'll report."

"Oh, I have no proof," Alex admitted. "The League investigation and the trials of the obviously guilty will drag on for years, I suppose. Meanwhile you'll come under the statute of limitations, damn it. But just between us, you were part and parcel of the thing, weren't you? Your job was to prepare the way for the Kratch, and afterward it would've been to write and televise the stories which would have brought our whole system down."

Ormen narrowed his eyes. "Those are pretty serious charges, Jones," he lipped thinly. "I wouldn't like your noising them around, even in private conversation. They could hurt me; and I don't sit still for being hurt. No, sir."

He straightened. "All right," he said, "let's be frank. You've found indications, not legal proof but indications, that would cause many of my audience and my readers to stop trusting me. But on my side—Jones, I've seen plenty on this planet. Maybe somehow you did pull your chestnuts out of the fire. But the incredible, left-handed way that you did it—not to mention the data I've gotten on your crazy, half-legal improvisations in the past— Let me warn you, Jones. If you don't keep quiet about me, I'll publish stories that will destroy you."

From his scalp to his toes, a great, tingling warmth rushed through Alex. He had nothing to fear. True, in the course of his duties he had often fallen into ridiculous positions, but this had taught him indifference to ridicule. As for his record of accomplishment, it spoke for itself. Nobody could have bettered it. Nobody in his right mind would want to try. Until such time as he had brought them to full autonomy, Alexander Jones was the indispensable man among the Hokas.

He could not resist. Rising behind the desk, he drew himself to his full height, fixed Leopold Ormen with a steely eye, and rapped out: "*Publish and be damned!*" ■

Dr. Robert L. Forward

Flattening Spacetime

There is no such thing as gravity.

According to Newton, a mass is supposed to create a force called gravity that attracts other masses toward it. According to Einstein, Newton was wrong. Masses do not create a gravity field; instead, the mass "warps" the space near it. Other objects then move freely in that curved space. The resulting behavior of the freely moving objects is *almost* the same as if the mass generated an attracting force; that's why Newton based his theory on the existence of an attracting force. Unfortunately for people's desires for physical and mathematical simplicity, the Newton gravity-force picture is wrong. It does not predict the correct orbits for the planets, especially Mercury, while the Einstein curved-space picture does.

In addition to curving space, a mass also "curves" time. Time runs slower near a massive body than it does farther away. This time-slowing effect has been measured by comparing two clocks, one on the surface of the Earth and one high up in a rocket where time is less curved than it is on Earth.

Einstein got his idea for curved spacetime from the famous elevator "experiment" shown schematically in Figure 1. In this "thought experiment" he imagined himself in an elevator with no windows. His feet are pressed firmly to the floor with a force of one Earth gravity. If he would drop a lead ball, it would accelerate and fall to the floor. He asked himself if that was enough evidence to prove that the elevator was sitting motionless on the Earth and that the Earth's gravity field was pulling him down. He then calculated that the same force would be felt by his feet, the same acceleration would be seen in the lead ball, and in fact the results of *any* experiment would be the same if the elevator were being pulled upwards with a constant acceleration of one Earth gravity. These thought experiments led to his statement of the principle of equivalence—that over a sufficiently small region there is no way to tell the difference between

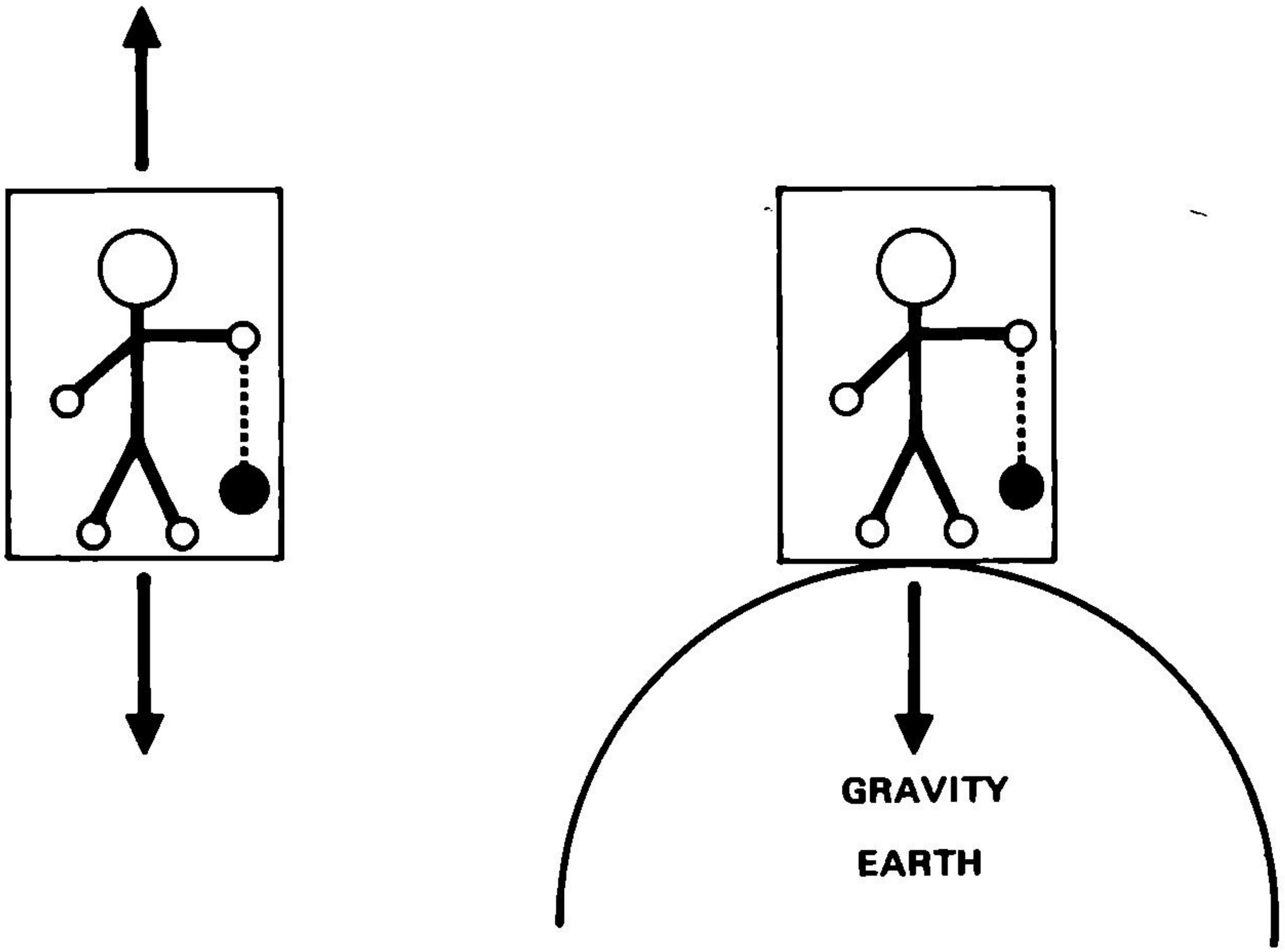


Figure 1. Einstein's elevator experiment.

gravity and acceleration. Mathematically they are equivalent.

Starting from this basic principle, Einstein proceeded to build his theory of gravity. Unlike the typical "idea man," Einstein was good not only at coming up with new ways of looking at nature, but he could also generate the mathematical equations that described his ideas so that he could put numbers in them and check them out. The resulting theory of curved spacetime, called the general theory of relativity, revolutionized our way of thinking about the universe. Ultimately it led to the discovery and understanding of such esoteric things as gravitational waves, black holes, and the Big Bang. All from a simple thought experiment about imaginary elevators.

In a *real* elevator, however, it *is* possible to tell the difference between gravity and acceleration. As is shown in Figure 2, if you take *two* lead balls into the elevator with you, hold them out at arm's length, and drop them, they will fall differently in accelerating elevators and gravitating elevators. In an accelerating elevator the balls will drop straight down to the floor. In a gravitating elevator the balls, being attracted to the center of the Earth (which is *not*

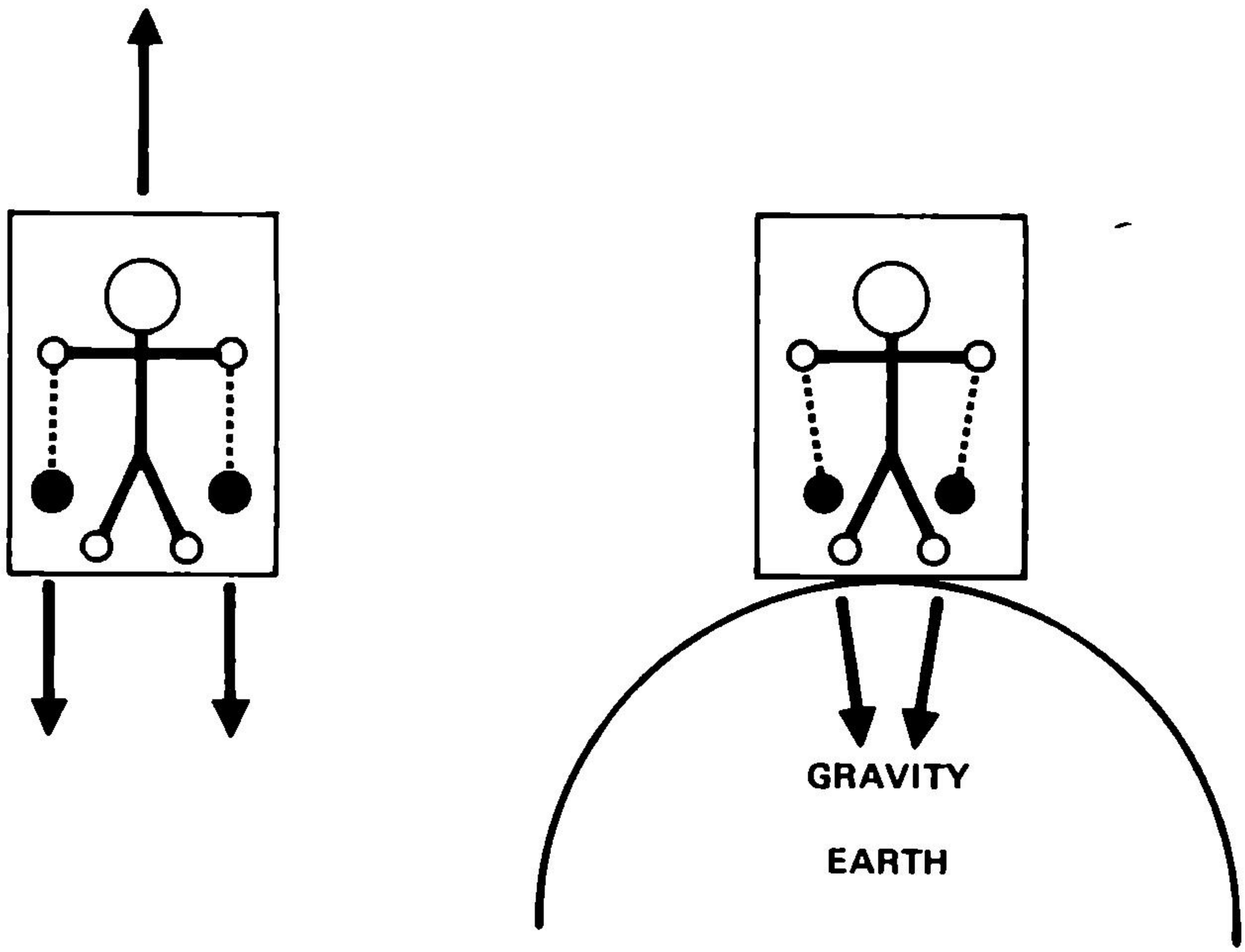


Figure 2. Measuring the curvature of spacetime in a real elevator.

"straight down"), fall inward at a slight angle. This difference in behavior is because over "large" regions the curvature of spacetime becomes noticeable.

Believe it or not, there are devices only 10 centimeters (4 inches) across that can detect this curvature of spacetime. I invented one: the rotating mass detector. You may have read about it in Larry Niven's Hugo Award-winning short story, "The Hole Man," published in the January 1974 issue of *Analog*. These mass detectors don't disprove the Einstein principle of equivalence. The principle of equivalence is only strictly valid at a point, and in Einstein's "thought experiment" he was assuming a *very* small elevator, so small that the curved spacetime in the elevator could be considered flat.

In a more prosaic example, this curvature of spacetime is what causes the twice-daily tides of the ocean. The Moon and the Sun warp the space around them, and the Earth moves through that multiply-warped space. The center of the Earth follows the "shortest path" in that curved space, dragging the rest of the Earth along with it. The tides in Earth's oceans are caused by the various portions of the oceans

trying to follow their own slightly differently curved versions of that "shortest path" trajectory.

Let's imagine another elevator experiment. You are inside a large closed box with six massive, highly accurate, hydrogen maser clocks. You are in free fall, and both you and the clocks are floating around. Could you use the clocks to tell whether you are in free fall near the Earth or whether you are motionless somewhere out in interstellar space?

If you place the six clocks about a meter away from you, one each above, below, in back, in front, and to the left and right, then you have formed a simple spacetime-curvature detector. If the elevator is floating out in interstellar space, the clocks will stay where they are and will all tick at the same rate. If the elevator is in free fall near the Earth, the clocks will respond to the spacetime curvature caused by the mass of the Earth and start behaving differently.

If the Earth is below you, then two of the clocks, the ones above and below you, will tick at different rates than the other four (in the plane around your waist). The clock below you, being farther down in the gravity field of the Earth (at a point of stronger spacetime curvature), will be ticking slower than the other clocks, and the one above you will be ticking faster. The clocks also will be moving. The ones above and below will be moving away from you with an acceleration of about 0.3 microgravities, while the four in the plane around you will be accelerating inward at 0.15 microgravities. (A microgravity is one millionth of an Earth gravity.)

If you wait a few minutes, this spacetime curvature measuring system can even tell you something about your free-fall trajectory. If the clocks continue with their accelerations and time-rate differences, but the accelerations increase with time, then you can start saying your prayers, because you are falling straight down. If the acceleration and time-rate differences start to change and shift—so that, instead of the above and below clocks ticking differently and accelerating away, the right and left clocks show the slowed and sped-up time differences and start accelerating away — then you know that you are in orbit, and the position of the Earth has shifted from below you to the right of you.

Interestingly enough, although you could tell you are near a mass with the curvature detector, you couldn't tell (without peeking outside) whether you were in a distant orbit about a black hole, a near orbit about Earth, or a ground-skimming orbit about a small asteroid with a density equal to that of the Earth. The accelerations, the time variations, and the orbital period would be the same in all three cases.

The effects of space curvature on time are very small. Although they are of great scientific importance and interest, they will have little effect on space technology. The acceleration forces are also small, but they *will* have an effect on space technology. At 0.3 microgravities an object would fall 5 centimeters (2 inches) in 10 minutes. Accelerations of this level can prove detrimental to certain very sensitive scientific experiments and space materials processes

trying to use the low-gravity environment of space.

One sensitive scientific experiment is called the gravitational clock experiment. The clock would consist of a large sphere of dense metal with a hole drilled in it. Inside the hole would be a small sphere bouncing back and forth in the tunnel (like the miniature black hole bouncing back and forth through the center of Mars in Larry Niven's story). The period of the bouncing "orbit" would be about 70 to 90 minutes, depending upon the density of the big sphere. This experiment would give an accurate measurement of the Newtonian gravitational constant G, and would allow us to compare the times of a "gravitational" clock with an "atomic" clock. (The times should be the same, but you can never tell.)

The gravitational clock can also be used to test Einstein's assertion that all masses fall at the same rate. Two clocks would be built, identical except that the "pendulum bobs" would be made of different materials. One would be made of one type of material, such as gold, that is as different as possible from the other material, such as aluminum. According to Einstein, both the gold and the aluminum spheres should bounce back and forth at the same rate, since the geometry of the curved spacetime doesn't care what the test masses are made of. If the gold falls at a different rate than the aluminum, then the two gravitational clocks would "tick" at different rates, and Einstein would be wrong. If we tried to do either of these experiments near the Earth, the tidal forces from the curved spacetime near Earth would try to pull the bouncing ball out of the sphere, upsetting the clock and spoiling the experiment.

Most of the proposed space materials processing experiments involve liquids. In one process small quantities of high-quality steel are melted and ejected into free fall. Surface tension then forms the blobs of molten steel into spherical balls. After they cool down and solidify they are perfect ball bearings (if you can prevent crystallization). With the Earth gravity tides present you do not get a perfect sphere, but a slightly football-shaped object.

Another space manufacturing process tries to make alloys out of two metals with greatly different densities, such as lead and aluminum. On the surface of the Earth the two liquids separate out, and you get a mostly lead alloy at the bottom of the pot and a mostly aluminum alloy at the top. In tideless free fall, once the two are mixed, there would be no forces to separate them. In free fall near the Earth the 0.3 microgravities of the Earth tides are enough to cause significant variations across the sample.

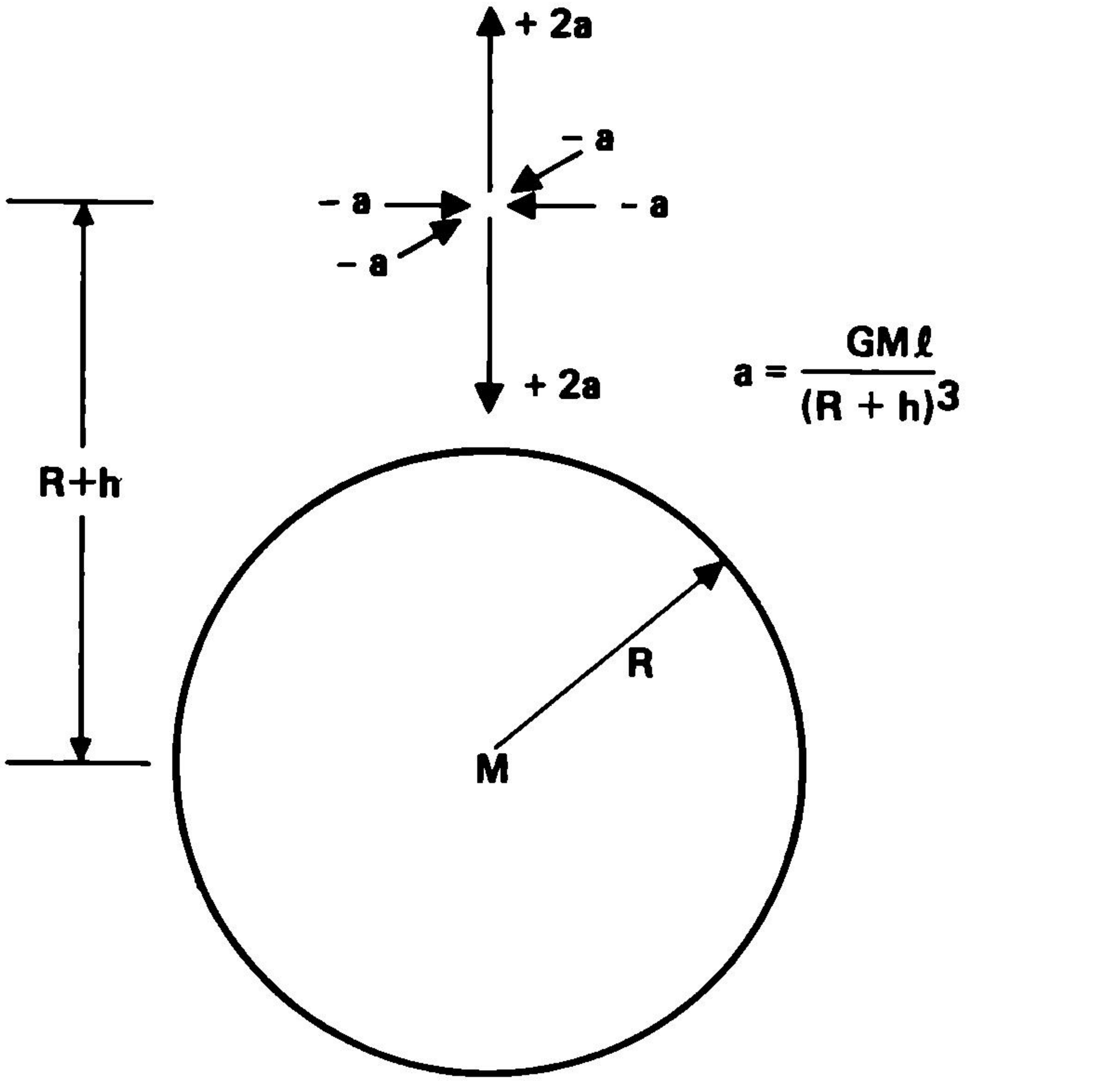
Another process, electrochemical separation, uses the flow of electrical currents to collect dilute quantities of precious biologicals from a watery mass of chemicals and bacteria. The purity of the end product will depend upon the dominance of the electrochemical currents over the convection currents induced by the Earth tides.

One solution to the problem of Earth tide accelerations is to get away from

the curved spacetime near the Earth by going into a higher orbit. But orbital altitude costs money. There is a better solution. We will get rid of these tidally induced accelerations by flattening the spacetime in the region of the experiment!

Our major tool for flattening spacetime is the gravity gradient compensator that I designed to keep the human characters in *Dragon's Egg* from being torn apart by the gravity tides of the neutron star. You can read about it in "A Taste of Dragon's Egg" in the April 1980 issue of *Analog*.[1] The compensator consists of six dense masses in a ring surrounding the region to be protected. In the novel the tides of the neutron star were exceptionally large, 200 gravities per meter, and exceptionally large compensators were needed to cancel them. To make the six ultra-dense spheres, I used asteroids hundreds of kilometers in diameter and invoked a magnetic monopole factory to shrink them down in size so there would be a spherical volume near the middle about 7 meters in diameter where the neutron star tides

Figure 3. Gravitational tides above the Earth.



$$a = \frac{GM\ell}{(R+h)^3}$$

would be nulled to less than 1 Earth gravity per meter.

It wasn't until a year after the novel was published that I realized that this science fiction "invention" might have a practical use. I got out my old notes, replaced the neutron star with the Earth, replaced the condensed asteroid spheres with tungsten spheres, and found that I could build a gravity gradient compensator ring that would cancel the tides of the Earth. It's too late to apply for a patent, but I've written a scientific paper on the idea, and it was published in the 15 August 1982 *Physical Review*. (The first reference is to the science fact article in *Analog*.)

The gravity tide pattern of the Earth is shown in Figure 3. The tidal forces consist of a tension in the vertical direction that is twice as strong as the uniform compression in the horizontal direction. The reason for the vertical tides is simple to understand if you imagine a cluster of masses in free fall above the Earth. The Newtonian gravity field falls off with increasing distance from the Earth. Those masses closer to the Earth than a mass at the center of the cluster are pulled harder than the center mass and move away from it. Similarly, the center mass is pulled harder than those masses farther away from the Earth, so it accelerates down, leaving them behind. The horizontal accelerations are a little harder to understand, but they are *always* just as important as the vertical gradients. (In this spherical Earth example, the horizontal gradients are half the strength of the vertical gradients, but there are two of them.) The horizontal inward compression force is caused by the slight inward angle of the Earth attraction on the masses to either side of the central mass. The angle is caused by the fact that the direction to the center of the Earth is different for masses in different positions.

The gravity tide pattern from the six compensator spheres in a ring is shown in Figure 4. The tidal forces consist of a compression in the vertical direction that is twice as strong as the uniform tension in the horizontal direction. This pattern of forces is easily understood if you imagine a small test object in the middle of the ring. If the test object is exactly in the center, the combined attraction of the six spheres cancels out. If the test object moves above or below the plane, the combined attractions will pull it back. If the test object moves toward one of the spheres, the attraction of that sphere increases while the attraction of the sphere on the opposite side of the ring decreases, and the test object is pulled even farther away from the center.

Since the field patterns of the Earth and compensator are opposite in sign, they will cancel each other out if the six spheres are placed in a ring tangent to the Earth's surface and the radius of the circle is mechanically adjusted to the right value and held there. (As an interesting aside, the tidal force pattern of the ring is identical to the tidal force pattern that would be produced by a sphere with a *negative* mass placed *below* the plane of the ring.)

If we assume that the spheres in the compensator are 100-kilogram balls of tungsten, then the spheres will be about

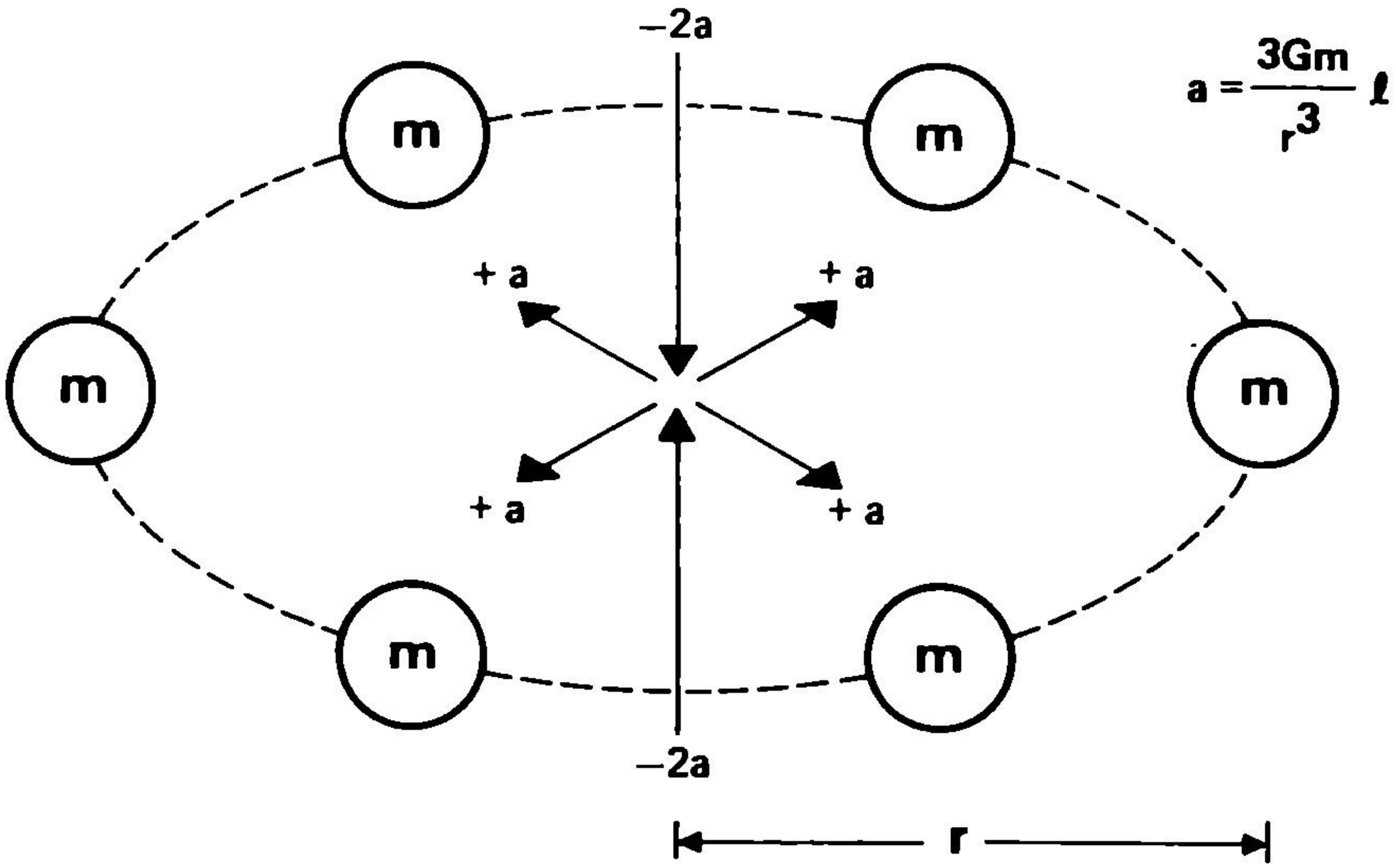


Figure 4. Gravitational tides of a six-mass compensator.

11 centimeters in radius. To cancel the gravitational tides of the Earth at 500 kilometers' altitude, the radius of the ring should be 25.4 centimeters (10 inches). Subtracting out the finite size of the compensator spheres, this gives you a working area inside the compensator that is 29 centimeters (11 inches) in diameter. Up in synchronous orbit at 36,000 kilometers' altitude, the Earth's gravity field is 300 times weaker, and the compensator spheres can be moved back to 156 centimeters, giving a working volume almost 3 meters (10 feet) in diameter.

The match of the compensating fields to the Earth fields is only perfect at the exact center of the ring. The match is fairly good, however, in a significant region about the central point. In Figure 5 we show the residual gravity contours for an orbital altitude of 500 kilometers and a compensator ring radius of 25.4 centimeters. The normal Earth tidal accelerations at this altitude are 250 nanogravities per meter or 10 nanogravities at 4 centimeters' distance from the center. (A nanogravity is a billionth of a gravity.) The middle contour in Figure 5 encloses a disk-shaped region 5 centimeters (2 inches) high and 8 centimeters (3 inches) in diameter (about the size of a box of bath powder). In that region the maximum acceleration levels have been reduced to less than 0.1 nanogravities—a flattening of the spacetime in that region by a factor of 100.

The contours show only the magni-

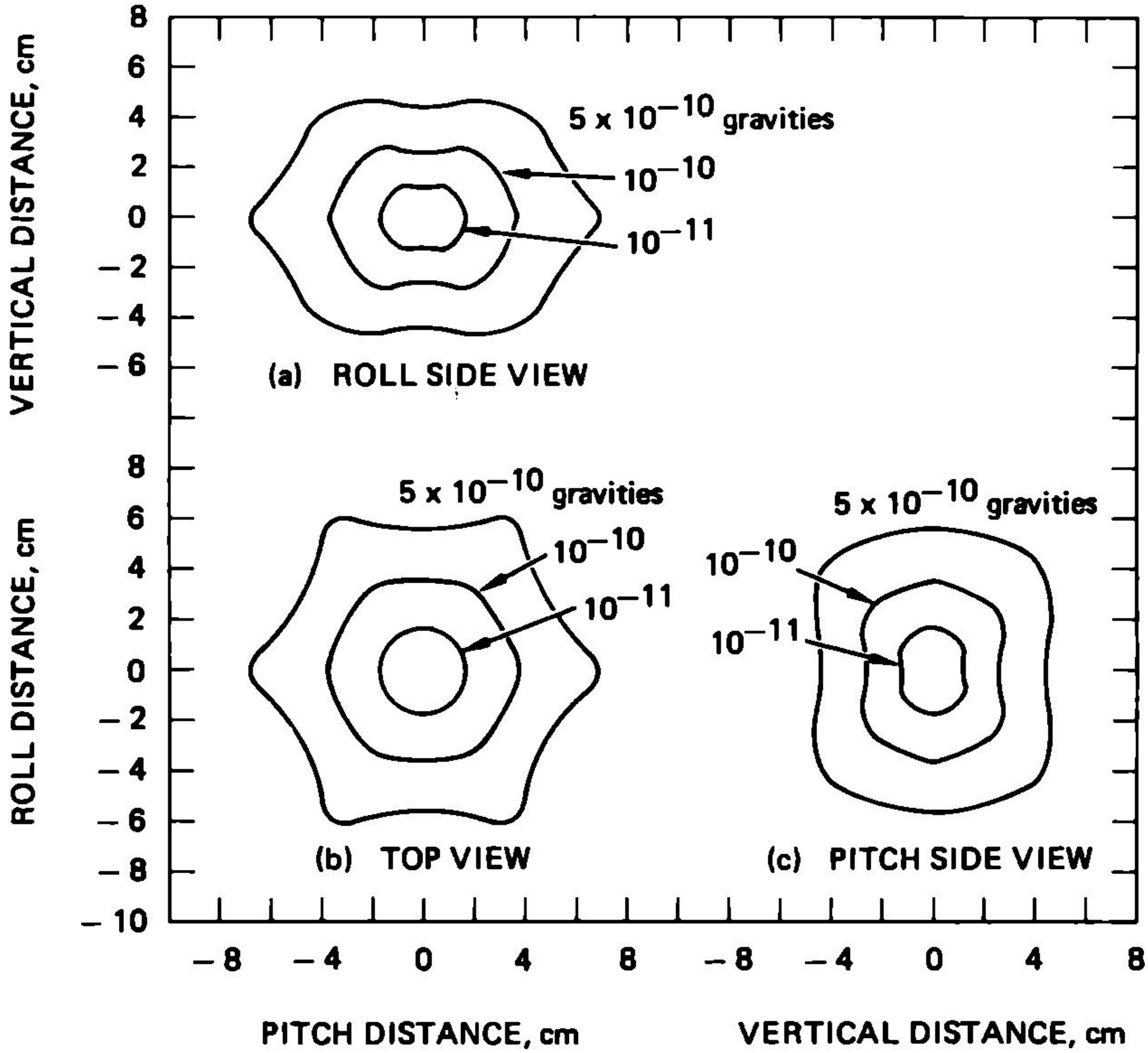


Figure 5. Compensated gravity contours at 500 kilometers' altitude.

tude of the forces. It is instructive to see the pattern of residual force vectors. In Figure 6 we see the residual force vectors in the horizontal plane. There is the "flat" region in the center, changing to a generally outward trend. This is because we are getting closer to the compensator spheres faster than we are changing the distance to the center of the Earth.

The vector force pattern in a plane passing through the vertical axis is more complex and is shown in Figure 7. We again see the outward trend in the horizontal plane plus an outward trend in the vertical direction where the vertical gravity tides of the Earth start to dominate, as we get farther and farther away from the masses in the ring. In a cone at 45 degrees above and below the horizontal plane, however, there is a strong inward trend, making for a complex pattern.

At synchronous orbit altitude, the size

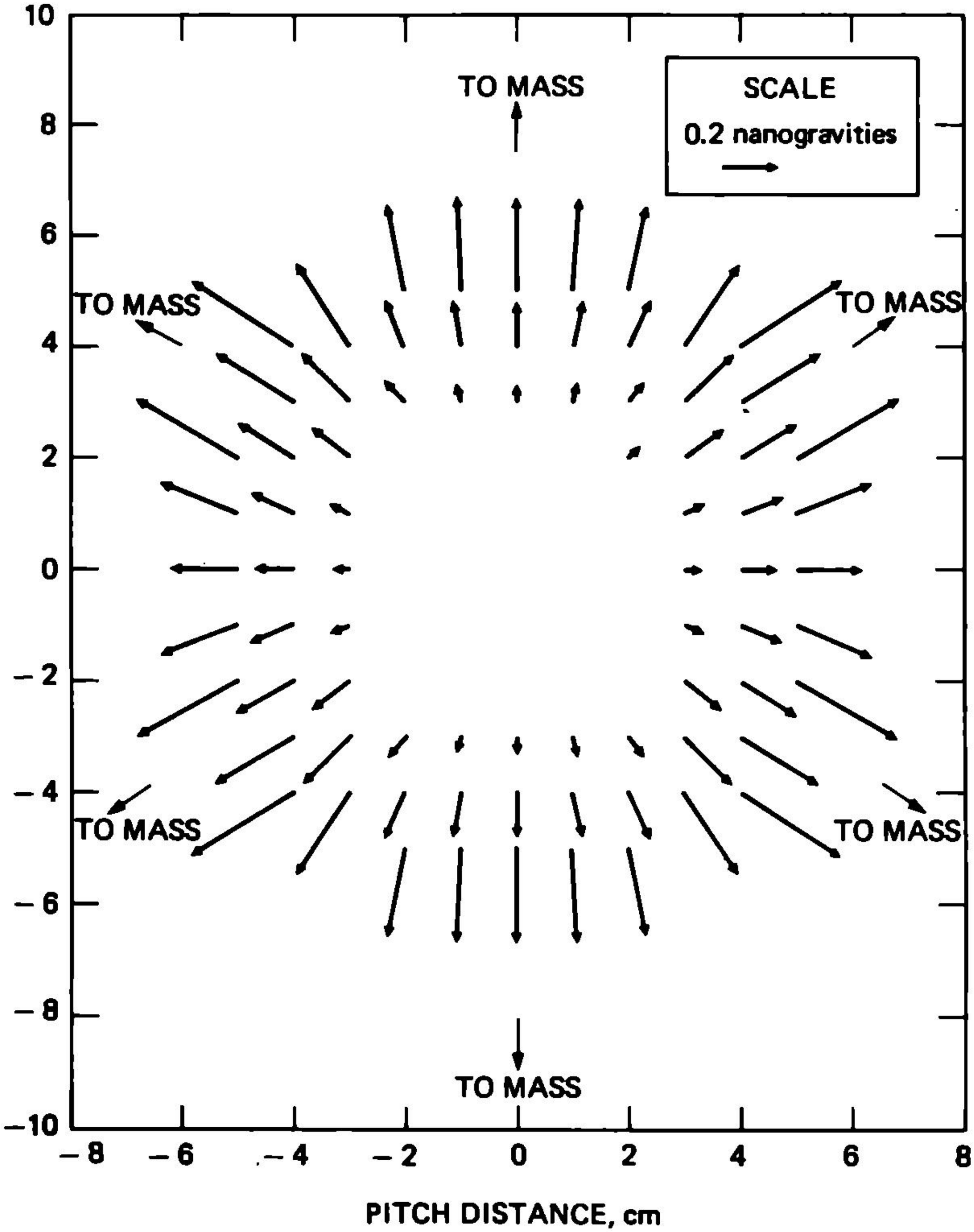


Figure 6. Residual force vectors in the horizontal plane.

of the flattened regions of spacetime become larger and "flatter." For example, the middle gravity acceleration contour in Figure 8 is where the compensator spheres have lowered the accelerations caused by the Earth tides to less than a trillionth of an Earth gravity (one picogravity) over a region 24 cen-

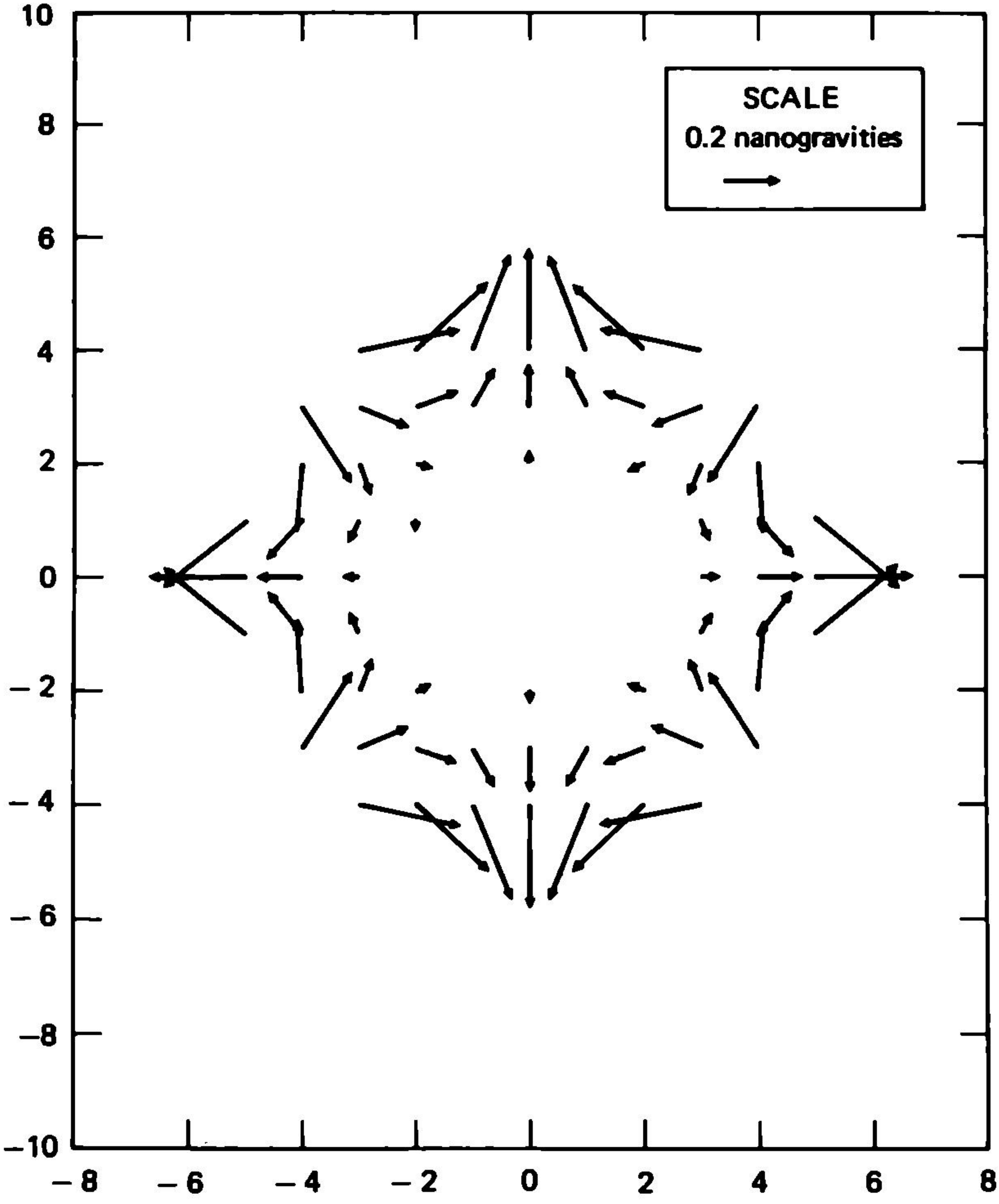


Figure 7. Residual force vectors in a vertical plane.

timeters high and 30 centimeters in diameter (the size of a hatbox).

These large volumes of flattened spacetime will certainly be valuable for scientific experiments that require a region free from Earth tides. They also will be useful, up to a point, for space materials processing experiments. The

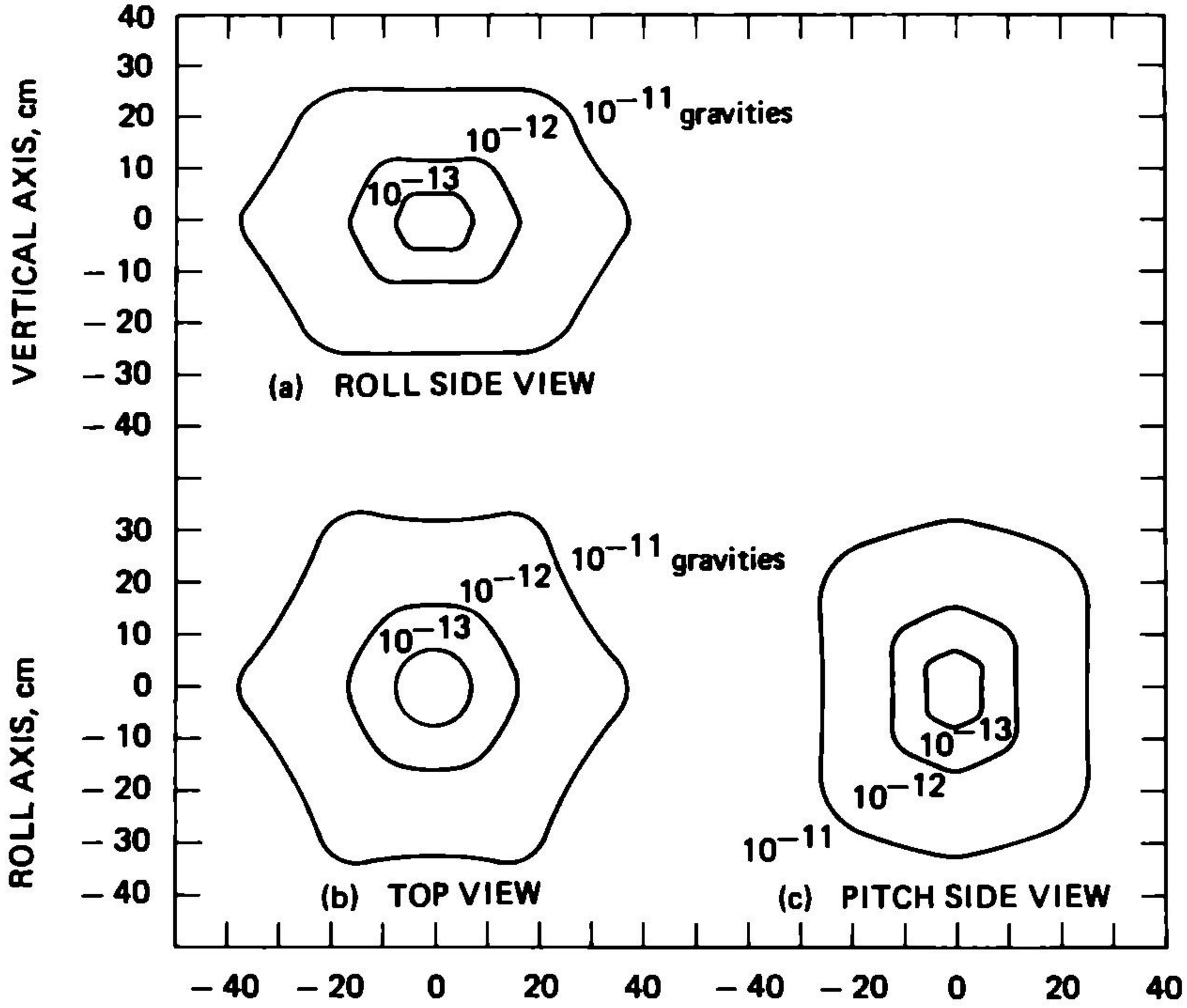


Figure 8. Compensated gravity contours at synchronous altitude..

lower acceleration limit for space processing experiments is set by the self-gravity of the molten metals or liquids being processed.

A ball of water 1 meter across (say, for some pharmaceutical process) has a self-gravity field at its surface of 29 nanogravities, while a molten ball of steel only 10 centimeters across has a self-gravity field of 22 nanogravities. These gravity fields will cause convection currents to flow in the liquid, disturbing the desired equilibrium conditions.

It turns out that, with a few more tricks, we can not only cancel any Earth tides that might affect those materials processing experiments, but we can also cancel the self-gravity fields everywhere inside the sample. We thus can not only flatten spacetime outside a mass, but even inside a mass, despite the mass's own attempts to curve the spacetime it is inhabiting.

The shape for a space materials processing experiment sample that gives the most volume with the lowest residual gravity is a thick disk. For a specific example, let us assume a disk of material with the density of water that is 30 centimeters (1 foot) in diameter and 10 centimeters (4 inches) thick (about the size of a large double-layer cake). The self-gravity pattern of this thick disk is quite complicated. The vertical component of the self-gravity is zero at the center and becomes stronger as you go toward the top or bottom. It is inward, of course, and gets stronger almost linearly with distance, reaching -3 nanogravities at the top and bottom surfaces 5 centimeters away. The horizontal component of the self-gravity of a disk also starts out with a zero value at the center. If you go out away from the center in the horizontal direction, the inward self-attraction increases with distance until it too reaches a value of about -3 nanogravities at the rim, some 15 centimeters out. The trend, however, is not linear at all.

As we approach the outer surfaces of the disk, the variations get worse. The vertical component of the gravity out along the rim of the disk and the horizontal component of gravity along the top and bottom surfaces have the same general trends as the accelerations near the center, but are down in strength by a factor of about two due to the "missing mass" outside the disk.

To get rid of this variation in field strength over the sample due to the "edge effects," we first surround our sample volume with a "guard ring" as is shown in Figure 9. The guard ring consists of a container in the shape of a ring filled with material that has the same density as the material in the sample chamber. The material in the sample volume and the guard ring are to be kept separated by a thin wall. The material in the guard ring will not be free from accelerations, and convection currents will be set up in it. The thin wall will keep the protected material in the sample volume from being disturbed by these currents. With the addition of the guard ring the self-gravity field inside the sample becomes more uniform and linear. If we then add "guard caps" to the top and bottom of the sample volume plus guard ring, we can make the field extremely uniform. By varying the width of the guard ring and the thickness of the guard caps we can not only adjust the magnitude of the self-gravity accelerations inside the disk, but we can "tailor" the shape of the internal field to match the slight non-uniformities of the compensator and augmentor fields.

Once we have added the guard ring and guard caps to our sample disk, we find that both the vertical and horizontal components of the self-gravity inside the sample disk are quite uniform over the whole disk and increase linearly with distance from the center. How can we cancel these self-gravity accelerations? Let's take them one at a time.

To compensate the inward vertical component of the self-gravity of the disk we will use the outward vertical acceleration of the Earth tides. The strength of the inward self-gravity is determined by the density of the material in the disk. For every given density, there is an orbital altitude above the Earth where the

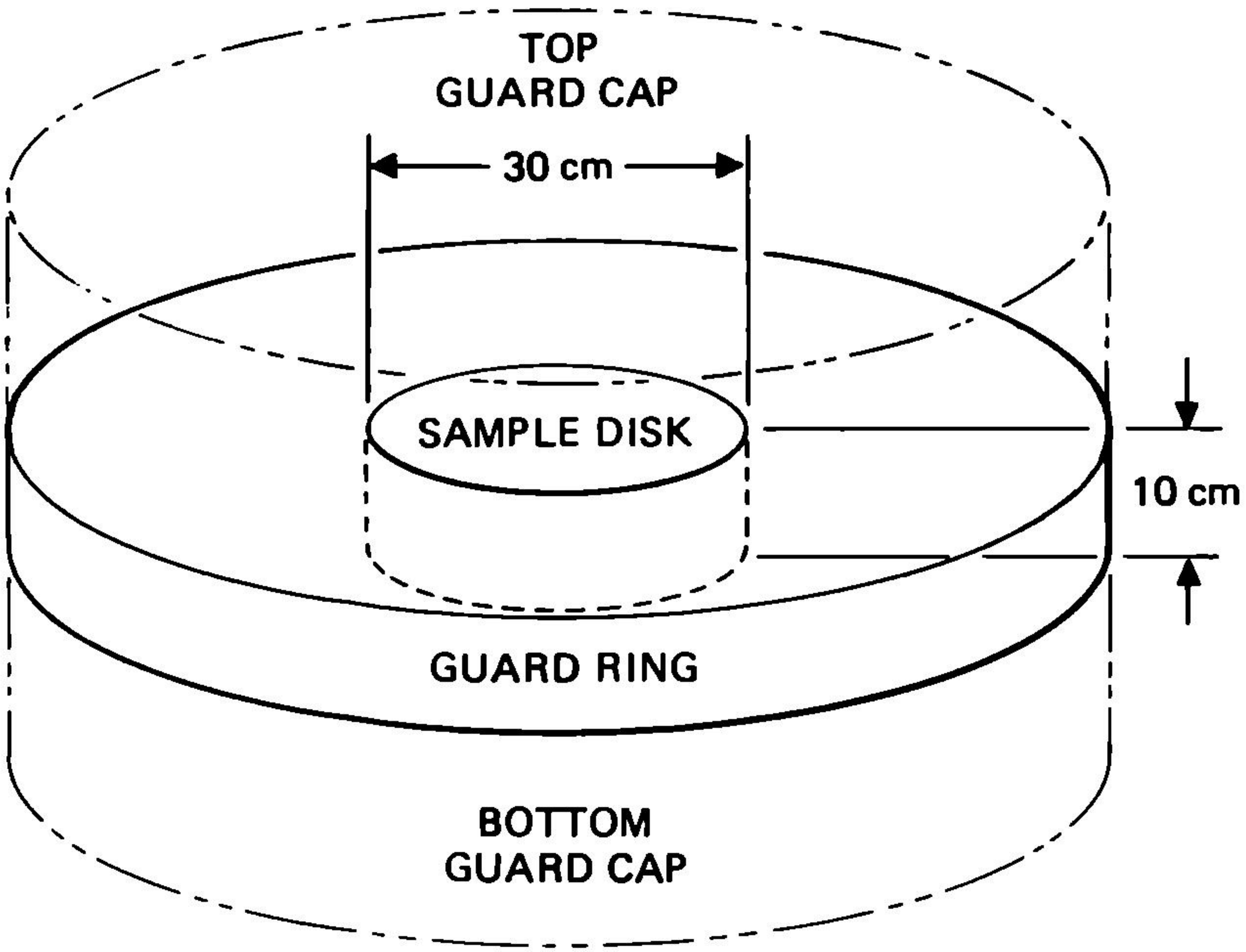


Figure 9. Sample disk with guard ring and guard caps.

Earth tides just cancel the vertical component of self-gravity.

We can't be changing the orbital altitude of our space laboratory every time we change the density of the sample being processed, however, so instead we will change the strength of the Earth tides. If the Earth tide at some altitude is too strong for the self-gravity of the disk, we cancel some of it with our six-sphere tidal compensator. If the Earth tide at that altitude is too weak, we increase the Earth tides with a two-sphere tidal augmentor.

The tidal augmentor is shown in Figure 10. It consists of two 100-kilogram masses placed above and below the sample disk. The gravity tidal pattern the augmentor produces is identical to the tidal pattern of the Earth. Thus, by judicious use of either the compensator or augmentor, we can adjust the Earth tides so that they will compensate for the vertical component of the self-gravity of a properly guarded sample disk.

The horizontal component of acceleration is another matter. The horizontal self-gravity accelerations of the disk are inward and so are the accelerations induced by the Earth tides. We have nulled out the vertical acceleration, but at the expense of doubling the horizontal

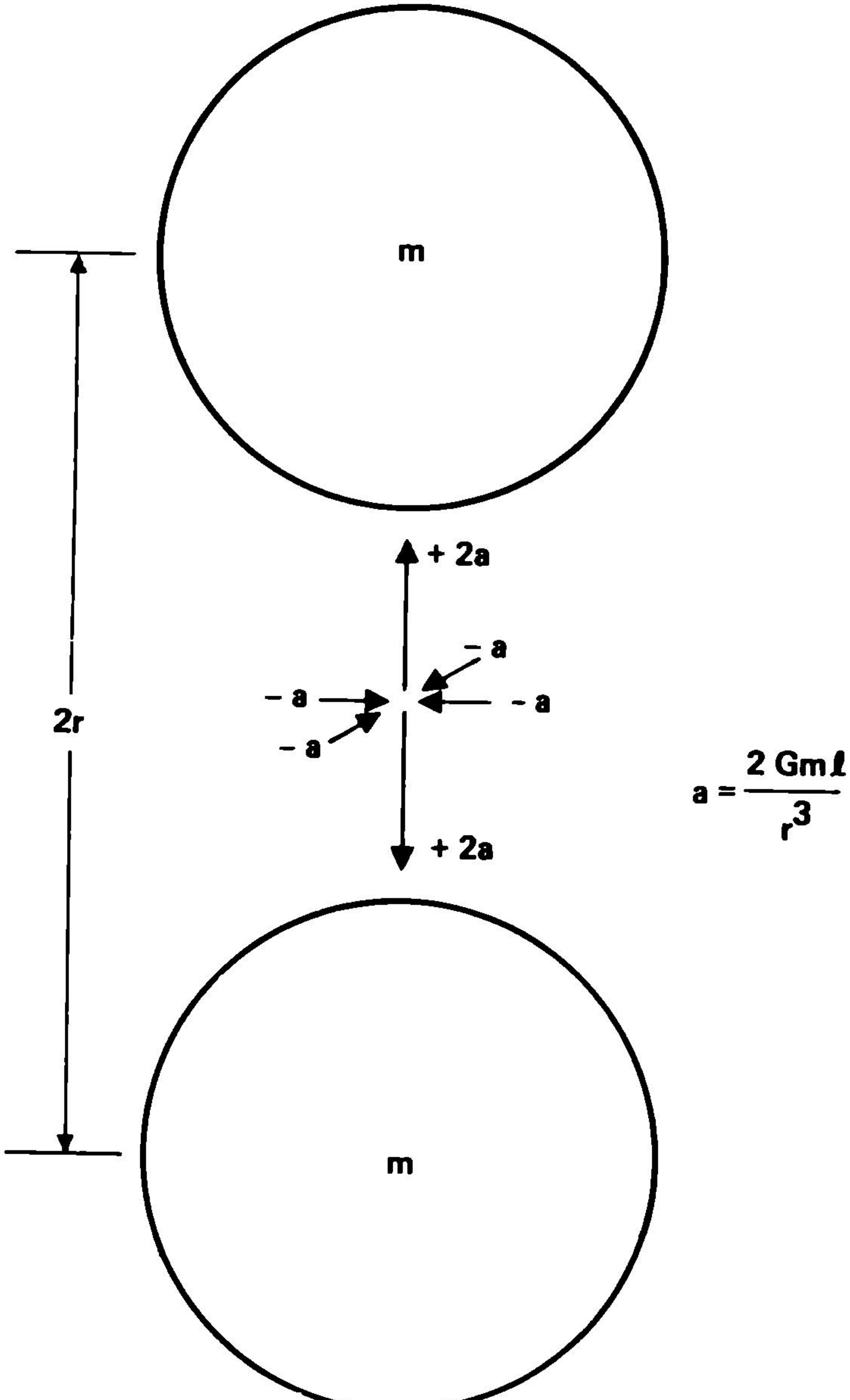


Figure 10. Gravitational tides of a two-mass augmentor.

accelerations. The combined self-gravity and Earth tide accelerations are still linear with increasing horizontal distance, however, and they both can be cancelled by our last trick—a slow rotation of the sample disk about its vertical axis.

The rotation of a disk causes an outward centrifugal acceleration that has no component along the vertical spin axis, just a horizontal acceleration that everywhere increases linearly with distance from the axis. A carefully chosen rotation (about one revolution every 2.7 hours) now will cancel both the inward acceleration of the self-gravity and the inward acceleration of the Earth tides.

Thus, by a combination of guard rings and guard caps to make the self-gravity more uniform, the use of the Earth's tides augmented or compensated by 100-kilogram masses, and a slight rotation of the sample volume, it is possible to cancel all accelerations inside a sample volume of material some 30 centimeters in diameter and 10 centimeters thick.

The technique can be used at any altitude, but the best results can be obtained in a space laboratory in synchronous orbit. In one example that I calculated, our birthday cake-sized sample disk of water had the spacetime inside flattened by a factor of 1000, so that the maximum acceleration anywhere inside the disk was less than 3 picogravities. At this level of acceleration it takes an atom 3 seconds to fall its own diameter!

One of these days there will be large space laboratories in space, with special isolated rooms where ultra-low gravity experiments can be carried out. There will be no humans near those rooms, for the gravity of even the most petite experimenter would be enough to disturb the delicate experiments floating inside.

From some laboratories will come exotic alloys, from others ultra-light, ultra-strong foamed metals. From still other laboratories the valuables extracted will not be tangible products like pharmaceuticals and new materials, but that intangible yet infinitely more valuable product of scientific research —knowledge. Perhaps new knowledge about the innermost secrets of gravity and inertia. Reports will be written and papers published in scientific journals, and to give proper credit for the gravity nulling techniques used in those laboratories the first entries in the list of references will be:

1. *Analog Science Fiction/Science Fact*, Volume 100, No. 4, 64–74 (April 1980).

2. R.L. Forward, "Flattening Spacetime Near the Earth," *Physical Review*, Volume 26D, 735–744 (15 August 1982).

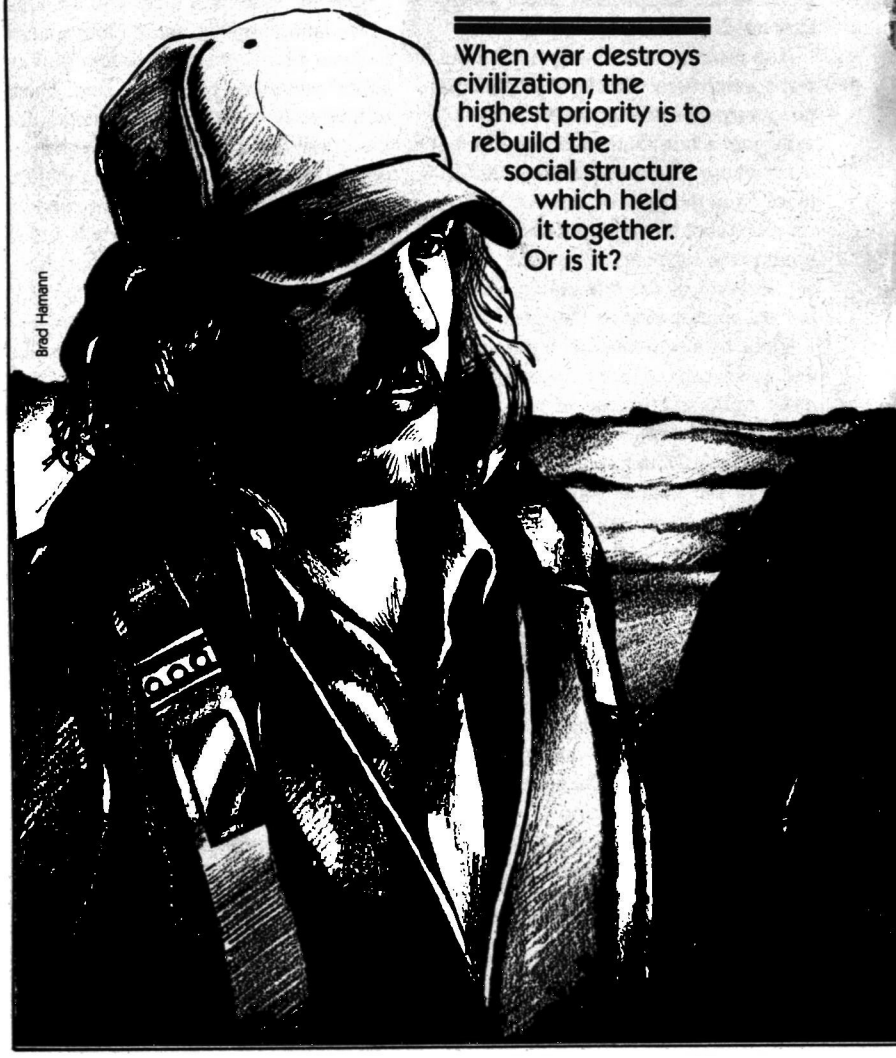
●How wonderful that we have met with a paradox. Now we have some hope of making progress.

Niels Bohr

THE ELECTION

Robert Silverberg

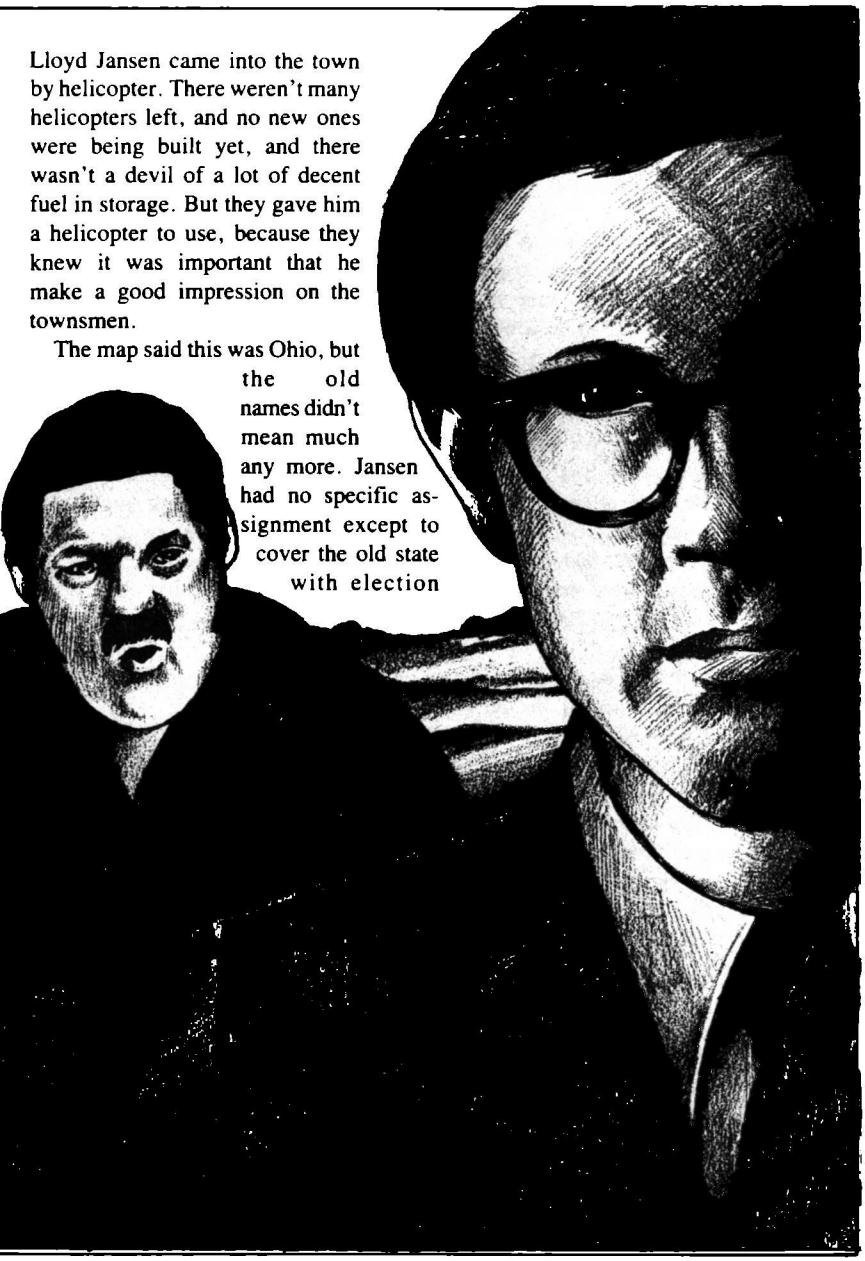
When war destroys civilization, the highest priority is to rebuild the social structure which held it together. Or is it?



Brad Hamann

Lloyd Jansen came into the town by helicopter. There weren't many helicopters left, and no new ones were being built yet, and there wasn't a devil of a lot of decent fuel in storage. But they gave him a helicopter to use, because they knew it was important that he make a good impression on the townsmen.

The map said this was Ohio, but the old names didn't mean much any more. Jansen had no specific assignment except to cover the old state with election



notices. The Provisional Federal Government was extending its feelers, up from its Kentucky base into the hinterlands. Ohio, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, Tennessee. Time to move westward later. There wasn't too much left in the northeast.

Jansen's assignment was Ohio. A lot of territory, and only a month to cover it all. But there weren't many men to go around, and the job had to be done.

The town was the first he had sighted that morning. It was small, huddled-looking from the air, situated in the heart of a patch of pretty fertile-looking farmland. Jansen brought his copter down in the middle of the town, a broad square flanked with stubby old buildings. Even before the rotors had stopped moving, the townsmen were starting to collect, peering uneasily at him from across the street.

Jansen dug his thumb into the towering stack of election posters in the back of the cabin, peeled off about twenty of them, picked up the spraytite tube, and got out of the copter. About twenty people were watching him — saying nothing, just watching.

Rule One. In every way try to dispel hostility toward the Provisional Federal Government and its representatives.

Jansen smiled. No one returned the smile, though.

Shrugging, he walked toward a lamppost, put down his stack of posters, took off the top one, positioned it at average eye level, and squeezed the handle of the spraytite tube. Handy stuff, spraytite. The poster clung.

NOTICE!

Pursuant to the articles of the Provisional Constitution of the United States of America, an election will be held on

Tuesday, Nov. 4, 2013

The candidates duly selected by nominating conventions are:

America Revival Party —
Benjamin V. Thurston for President
Nicholas C. Ryan for Vice-President

National Progress Party —
Thomas C. Macintyre for President
Noel Parr for Vice-President

Election is to be by direct popular vote and by secret ballot. Your local Provisional Federal Government representative will explain the details of election procedure if necessary. Election of a National Congress will be scheduled at the order of the President-elect.

Given by my hand this 3rd day of August, 2013.

Benjamin V. Thurston,
Acting President
Provisional Federal Government
Scottsville, Kentucky

Jansen stepped back, surveyed the poster, nodded, and moved on. A couple of townsmen wandered over to inspect it. *I hope they can read,* Jansen thought.

He looked back again after he had placed a second and third poster in strategic places. He was definitely drawing a crowd. And they were reading the posters, discussing them, muttering to each other.

Then Jansen saw a boy of about twelve, wearing only a pair of ragged

jeans, reach up and begin to draw with a piece of charcoal on the first poster.

"Hey!" Jansen yelled, rushing across the square. "You can't deface a government sign!"

The boy looked up, grinning. He had drawn a shockingly obscene sketch of Jansen.

"Who says I can't?"

Jansen nibbled his lip. "Look," he said, "you can't go around drawing on these posters. It isn't right."

"Says who?"

Scowling, Jansen glanced at the crowd. They were laughing now. Laughing at him.

Gesturing at the defaced poster, he said, "Are this boy's parents here?" When no one spoke up, he went on, "Isn't there anyone here who'll explain to this boy that it's wrong to scrawl on government signs?"

The crowd tittered. Jansen checked his anger and wiped out the sketch with his handkerchief. He stalked back across the square to continue his work.

Behind him, someone sang out, "Hey, mister, what's an election?"

Jansen turned. "Who said that?"

"I did." A tall young fellow stepped forward—about twenty, so he had never known any other kind of world but this one. But his eyes held intelligence, and Jansen knew he was being baited.

Frowning, Jansen said, "An election is the free choice of a government."

"You mean I can pick between this Thurston fellow and this Macintyre fellow for who I want to be President of the U-nited States?"

"That's right."

"But suppose I don't want them. Suppose I want Ned Ludlow here to be president."

Jansen managed an uneasy smile. "Naturally, it would be a good thing if we could all pick our best friends to run the government. But we can't really do that, can we? We have to be sure that the men we chose are qualified for the position."

"And Thurston and Macintyre are qualified?"

"Yes."

"Who says so?" There was no real truculence in the question, just a slow, unshatterable obstinacy.

Jansen held up a poster and pointed to the official seal. "The Provisional Federal Government says they're qualified."

His interlocuter guffawed. "Come off it, mister. That thing's signed by Ben Thurston! You gonna stand there and tell me that Ben Thurston declares that Ben Thurston is qualified to be president, and have me swallow it?"

The crowd snickered. Jansen, reddening, realized dismally that he was losing them right at the start.

"Ben Thurston didn't write that poster. He just issued it, because he's temporarily in charge. The candidates for president were picked by conventions of the people, held in Kentucky last month."

"Yeah. And who picked the convention people?"

"Why—" Jansen sputtered for an instant. "They were chosen by the whole electorate of Kentucky."

"How come we wasn't asked?"

"The next time, you will be. The important thing is to get the government moving again. Once we've rebuilt com-

munication channels, once we've linked the country up again, we can hold a real nationwide nominating convention. Until then, we just had to pick the best men we had, and put them up for your approval. You'll get your chance to hear both Thurston and Macintyre. They'll be touring this way next month to explain their programs."

That fairly lengthy statement was met with silence. Jansen rocked back and forth on his heels, waiting for some new challenge. None came. He smiled broadly at the crowd, hoping for at least one smile in return. But a solid row of sullen faces glowered back at him.

And then the crowd seemed to lose interest both in him and in his posters. They melted driftingly away, leaving him without an audience. A boy of four stood alone near him, looking up quizzically, and then he, too, slipped away.

Jansen shrugged. They had warned him yesterday, before sending him out on this job, that he was likely to meet resistance. The people of this area had been isolated for years. They might not show too much interest in getting the government started again.

The election, Jansen thought, was a wonderful thing—a sign that the decade and a half of anarchy was over, and that a rebirth of the old United States was at last under way. True, the beginning was slow. First, the nucleus in Kentucky—the surviving members of the old government and the new, post-blowup leaders coming together for the Constitutional Convention. The new Constitution was a lot like the old one, except that it made provision for more gradual federalization. Graduality was the keyword. It had to be. No one this side of the Rockies had heard from the West Coast at all in fifteen years. It was impossible to go about hurrying the reconstruction when the country was still this badly splintered.

But at least we won *the war*, Jansen thought.

The job of rebuilding was inching along. Ben Thurston had done wonders organizing Kentucky. But he was troubled about his self-assumed mantle. He wanted an election to confirm him in office—if not a national election, then at least one held in the nearby states. Nobody seriously thought Tom Macintyre would be elected, and certainly Tom didn't want to take the job away from Ben. But there had to be two candidates, to keep the old forms alive.

After the election, Jansen thought, the Provisional Government would have some sort of legal authority. Ben would call for the election of a Congress, would appoint judges, would send out representatives to the more distant states. Gradually the old web of tradition and custom would be spun anew. A Government of the United States would again be supreme from shore to shore, less than twenty years after the destruction.

Jansen felt a sense of pride, knowing that he was part of the rebuilding. It was a glorious thing to be alive at the same time Ben Thurston was.

But the moment of elation soured. His first contact with the citizenry beyond Kentucky hadn't been encouraging. It would take patient toil to undo the damage of anarchy, to persuade these people that they *needed* to join in the effort to rebuild.

After all, he thought, they were really

only peasants. He didn't want to sound patronizing, but it was the truth. They lived close to the land here, they toiled without end, and if they lifted their eyes to the stars it was only to find out whether or not it was going to rain. The big issues of philosophy and politics didn't matter to them. They weren't philosophers. And they probably couldn't see much use for a Federal Government, either.

But maybe they would, someday, Jansen told himself. And some day these people would bless the name of Ben Thurston. Maybe even bless the name of Lloyd Jansen.

He took another poster from his stack and started to stick it to the sycamore tree. As he was about to apply the spray-tite, a voice said behind him, "We'd like to have a word with you, mister."

Poised for trouble, Jansen turned and confronted three men. They looked unsavory—lean, all three, raggedly dressed, with uneasy flickering eyes and stubbly faces.

"What is it?" Jansen asked.

The man in the middle thrust out his hand. "Name's Chuck Webster. I seen your signs put up. I come to tell you I'm with you one hundred percent. Lot of people here don't like this election thing, but I'm with you."

"Yeah," one of his flankers said. "The election's a good thing."

Jansen relaxed. These three didn't look too trustworthy, but at least it was a beginning. At least there were three men in this town who didn't react with blank-faced apathy to the whole idea of a federal election. "Glad to hear I've got some supporters in town," Jansen said.

Webster stuck his thumbs into his belt. "We figure the Federal Government can help us out some, that's why we're behind you. This town's in a bad way, y'see. We got a dic-tator here who runs the place. But maybe you Feds can bust him down to size."

"A dictator?" Jansen said.

"Name of Broderick, Sam Broderick. Set himself up as boss right after the blowup," Webster said. "We had some decent folk running things, but Broderick just tossed them out and took over. Runs this town like he owns it."

"Won't let decent people speak up," one of the other men said, scowling. "A regular dic-tator."

Jansen frowned. "How come he can't be tossed out himself?"

"He's got the people bulldozed," Webster said darkly. "Two-thirds of this town don't give a damn. They're willing to let Sam Broderick tell them what to do."

"How about the rest?"

"Lot of us don't like Broderick, but we ain't organized right. He's too strong for us. Few years back I tried to push him over, but it wouldn't work. I got my men, though. Lots of people round here think *I* oughta be running this town insteada him. A lot of Broderick's own people think that way, too. Deep down they'd rather have me in charge, but they're too scared of Broderick to admit it."

"This is just why we need a central government again," Jansen said. "To prevent local government from falling into the hands of tinhorn bosses."

"A-men," Webster agreed. "Look — I'm gonna try to get the people back of your election. Broderick, he don't

want any elections, but I'll see that we get one. Provided the Federal Government recognizes me and my men as the legal government of this town, that is."

Jansen hesitated for a moment. Then he nodded; the election idea had to be put across. Webster might not be any paragon of virtue, but at least he seemed law-abiding, which this Broderick certainly wasn't. "I can't give you any definite guarantee, of course," Jansen said. "Let's just say that once the authority of the Federal Government is reestablished in this town, we'll conduct a thorough investigation. If the constitutional rights of the citizens are being violated, we'll take steps to reestablish democracy and law and order here — which means throwing out Broderick. Fair enough?"

"It's a deal," Webster said, grinning snagtoothedly. "We'll back up you people, and you back me up against Sam Broderick. And—"

"There ain't gonna be any deals like that made in town," a booming voice rumbled suddenly. "Get yourself outa here, Webster."

Webster went pale at the sight of the big man looming over him. "You been listening all along, Sam?"

"Sure I have. I know when to expect trouble. Go on. Beat it." Broderick put one ham-like hand on the back of Webster's neck and gave him a contemptuous shove. "Damn bunch of snakes. Scram!"

Then he turned and extended the same hand to Jansen. "I'm Sam Broderick," he boomed. "I'm in charge here."

Broderick was in his forties or maybe his fifties, an enormous man, six-four at least. His face had power in it to match his size. A huge black mustache drooped below a savagely beaked nose. He wore a friendly smile, but there was something grim about the smile. Jansen was surprised to realize that this man was even more commanding-looking than Ben Thurston.

Broderick shook his head. "I figured them guys would get at you with some scheming deal. Well, I'm still boss here, no matter what Webster thinks. Put all them posters back in your whirlybird, son. There ain't going to be any elections here in Falbridge."

"It's up to the town authorities to decide that."

"*I'm* the town authorities," the big man said. "No election. You boys aren't getting a foothold here."

"Do you have any right to tell me that?"

"I think I do. I'm in charge here. Which means that every time there's trouble, they send me out to take care of it. I didn't ask for the job, but I got it, and I'm doing it. And you're trouble, mister."

"I'm not making any trouble. I'm just here to—"

"To tell us about the elections. Sure, I know. And that means trouble." He pointed toward the other side of the square. "Come over to the town hall with me. I've got an office that I use when I'm being mayor. We can talk better there."

Jansen walked back across the square into the gray, dumpy town hall, silently. The very physical massiveness of Broderick troubled him. Breaking this local strong-man's hold might be a tough job.

They entered a small office. Brod-

erick opened a desk drawer, took out a clay jug and two clay cups. He uncorked the jug and poured about two inches of liquor into each of the cups.

"Drink hearty," Broderick said.

Jansen tasted the drink hesitantly. It was fiery and tremendously potent.

"What is it?"

"Applejack. Don't they have applejack where you come from, mister?"

Jansen smiled. "I suppose they do. I'm not much of a drinking man." He set the cup down. "Now, about the election—"

"Yeah. The election."

"Why are you against it?" Jansen asked.

"Because I know what'll happen, after the election. The Federal Government will decide it doesn't like the way this town is run, and next thing I know I'll be mixed up in a power struggle. This town is full of power-hungry fools who're willing to bamboozle the Feds into putting them in control. Well, I aim to stay in charge here so long as I think I can do the job better than anyone else. So there ain't going to be any messing with a Federal Government here."

Talk of power-hungry fools, Jansen thought. *This fellow must think he rules here by divine right, or something.*

Broderick went on, "I got a question for *you*. How come there has to be an election in the first place?"

"Why, to reestablish formal legal authority in the United States. To end the state of anarchy that's prevailed since the war." *And to take power away from demagogues like you,* Jansen added silently.

Broderick smiled. "Okay, I got another question, then. What do we need a United States for? And a Constitution, and all that stuff?"

Jansen gawped. "What do—why, that question's so silly I can't answer it!"

"Is it?"

"Of course. We need a United States because we want to keep building upward. Until we're back where we were before the war. Until we've got our strength again. There's strength in union, you can't deny that. If an enemy should attack us—"

"There ain't no enemies left," Broderick said.

"Suppose."

"Anybody who wants to be our enemy has to do a hell of a lot of rebuilding before he gets as strong as we are now," Broderick said. "And we ain't very strong. But you're ducking my question. What's all this need for a Federal Government, for a United States? What will that give us that we don't have now?"

"Contact with your fellow Americans. Markets for your produce. Communication. Laws."

"We got laws," Broderick said. "When two people in this town have an argument, they come to me. I settle it. We got contact with our fellow Americans, right here in this town: I got a hundred men I love like brothers. You have that many friends, mister? We got communication, too. When I want to see Jimmy Lyons, I go over to his place. If he ain't there, I leave a message. And we don't need markets for our produce. We make what we need. And we've got everything we want. So what we need your election for, mister?"

Jansen felt a dull throbbing in the pit

of his stomach. He took a quick gulp of the apple brandy, but it didn't improve the state of his nerves.

Broderick was sawing him off at the ankles. He was asking questions so big that there weren't any easy answers.

Jansen said, "Okay, I grant the fact that you're happy, living in a little self-sufficient self-contained town. But the human race can't make progress that way. There's got to be a going out, a seeking for better things."

"Why?" Broderick asked flatly.

"If we stand still, we'll stagnate and die."

"Says you."

"It's a law of human nature! We've got to progress," Jansen said, a little panicky now. "We can't just sit back and blot out the rest of the world."

"Why the dickens not?"

"Progress—"

"Where did progress get us the last time? Where's all the progress of New York? A bubbling slagheap, that's all. Where's Washington? Where's Cleveland? Where's every goddam big city in the world? Where's all your progress, mister?"

"We made mistakes," Jansen said. "Our mistakes destroyed the world. But now's our second chance."

"To make the same mistakes all over? Uh-uh, friend. We tried your kind of government and it didn't work. This time we've got to try something different."

Jansen scowled. "Like a country consisting of a bunch of independent towns run by strong-fisted bosses? Is that your idea of how America ought to be?"

"You must think I'm a real evil sort, huh?" Broderick asked casually. "A power-hungry villain. Listen, if I was the sort you think I am, I'd have slit your throat instead of hauling you in here for a nice civilized discussion."

"You run this town undemocratically."

"Damn right I do. But do you think I *wanted* this goddam job? You think I want to listen to damfool quarrels when I could be fishing? You think I want to spend my good time deciding produce quotas, or making sure that nobody like Webster gets control? Or talking to idiots from Kentucky who want to have elections?"

"You don't act unwilling to run this town," Jansen said.

"Because I know I have to. But I didn't go out of my way to get the job. One day after the blowup a bunch of people from around here came to me and said, *Sam, you've got to take charge. Webster and his bunch are making a mess of things*. I ran them off my farm. They came back. *Sam, we need you. Sam, help us*. Sam this and Sam that. After a while I got the idea that if I didn't take over everything around here would go to pot. But, brother, any time somebody in this town shows me he can do the job better than me, he can have it—with my blessing."

"What about Webster?" Jansen asked.

"That snake? He had his chance, right after the blowup. Funneled the town treasury into his pockets, gave all his friends soft jobs, told everybody else what to do. Everything for *his* benefit. Well, this town couldn't put up with that. Nobody's fitten to boss other people if he can't even boss himself. So after I saw that if someone didn't stop Webster he was going to run the town

into the ground, and that if I didn't do the stopping no one else would, I walked into town hall and threw Webster out. He's been scheming to get back in ever since."

"But how do you know your rule is any better?"

Broderick laughed. "I know, is all. Look, this town was like a runaway engine with a moron at the wheel. So I pushed him aside and took the controls myself, because I didn't want to get run over. I've been running this town well ever since. But you come along, with your talk of an election. So Webster and his scalawags try to cook up a deal with you. They say to you, *We'll support you and you support us*. So the Feds will come in here and turn the town over to Webster."

"We're only interested in restoring democracy."

"Democracy's only a word," Broderick said. "What ought to interest you is restoring law and order. Which is what interests me."

"Suppose the people really want Webster?"

"Wouldn't be surprised if they do. People always want damfool things. Never know when they're well off."

"And you're interfering with their free expression of opinion."

"Sure I am," Broderick said. "Their opinions ain't no good! They're just a bunch of farmers. They want to be ruled by whoever'll make things easiest for them. So Webster can promise them the moon, and they'd vote for him if they got the chance."

"You don't trust your own townspeople," Jansen said accusingly. "You're afraid to let them voice their own wishes!"

Broderick chuckled. "All right, friend. You want democracy? You'll get it. I'll call a town meeting. You tell the people about the Feds, and we'll see how they vote."

Close to four hundred townspeople showed up at the hall. Broderick's introduction was brief. "This is Lloyd Jansen. He's from the Federal Government. Wants to talk to you."

Jansen talked for twenty minutes. He gave them everything he had: fragments of Ben Thurston's speeches, bits of the old Constitution and the new one, whole paragraphs from his psychology manuals. He wheedled, cajoled, threatened, bribed. He explained, half a dozen times in half a dozen ways, how necessary it was that everyone in what had been the United States throw his support behind the reorganized Provisional Government. And he ended up with what he hoped would be enough of a tearjerker to swing it:

". . . and we here highly resolve that this nation under God shall have a new birth of freedom, and that government of the people, by the people, for the people shall not perish from the earth. One nation—indivisible—with liberty and justice for all. The choice is yours. Will you help us forge the new America?"

He stepped down from the platform. There were no whoops of applause, no patriotic outcries. For twenty minutes his audience had stared at him like so many wooden Indians. They kept their hands on their laps. Jansen bit his lip. *Didn't I reach them at all*, he wondered.

Broderick rose again. His towering form dominated the entire hall; his big voice filled the auditorium effortlessly, while Jansen had had to push and strain. "That was a mighty fine speech, young fellow," Broderick said amiably. "You really know how to spout. Let's give the boy a hand, folks!"

Light applause, for a moment. Jansen gritted his teeth. In three patronizing sentences Broderick had wiped out any effect the speech might have had.

The big man went on, "I just want to say one little thing before we vote. I don't like this Federal Government business myself. I think we're doing okay running ourselves. I also think that the Feds will interfere with us, in a way we won't like.

"Let your conscience guide you. But keep this in mind: there are still plenty of hungry folk from the cities wandering around these parts raiding farms. I've organized a pretty tough little corps to protect you folk against raiders. But anybody who wants to vote for joining this Federal Government, well, I figure he can be protected by the Feds, not us. So I'll tell the militia to stop guarding the farm of anyone who thinks the Feds can do a better job running this town than I do. That's fair enough, ain't it?

"And now it's time for voting. We're all friends, so we don't need to fool around with paper ballots. Just stand up and show your face. Everybody here who wants us to have these elections and let Ben Thurston's government run us, stand up good and tall."

Broderick waited. No one stood up.

"Kinda looks like you lost," Broderick said casually. "The other side, now. All those who don't want no elections, suppose you sing out with a nay."

The deafening *Nay* from four hundred throats almost blew Jansen off the platform.

"Okay, folks," Broderick said. "Meeting's over. You can all go home."

As the crowd filed out, Jansen muttered to him, "It was rigged. You blackmailed them into voting against me."

"Not so, son. I just put the realities to 'em, and let them stand up on their hind legs and vote."

"You threatened to withdraw protection from them!"

"Sure. If they were going to repudiate the town government, there wouldn't be any government to protect them. You Feds can't go policing every small town. I just put it to them a little differently."

"I should have known you'd connive," Jansen said bitterly. "The meeting was a farce. You wouldn't let them vote against you."

"They have to be pushed a little," Broderick said. "Deep down a lot of them would love to toss me out and put Webster in. Leave them be and they'd be likely to do just that. And he ain't fit to run the town. I am."

"You're pretty cocky about your qualifications."

"I've got sense," Broderick said. "Pretty near the only man around here who does."

"Where was Webster at the meeting?"

"He wasn't. You think I was going to let him and his pals in to start trouble?"

Despite his anger, Jansen chuckled. "So that's your idea of a free and open

meeting—your opponents excluded, and threats applied to the electorate! This thing tonight was just a high-handed power play to keep yourself in office."

"Call it that. But it was necessary." One of Broderick's massive paws tightened on Jansen's arm. "Come on, now. Better clear out of town. I don't want you hanging around, stirring up trouble. I'll walk as far as the copter with you."

The moon lit up the town square. Men were busily ripping down the election posters. Jansen caught stray scraps of conversation.

". . . *the damn fool! Who needs a Federal Government anyway?*"

"*Yeah. We had one of them once. We been there before. And what good it did?*"

"*Blew everything to bits, that's what.*"

Jansen and Broderick paused at the copter. In a surprisingly gentle voice, Broderick said, "You look awful hurt, son. Don't take it personal."

"I'm not hurt, I'm angry. Sheer dumbness makes me angry."

"It isn't dumbness," Broderick said. "It's fear."

"Fear of a government?"

"Fear of making bad mistakes twice. Look, you go on back where you came from. Next town you stop at, you might get lynched."

"I'll take my chances," Jansen said. "One of these days the government will be strong again, and then we'll come back here and clean this town up."

"You still harping on my wickedness?" Broderick said.

"You're nothing but a two-bit tyrant."

"That's where you're wrong," Broderick said, taking no offense. "I like to think I'm a sort of philosopher-king, like Plato talked about."

"You read Plato?"

"How dumb do you think I am?" Broderick retorted. "We got a library here. My grammar ain't so good, but I can read. And think. And what I've been thinking is that we've got to change this country around a little. Sure, we need a central government, if we're ever going to climb back up to where we were. But not a government of fools by fools."

"And you think Ben Thurston's a fool?"

"He isn't, but he's trying hard to act like one. Him and his bunch in Kentucky are trying to do a Humpty Dumpty act with this country. He's got a right to try, but I know he's wrong, and I'm not going to support him." Broderick yawned. "Thurston's a good, powerful man, and I respect strong men. But he's full of a lot of crazy ideas. This ain't no time to go around with fancy-pants stuff like elections and congresses and political parties."

"It's fifteen years since the blowup. How long do you think we ought to wait? A thousand years?"

"The blowup," Broderick said, "set this country back three hundred years. What got blown apart takes a lot of time to grow together. No matter how hard you Kentucky people want to put back the good old days of television and advertising and Republicans and Democrats, you better learn that it can't be done. Maybe even *shouldn't* be done. You see those people over there?"

Jansen nodded. They were at work on the last of his posters now.

Broderick said, "Those people are scared of governments. The governments built the bombs. If things stay split up this way, there won't be any more bombs. These people don't want a central government. You heard them. They been there once."

"Should we just let things slide, then?"

"Of course not. But we can't put them back together with an election proclamation. The time ain't fitten for democracy again, yet. That's Ben Thurston's mistake. He wants the whole extinct shooting match, conventions and parties and secret ballots. Well, all that stuff's nice enough. But you have to let the old wounds heal. Let the country get its balance again. Right now we got a lot of weak, scared people in this country. They just want to be left alone, to hide their heads like ostriches. And if a man comes along running for office and promising to let them be ostriches, they'll vote for him. How you gonna rebuild that way?" Broderick shook his head. "Thurston's all wrong on this election thing. If he set up shop as Emperor of the United States, I'd support him. But he wants to be constitutional president, and the time ain't ripe for that yet."

"Thurston thinks it is."

"Well, he's *wrong*," Broderick said. "Let him see what happens. Some guy like Webster will get himself voted into office. There's always some damn fool like that around, for the people to vote for. Times like this, you got to figure that the people are always wrong. They got to be *led*, all the way back uphill, because the blowup took the starch out of most of them, and they can't get there by themselves. Thurston will find that out sooner or later, I hope. And then he'll start *leading*. None of this election business. And I'll be with him, then." Broderick frowned. "Or maybe he won't see what I'm getting at. And then I may have to start a little movement of my own. Dammit, I don't want to get mixed up in politics—but if I have to, I will, just like I pushed Webster over when I had to."

Jansen started to get into the helicopter. Broderick looked up and said, "Let me have one of them posters, son."

"What for?"

"A souvenir. A souvenir of Ben Thurston's government. I got a feeling it won't last too long."

Silently Jansen handed the big man a poster. Broderick nodded his thanks. Jansen began to start up the copter.

Over the noise of the engine, Broderick said, "When you get back to Kentucky, you tell Ben Thurston everything I told you, hear?"

"It won't do any good."

"Don't be too sure of that, son. Ben Thurston's a smart man. Pretty soon he'll see that he's got the wrong idea."

The rotors whirled. The copter lifted straight up, hovered over Falbridge.

Jansen hung for a moment at five hundred feet. Far below, in the square, he saw the dot that was Sam Broderick. The poster fluttered in Broderick's hands. Jansen was sure Broderick was laughing.

But this is what we've all worked for so long, Jansen thought bewilderedly. *Restoration of constitutional government. Can we be all wrong?*

He frowned. On the surface of things, Broderick was a typical local dictator.

But there was more to him that that. There was a depth in his eyes, a sincerity in his voice. Jansen's head ached. All his training had taught him that democracy was an ideal form of government, that one-man or oligarchic rule was evil.

But those were old rules, pre-blowup rules. The world was back in the twelfth century now, technologically speaking. Maybe democracy wasn't relevant just now. Maybe—Jansen fought with the notion, trying to suppress it—maybe Broderick was right. *I won't admit it*, Jansen told himself. *It can't be. Oligarchy has to be wrong, democracy right.*

But his protests had a tinny, whining sound inside his own throbbing skull. He felt numb, stunned, as he realized that values he had sworn by all his life had been called into question and — perhaps — demolished. For one wild moment he had the urge to fly toward the lake on his left and dump the remaining stack of posters over the side.

He fought the urge back. *I'll try another town*, he thought. *Two or three more. Maybe half a dozen. And then we'll see who's wrong, Broderick or us.*

The copter droned northward. Village lights glimmered, ten miles away. Jansen girded himself for another round. But he had an uncomfortable feeling that he was going to be back in Kentucky trying to explain things to Ben Thurston a lot sooner than anyone expected. ■

Jay Kay Klein's biolog

"The point-scores ran high on the May issue; it seems to have been a five-way fight all the way. However, it settled down with Ray Jones getting the 1¢ bonus, and Bob Silverberg, with 'To Be Continued,' taking second-place bonus." Thus read the AnLab reporting on the 1956 issue, which contained Robert Silverberg's first story in this magazine. That was the year he won a Hugo as Best New Author at the world science fiction convention in New York City, nosing out Harlan Ellison and Frank Herbert.

Bob had been a full-time writer since the previous year, not long out of Columbia University with a degree in literature and philosophy. He has remained a freelancer.

Science fiction was his first love, and remains so. He was one of the leading fans as a teenager, publishing a fanzine, *Spaceship*, from 1949 to 1955. His first science fiction story appeared in 1953 in a now-defunct magazine. He'd read so much science fiction that he thought he could write it, and he turned out to be right. Somewhere in the mid 1960s he took stock of what he'd done and realized he'd made a lot of money but that what he really wanted to do was produce stories good enough to qualify as literature. He cut down on the pen names and cut out potboilers-for-money.

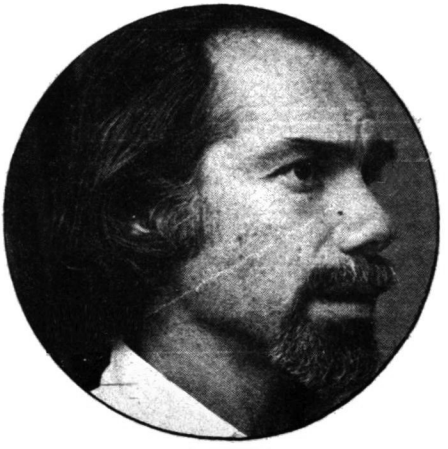
Bob tried then to achieve in science fiction the sort of intensity of character and prose that is typical of "serious" mainstream fiction. This ultimately produced such memorable stories as *Book of Skulls*, *Dying Inside*, and *Born with the Dead*. His peers in the Science Fiction Writers of America four times in a row gave him second-place votes for Nebula Awards. The general audience, accustomed to stories in which fine writing was a distant third to plot and ideas or absent altogether, didn't know what to make of the new Silverberg. That's when he announced he was stopping the production of science fiction entirely.

Of course, Bob regrouped his forces, started writing again, and has since won four Nebulas and two Hugos. All of his earlier fine writings came back in print. He was a guest of honor at the 1970 world science fiction convention in Heidelberg, Germany. Along with Robert Bloch and Isaac Asimov, he forms a triumvirate of the most sought-after masters of ceremonies. Bob's caustic wit can leave a victim dying of laughter even as he is being sliced to ribbons.

Brooklyn-born and New York City-raised in a cliff dwelling, Bob thought he'd reached the pinnacle of good living when he bought his own house, a mansion once owned by Mayor Fiorello LaGuardia. When this was gutted by fire in 1968, destroying an absolutely complete collection of science fiction and fantasy magazines, he was crushed. Even though the house was rebuilt a year later, he relocated to California's Bay area.

Perhaps two dozen people in science fiction are so well known that their first names or nicknames serve as sufficient identification. There is only one Silverbob. His next novel, *Lord of Darkness*, is due out the middle of this year. ■

Robert Silverberg



The Alternate View
PROGRESS REPORT
Jerry Pournelle

A couple of years ago I was at a NASA planning conference. One of my colleagues was a delightful Italian navigator named Giuseppe Colombos, who is one of the grand old men of the space program.

Colombos was working on tethered orbiters.

Problem: How do you get long-term samples from very high altitudes? Sounding rockets are expensive, and certainly not very elegant. Aircraft generally can't get that high. Satellites can't stay there: the atmospheric drag is too high. It's no good putting propulsion systems on them, either, since that would not only be expensive, but probably contaminate your samples.

The solution is simple enough: tether the probe to a statellite that *is* up high enough to have a stable orbit. Sure, the tether will have to be pretty long, at least tens of kilometers, but so what? DuPont Kevlar ® is strong enough. The only real problem is the orbital mechanics: that is, the concept ought to work, but will it, when you get down to actual calculations?

That's what Colombos was doing, and by his calculations it all looked very good. Moreover, the concept of tethers, once seriously considered, began to lead to a lot of exciting ideas no one had ever thought of.

STS (Space Transportation System, better known as the shuttle) has some interesting anomalies. For one thing, it's designed to throw away that magnificent External Tank (ET, and that's our acronym, darn it: Extraterrestrial Intelligent beings have always been designated as ETI. Oh, well). The tank not only gets thrown away, but *it costs to do it*. It is actually cheaper to put the tank, with residual gallons of hydrogen and oxygen left inside, into orbit than it is to splash it.

Heaven knows that tank would be useful. Any mass in orbit is useful, but a seven-story apartment building partly filled with hydrogen and oxygen (and thus with water if we like)—an aluminum structure with a nose hatch just large enough to allow a space-suited man to get in so that if you put on an airlock you'd have an instant lifeboat — well, a thing like that is just plain *valuable*.

Alas, although it's cheap to put the tank into orbit, it costs to put it up high enough so that the orbit is stable. Atmospheric drag will bring it down, and worse, not at a predictable time and place. It isn't that we don't understand orbital mechanics, it's that the Earth's atmosphere grows and shrinks depending on solar flare conditions, so that atmospheric drag is not constant for a given altitude.

Of course, if you could stabilize the ET to present a minimum drag, which

is to say stay nose or tail first as it circles the Earth, you could guarantee that it would stay up a lot longer; but that kind of station-keeping is not cheap at all.

There is an answer, and I hope you've seen it coming. All we have to do is tether the ET into a head-on position. What we can tether it to is, of course, another ET up perhaps fifty or sixty kilometers higher. The tethered group of ETs is quite stable (won't fall for tens to hundreds of years).

The package is even nicer than that. It turns out that you can tether a lot of these tanks (ten to twenty low and the same number higher); and if you do it all properly, the shuttle can come up to the height of the lower ones, put down the gear, and *land* on this orbiting airfield. When the shuttle leaves, it can use suitable techniques for imparting some of its unwanted velocity—if you're trying to leave orbit, you're going too fast—to the ETs, and on the next trip up can catch a line dangled out from the ETs and use that to pull itself up, meaning that the shuttle can increase its payload when it's going up to the space station.

Because, of course, that's what you have if you do this. A lovely space station, fueled each shuttle flight with the left-over hydrogen and oxygen, growing all the time as more and more tanks are added—

And here I have to stop, because it's not my story. Dr. David Criswell of CalSpace, Dr. David Brin, Dr. Colombos, and a number of others have worked this out in great detail. As of this writing, I'm summarizing Dave Brin's half-hour presentation to the Space Industrialization Symposium that looks to have become a permanent part of the World Science Fiction Convention. The symposium is pretty well hammered together by the L-5 Society. Dave Brin has promised to write up a summary of the study report for the L-5 *News*, and when the full report is available I'm sure the *News* will let you know how to get it. If you don't get the *News*, join up: it's L-5 Society, 1060 E. Elm, Tucson AZ 85719.

It wasn't very long ago that a symposium on space industrialization couldn't have been held anywhere except at a science fiction convention; and not long before that you couldn't have held one at an SF Worldcon, because there wouldn't have been anything to talk about that was different from the regular SF program. This year in Chicago there were two days of "nonfiction" programming about space platforms and space colonies.

There were talks about space platforms and space colonies. Gary Hudson told of some of his efforts to turn loose the engines of free enterprise on the problem of getting to space. Art Dula announced that the Second Annual L-5 Space Convention will be in Houston during the last week of March. Write L-5 for details; Robert Heinlein says he'll be there if he has to come in a wheel chair, which, given his vigor at the last convention, isn't likely.

I reported on the L-5 Lunar Colony project, which is headed by a world-famous architect, and has taken on a life of its own. Dr. Brin, as noted, spoke of designs of space stations.

A wonderful two days. The point is

that it's all stuff we can do *now*, with today's technology and engineering.

I was at the World SF Convention in Chicago twenty years ago. John F. Kennedy had made his announcement. We were going to the moon before the end of the decade. True, a number of respected engineers and scientists didn't believe it, but it did look likely. There was excitement in the air. We were going to the moon! Yet oddly, now that I think of it, there wasn't any part of the program devoted to what might be done "Beyond Apollo." We'd leave that to the "space professionals."

Worse, there was absolutely nothing said about what we might do to ensure that there would be anything after Apollo. Indeed, not only was there no organized "space support" within science fiction fandom, but organizations like the old Society For The Advancement of Space Travel (SAST) had withered out: their officers and enthusiasts were out working on the space program. What need had we of a cheering section, or organized political support groups? What need for amateurs to generate space plans and speculate on what we should do after Apollo?

We know better now.

This time we won't disband until the job is done. I can't speak for the other space groups, but the L-5 Society will not go out of business until we can dissolve the organization in a meeting held aboard a space colony.

Because, alas, we're still needed.

We're needed for a lot of reasons. Just because something is obvious to the "professionals" doesn't mean it's obvious to the public; someone has to explain it, but more important, someone has to be first to *accept* new ideas and concepts. Enter science fiction fandom, which has grown pretty large.

I would suppose that everyone reading this finds reasons for joy in the opening section. The idea of using the STS External Tanks as raw materials in space has always been intriguing, and to discover that by using them we can not only make a large space station, but save money in the bargain, makes me positively ecstatic.

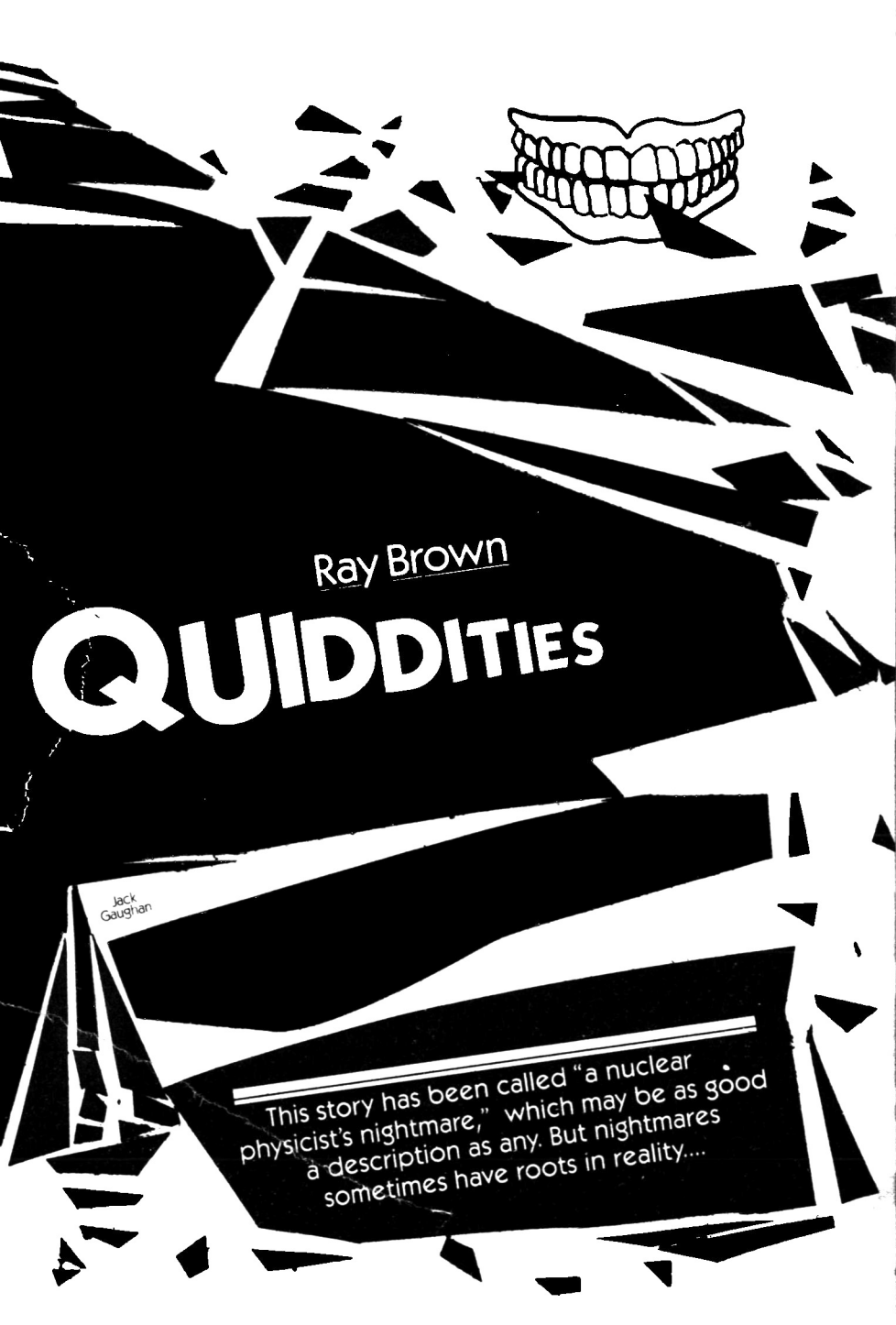
There are those who take a different view.

Senator William Proxmire not long ago tried to amend the budget to provide that not one cent be spent to put shuttle External Tanks into orbit. He's still around, still a powerful senator of the United States, still trying to keep Mankind in the cradle—which is why I continue to say that anyone who eats Wisconsin cheese is a traitor to the human race.

The good news, though, is that Proxmire's silly proposal not only lost, but lost big. I doubt that he learned anything from that, but he might have.

The good news is that space and space travel and high technology are suddenly back in the news. People are talking, not laughing. Science fiction conventions are no longer inevitably reported in the papers as collections of goofies in funny hats. Science fiction books are selling. Science fact magazines, books, movies, TV series, are thriving. It has been building slowly, but now, I think, there's a coming explosion of interest.

This time we won't let it die out. ■



Ray Brown

QUIDDITIES

Jack Gaughan

This story has been called "a nuclear physicist's nightmare," which may be as good a description as any. But nightmares sometimes have roots in reality....

For breakfast they had steak and eggs. Pai Chao had the steak and Sterling had the eggs—powdered ones, cooked to the consistency of lumpy soup.

Sterling's body objected to this treatment, of course, but interposed between his body and his mind was a soothing haze. It had been that way with Sterling almost every morning since he was a mere brat, when the haze had made him leave his house with mismatched shoes and unzipped fly and a tendency to bump into things, an unfailing source of low comedy for his friends.

But now the curse of his absent-minded youth had turned into a blessing. So he wasn't exactly thrilled when Chao jerked him abruptly into awareness of the extruded table he sat at and the two-fold horror inside his mouth by asking, "Have I done something to offend you again, Sterling?"

"What do you mean, 'again'?"

"Well, you've been testy lately."

Sterling's head began to throb—a symptom of looking around a cheap class "G" dorm room with wide eyes. Wall to wall, walls included, the whole thing was flat white, like twilight in the arctic, giving the eyes nothing to rest on but food and humans. As he reluctantly focused his eyes on Chao, the headache subsided.

Chao looked concerned. His eyes were squinted, his forehead wrinkled.

"I've been testy for the past twenty years," Sterling said. "And no, you haven't done anything. Why do you ask?"

"You've been making horrible faces at me ever since we sat down to eat. Weren't you aware of it?"

That's right, Sterling thought, he had been. His body had been trying to tell him something. And now it was getting through.

"It's got nothing to do with you," he said aloud. "It's these damned new dentures. They don't fit right and they hurt and I can't eat anything but slop. I think they got mixed up with another pair in delivery. I bet some poor bastard is running around the university right now wearing my pair, making the same faces."

"And what did the Alcalde say?"

"I haven't asked it yet."

"Oh. I'll get it for you, then."

Chao was sitting next to the wall and had already arched his skinny body backwards over the chair, reaching towards a button under the big screen.

"I don't feel like talking to it first thing in the morning," Sterling said hastily. His grimace turned even uglier as Chao's hand slapped the button in stopping the chair from tipping over.

The screen stayed white, but a soothing baritone voice came from the wall.

"Hi, guys," it said.

"Too late," Chao muttered.

"What can I do for you, Mr. Pai?" the Alcalde asked, responding to the voice.

"It's not me, it's my roommate."

"Mr. Amo is here, eh? I'm afraid I've got some bad news for you, Sterling. I've just been looking in on your mentor, Dr. Bonnet, and he's taken a severe turn for the worse."

Sterling groaned, then said, "Great! That's all I needed to hear right now! Why don't you save your cheery little reports on Sammy-Jack's health till late evening, when I'm drunk?"

"But Sterling you called me, remember?"

"That's not exactly the way it happened, but never mind. I don't want to talk about that, I want to talk about my false teeth. They don't fit."

"You mean they hurt."

"I guess I mean whatever you say I mean."

The Alcade gushed sympathy. "Gosh," it said, "I'm sorry to hear that. But you can't expect to adjust to them overnight, you know. You've only had them two weeks."

"But I got used to my old set in a week. I don't think they're mine at all. I think they got mixed up in delivery. They're too big."

"I know just how you feel," said the Alcalde. "But the fact is, Sterling, you're not getting any younger. It takes longer to adjust as you get on in years."

"Would you check it out for me anyway, please?"

"Of course, Sterling," it said soothingly. After a barely detectable pause, it added, "Are you still there, Mr. Pai?"

"Yes."

"As long as I'm in touch, I may as well give you some news, too."

"Oh, no," Chao moaned.

"It's good news this time. Your book on pre-Alcalde North American History has been accepted as a dissertation. You are now a phud, and may inflict your ideas on society without hindrance."

With these words, traditionally spoken at the conferral of the phud, the Alcalde clicked off.

"What about my teeth?" Sterling asked the unhearing wall.

Chao, too, failed to respond. He was ecstatic, Sterling decided. Only ecstasy could explain the loss of his usually ravenous appetite, which loss he proved by flinging his uneaten half-steak across the room into the disposal chute.

"I've done it!" Chao cried, pushing back his chair and stooping for a leap. He checked himself, though. Still crouching, he stared hard at Sterling's face.

"The look you're giving me now isn't caused by sore gums," Chao said.

Sterling was shocked to find his false teeth bared in an animal snarl. "I'm sorry, Chao," he said, pulling his lips over them. "It's just that well, how old are you? Thirty?"

"I'll be thirty-one this month."

"And I'm fifty-four. See the problem? Don't get me wrong—I'm glad for you—but I can't help being a little resentful."

"That's silly," Chao said, straightening up. "We're in totally different fields."

"That's right. And — intellectually — that makes a big difference to me," Sterling said, nodding. "Unfortunately, my mind and my gut don't always see eye to eye on these matters."

He walked to the screen and punched a button next to it. The table melted into the wall and a keyboard slipped out. He tapped on the keyboard, requesting the preface to the course catalogue. The screen buzzed and faded until the white-on-black letters were clear:

UNIVERSITY OF EARTH

STUDENT CATEGORIES

I –Occupational Trainees
II –Pre-Graduate Students
III –Social Scientists
IV –Historians

V –Scientists, class 1
VI –Scientists, class 2
VII –Philosophers
VIII–Theologians

"Look," Sterling said, gesturing at the list like a prosecutor pointing at the accused. "There we are, all neatly classified—but why are there two classes of scientists? What's the difference between a neurologist and a neuropsychologist? Or an astronomer and a nuclear physicist like me?"

"Well," said Chao, taking his seat back, "one studies stars and the like, while you "

"That's not what I'm talking about. What I mean is: Is nuclear physics any harder?"

"I wouldn't

"No!" Sterling answered himself, forcefully. "Matching what it takes to learn each science, step for step, mine is probably a lot easier. It's just that nuclear physics has so goddam many steps! The only reason for there being a second class of scientists is that the chances are good they'll spend their whole lives studying and never get a phud. Category six is an administrative thing, and it's unique—nobody else has to face that. The astronomer will get his phud after about twelve years of postgraduate work. Category threes get theirs in seven, usually. And you got yours in only nine. "

"I have heard of it taking as long as fifteen years' steady work for an historian to get his phud," Chao said.

"That doesn't mean much since category four includes any scholar who's researching the past—hell, that's almost redundant. Your category's a catch-all; everybody's in it. I bet your example was working in a field that had already been done to death."

Chao nodded reluctantly. "Twentieth-century television," he said. "Hanna-Barbera."

"See? To tell you the truth, I don't understand what makes all you historians immune to my problem. After all, historical knowledge accumulates at the same rate as other kinds—faster, actually, since you're not only doing research, but the subject matter itself grows every day."

Chao smiled lopsidedly and leaned back in his chair, using his hands for a pillow. "Fortunately," he said, "I'm dealing with the kind of knowledge that can always be condensed at need. Think of one of those elementary textbooks that supposedly shows the whole history of human civilization and you'll get an extreme idea of what can be done."

"But you still have to do something new to get a phud," Sterling objected. "Condensing the material doesn't get around that problem."

"That's true, but until someone invents a time machine, historians aren't going to be dealing with facts that can be verified by experiment. Unluckily for human progress, but luckily for me, the work of the previous generation of historians is filled with gross misinterpretations, and any solid work that goes toward correcting them will get you a phud."

Sterling was amazed.

"Hold on," he said. "It sounds to me like you're not just talking about your own specialty. Are you saying that *all* those different fields are full of mistakes?"

Chao's brow furrowed. "You know,"

he said, "it's funny, but I can't think of more than a couple that aren't."

"Hmm. When *I* was a young pre-graduate student and you were still a soul waiting in line for a womb, I studied the works of that previous generation you're talking about. If I remember right, they said in their prefaces that *they* were correcting the gross misinterpretations of yet an earlier generation. ."

Chao rose from the chair and looked down at Sterling. "I hope you're not suggesting what I think you're suggesting," he said stuffily.

He walked stiffly to a wall, pressed a spot on it, and created the bathroom door. When he'd passed through, he slammed it.

I've let my mouth run ahead of my brain again, Sterling thought dejectedly. Chao and he had been friends a long time. He didn't have many friends. Now Chao was going to move up in the world and out of the dorm. It would be too bad if he left mad. He'd already had his share of higher-ups mad at him.

Still, Sterling thought he was right. Many historians and social scientists were just making work for themselves. They were in no position to appreciate the problem of the category sixes, or any scientist, for that matter.

Faintly, through the wall, he could hear the sound of the shower.

Sterling was suddenly seized with a bad case of curiosity. Chao had always been very secretive about his work, but now Sterling wanted a close look at it. Chao always spent at least ten minutes in the shower.

Furtively, he punched the manuscript up on the screen:

THE SEED OF THE ALCALDE
(The Origin of the Movement
for "Computerized Government"
in Early Political Scandals)

Keeping one eye on the clock in the upper left-hand corner of the screen, he skimmed through the first couple of chapters, pulling what he could into his mind in a hurry.

Chao seemed to be saying that the main reason the Alcalde was installed in the Terran capitol at Geneva was to eliminate the possibility of self-serving politicans rising to the top of the court system or the executive departments. The Alcalde couldn't be bribed or blackmailed—it was theoretically incorruptible. That was by far the most important reason for the eventual acceptance of a government that was two-thirds computerized. The Alcalde had other advantages that might be more important in reality: a superior grasp of the facts, accessibility to everyone, the ability to run each government department itself (including the State-supported University of Earth). These advantages were scarcely considered.

Sterling frowned. There was nothing really new in any of this. He skipped to the middle of the book.

Aha!

Chao maintained that the political scandals of 2440–60 were merely the last of a long series, stretching all the way back to the late twentieth century, when the government of the U.S.A. was divided between Washington and the Holy Wood where actors were apprenticed in the Conspiracies and vied with one another at telling whoppers with the straightest face, the best of them proving

their aptitude for democratic government.

Sterling was skeptical. Chao seemed to be reaching pretty far back in time to explain things. He did have a long chain of evidence, and Sterling was willing to follow it, but he didn't have the time. The shower had been turned off and Chao was fumbling at the door. He switched the screen off.

Chao emerged, elegantly dressed. He still looked mad, but was at least willing to talk.

"And another thing," he said, shaking his finger at Sterling, "you nuclear physicists seem to have done quite a bit of reforming yourselves!"

"We haven't done any such thing," Sterling said softly, almost apologetically. "That's the whole problem. Nothing important that my predecessors has done has been disproved—we're only building on their work. The data just keeps mounting and mounting—or at least it did until forty-odd years ago."

"But not any more?"

Sterling raised his hands and eyes heavenward. "The knowledge has accumulated to such an extent that by the time you've got enough in your head to contribute something new, you're too old to do the work."

"Seems to me," Chao said with a pitiless shrug, "that you category six types have created your own problem. Whenever one of *our* fields finds itself with an overabundance of knowledge it just splits in two, like a fat amoeba. And I know they do that in the sciences, too. There are at least a dozen different kinds of biochemistry ."

"God knows," said Sterling, "we've *tried* to subdivide our field, but nobody's come up with a sensible way to do it. You can't chop it up in the obvious way—you can't just work with hadrons without knowing about quarks, because quarks are their building blocks. And you can't work on quarks without knowing about the sub-quark particles they break down into. And you can't work with sub-quark particles without knowing about the quirks of which *they're* made. And the same applies to quirks and sub-quirk particles, and sub-quirk particles and quiddities."

"Let's see—you're studying sub-quirk particles now?"

"All two-hundred-odd of them," said Sterling. "I'll probably be through with that in four or five years. Then I'll start on quiddity theory. That'll take a couple more years, then I'll be ready to start my search for thesis material."

It was a sad story, and Sterling was gratified to see it having an effect on Chao. He seemed completely over his mad—in fact, he looked horrified.

"And how long does that take?" he gasped.

"I don't know," said Sterling. "All the particles have already been discovered. I'm not sure what I can do to make a decent thesis, an important original ."

"What!" Chao gaped in disbelief.

It took Sterling a minute to figure out what was supposed to be so shocking, then he said, "I said there aren't any more particles. Discovering particles used to be *the* way to get a phud—back in the golden age of nuclear physics you were almost expected to discover one. But that road's run to an end. I could pick a few unimportant particles, of course, and study their interactions—but

the last time somebody tried that, the department decided it was trivial."

"Excuse me," Chao said. "I don't know all that much about nuclear physics, but I do know some history. At one time people generally thought that protons and neutrons were truly elementary particles, right?"

"Yeah."

"Then they settled on quarks, until the number of quarks grew too large. Then they went to quirks, and now quiddities. Who's to say there aren't sub-quiddity particles?"

Sterling sighed. "In the first place," he said, pointing at the fingers of one hand with the index finger of the other, "a quiddity is truly elementary. In the second place, even if it weren't, there still won't be any more particles discovered during my lifetime ."

"There certainly won't be if you all take that attitude!"

"No, hear me out! Subatomic particles are created by smashing bits of matter together. The reason they couldn't get beyond quarks for so long was that they couldn't smash bits of matter together hard enough. The same with quirks. And the sub-quirk particles which lead us to deduce the existence of quiddities were only created in that one experiment—you know, the one which produced the Gell-Mann Memorial Nebula?"

"I've heard," Chao acknowledged. "My father always said that collapsing a star usurped the privileges of God."

"How else could we get the necessary power?" asked Sterling. "Anyway, the point is that we've reached the limit of our resources. How could we hope to top that?"

"You could collapse a bigger star."

Sterling's eyes misted over. His soul filled with a kind of nostalgic sadness.

"We'll never get that kind of funding again," he said.

"Never say 'never.' "

"OK. But like I said, it won't happen again in my lifetime."

Chao stood silent for a while, then he paced. He began by walking slowly, but in a few minutes his movements became jerky and excited.

"Suppose it did," he said, finally. "And suppose you came up with sub-quiddity particles "

"Impossible."

"I wouldn't know, but I'm only asking you to *suppose*. Look, I'm trying to help—I think maybe I've come up with a way around your problem."

"OK, I'm supposing."

"And that supposition doesn't suggest anything to you?"

"No."

Chao scowled and scratched his head. "Let's try to get at it another way. Your problem is that you have to learn about so many particles that you grow old learning."

"You could put it that way, yes."

"What if there are no truly elementary particles? What if the old Greek theory turns out to be true, in sense, and matter really is infinitely divisible—the harder you smash matter together, the more and smaller particles you get? Then the number of particles would be infinite. All those particles you have to learn about would be reduced infinitely in importance, or at least they'd be reduced a lot—they couldn't put such an emphasis on learning about each of the ones which just

happen to have been discovered. They'd *have* to reorganize the curriculum!"

"That's true," said Sterling. "And it would change the whole nature of my science. It would open it up for all kinds of original work. Youngsters would aspire to be nuclear physicists again."

"Right."

"Unfortunately, there *are* such things as truly elementary particles. Like the leptons . . ."

"The what?"

"Electrons, photons, and the like. Everything that's not a hadron—that is, that's not made of quiddities."

"Are you sure? Maybe you just haven't been able to smash *them* hard enough."

"Trust me."

"OK. But what stops you from just saying that hadrons are infinitely divisible, and not the leopards?"

Sterling smiled a sad smile. "Forgive me," he said, "if I sound ungrateful — actually, your proposed solution to our category six problem is as good as any I've heard. But like all of them, there's a flaw in it."

"Which is?"

"If it's already been shown that some parts of the atom are truly elementary, then the safest assumption is that the rest of the atom can also be broken down into such parts, eventually. Assuming otherwise complicates things unnecessarily."

Chao pressed a spot on the far well, creating a door and the opportunity to get the last word in by leaving.

"If I were you," he said, "I'd be all for complicating the atom, regardless, if it meant uncomplicating my life."

* * *

Of all the ways men measure things, Sterling decided, the ways they measured events in the invisible world of the subatomic were the most simple-minded and tedious. Matrix algebra was the mathematical equivalent of knitting. The new methods for relating the most probable interactions of quiddities to their quirks to their quarks were the same—with the added disadvantage that you couldn't watch TV while you worked.

The thought of TV pulled Sterling's eyes up from the thing that had been a breakfast table and was now a desk, to the screen. It was on, but it wasn't worth watching—it merely displayed the bright blue seal of the Alcalde, which meant that the camera was on, too, watching him.

"Alcalde?"

"What can I do for you, Sterling?"

Sterling lifted the paper full of columns of figures he'd been scribbling on and waved it before the camera-hole.

"You could give me the rest of these numbers," he said.

"Aren't you being sort of childish, Sterling?" the Alcalde asked, its voice a sonic sneer. "Whenever you're looking for something to distract you from your unpleasant assignments, you waste time baiting me."

Sterling ground his false teeth in resentment of that sneer, then jerked his jaw open at the jolt of pain it gave him. His teeth flew out onto the desk.

"Shometimesh," he said, as he grabbed them and popped them back in his mouth, "you can be very irritating."

"I'm only trying to motivate you and get you back on the right track," the Alcalde said. "It's part of my job. They

spent millions programming my voice to get maximum emotional response from humans, and it would be a waste not to use it. And you *are* behaving like a child."

"Why shouldn't I? I'm treated like a child. I'm still going to school, still given an allowance, still . . ."

"Surely you're not going to start on *that* again!"

"I'll lay off it," Sterling said, smirking, "if you'll give me the numbers."

The Alcalde switched to sounding aggrieved.

"You're being very unreasonable, Sterling," it said. "I don't want to have to enter this in your student records, but . . ."

"My records must be the size of an encyclopedia by now. Since nobody'll ever read anything that hefty, I can bait you as much as I want. So—you already have all those heavy-isotope relationships on file. Why are you making me figure them out? You want me to check your work for you, or what?"

"God knows, Sterling, if it were up to *me*, I'd be handling things differently. But the department says that practice at regular intervals firms your grasp of the math."

"Alcalde, I've been doing this for twenty years. Why would I forget all of a sudden?"

"Well, I can't really relate to that question — not on a gut level, anyway — since I've never personally forgotten anything."

"The question was rhetorical. My point is that you're capable of getting me out of this, and I can't see why you don't. I mean—even your capacity is limited. In fact, I heard on the news that your capacity's being stretched to the limit, lately."

"That's the truth! I'm being worked to death—people bothering me all the time with stupid questions you wouldn't believe. What am I, Dear Abby?"

"Who?"

"Never mind. And the crank calls — seems like every minute some joker calls asking for an exhaustive search on a chess problem or a traveling salesman problem or something else that would burn me out. And then there's just plain old pestering. You know who one of the worst pests is?"

Sterling stepped around that one, and said, "That being the case, then surely you must have something better to do with your time than making sure I don't use your computing capacity to finish this busywork!"

"I'm only an Alcalde, Sterling," it said, putting enough pathos in its voice to have brought tears from a less hard-hearted man. "Legislative powers are reserved to humans—my powers are only executive and judicial. And here at the University of Earth that means I execute what the departments decide."

"It must be nice to be the chairman and the board all at once."

"If you're talking about Dr. Bonnet . . ."

"I am! The Nuclear Physics Department consists of Sammy-Jack Bonnet, period. He's the only faculty left. So why do you try to confuse things by calling it a department?"

". . . this particular policy was begun long before he assumed the chairmanship—in the days when they were category fives."

"You mean in the days when a stu-

dent wouldn't have had twenty years of practice?" Sterling asked, grinning.

"Sterling, I agree with you in principle, but "

"Tell you what—why don't you hook me up with Sammy-Jack and we can get a Departmental Decision on this. You are in contact with the computer that monitors his jug, aren't you?"

"Yes, but I think it would be better if we left him alone."

"Why?"

"As I told you this morning, he's gotten a lot sicker. Not only would it be polite to avoid bothering him, but there's a good chance we wouldn't get anything out of him anyway. He's getting senile pretty fast, in spite of everything we can do. He's only lucid about half the time, now."

Sterling thought about what might happen to the department—and to him—if the last faculty member should die without a replacement, then pushed the matter, uncomfortably, to the back of his mind.

"Why don't you just ask him?" Sterling said. "If he doesn't want to talk, or if it sounds like he's not himself, then don't hook us up."

There was no reply. The blue seal stayed on the screen, there was a pause of about half a minute, and then Sammy-Jack's hoarse croak came over the speaker.

"Hi, Sterling," he said. "How's it hanging?"

"Good afternoon, Dr. Bonnet. How are *you?*"

"Oh, I'm feeling pretty poorly, they *tell* me. I wouldn't know myself, of course."

"No," said Sterling, thoughtfully, "I suppose not."

"They tell me my body kicked up a real fuss early this morning. And they say I'm only rational 'bout half the time." He cackled. "Hell, that's been going on all my life. I don't see why they waited till now to make a fuss over it."

Sterling smiled. "Me too," he said. "Listen, the reason I wanted to get in touch with you was to ask about a policy matter."

"Yes?"

"What I wanted to know was why I should still be doing exercises in the math I learned twenty years ago — monitored by the Alcalde, I might add."

"I don't know. Why?"

"Because," Sterling said tartly, "a policy formed during the golden age is still being applied—to me."

"I see," said Sammy-Jack, cackling hilariously, forcing the words past his laughter. "So you'll likely be doing those kids' exercises till you die of old age!"

"That's right."

"You won't like dying of old age, Sterling. You ain't got the temperament for it . ." the laughter died away. "So—what do you expect me to do about it?"

"Well, you *are* the chairman, Dr. Bonnet."

"I am? Oh, that's right, I am."

"So will you please inform the Alcalde that I don't have to go through this any more?"

"You know, I don't think I will, Sterling. The spot you're in kind of tickles me—and I always have had a cruel streak."

Sterling sighed. "I know," he said. "But you've always been concerned about the future of the department, too. New students haven't exactly been beating down the doors, and it's stuff like this that's the cause of it."

"The cause of it," Sammy-Jack corrected, "is being in category six. Everything else follows from that. But I'll tell you what I'll do."

"Yes?"

"I'll put you in the line-up this inning. If you can get on base, I'll keep you in for the rest of the game."

"Huh?"

Dr. Bonnet's voice was becoming weaker and weaker. "This here pitcher," the speaker warbled, "he's got a mean slow curve. And watch out for "

"Damn," said Sterling, banging the desk with his fist as the voice faded to nothing. He remembered that in the days when Dr. Bonnet was ambulatory, he'd coached the faculty baseball team, and that's undoubtedly where he was now.

He hoped they lost.

The Alcalde's voice switched back on.

"I told you so," it said.

"Go to hell."

The Alcalde made some further claims to prescience, but Sterling missed the gist of them. He was distracted by the creation of a door in the far wall. Chao came through, whistling happily.

"I just found out," he announced with a grin, "that this'll be my last semester of teaching pre-graduate buffoons. I'll be doing phudly work at a salary that'll get me out of this housing—not, mind you, that living here hasn't been a joy."

"Good afternoon, Chao," the Alcalde said.

"Hi, Alcalde," Chao answered, still looking at Sterling. "Have you been checking out my theory with him?"

"What theory?" asked the Alcalde.

"No," said Sterling.

"What theory?" asked the Alcalde.

"Why not?" asked Chao.

"It's like I told you," Sterling said. "It's a very unlikely explanation of subatomic events."

"So? What harm is there is asking?"

"I don't suppose you'll give me any peace until I do ask," Sterling grumped. "Though, come to think of it, I can't see why you don't ask yourself, if you're so interested."

"Well," said Chao, "it is *your* specialty, after all."

"What theory?" asked the Alcalde.

"The idea," Sterling said, "was that you could just keep on dividing the atomic nucleus without ever stopping. Chao wants me to ask you if that would be a good theory to use."

"I couldn't allow you to use it officially," the Alcalde said cautiously. "All the research that's funded under the department is run on the theory—let me quote—'that atoms are completely reducible to elements which are, in themselves, irreducible.' "

"You see?" Sterling said, giving Chao an I-told-you-so look.

"Not so fast," Chao said. "You can't brush it off that easily." He took a seat at the desk beside Sterling and asked "Alcalde, if the department didn't have a policy on that sort of thing, how good a theory would it be then?"

"I can't tell you that."

"You mean it's a secret?"

"No, but such questioning of department policy would be very painful to me, personally, unless it were done by the head of the department himself. I'd have to disconnect my personality so you could ask the computer part of me alone."

"Then what's stopping you? We'll call you back and tell you how it turned out, if you like."

"In the first place, it's a strange sort of question. You'd have to pose it as a probability question, and yet—it doesn't lend itself very well to figuring probabilities. I'd probably have to use one of the gamblers' algorithms."

"That's OK with me."

"And in the second place, I'm not allowed to disconnect my personality until Sterling finishes his work."

"Why not?"

Sterling felt his face growing hot as he yelled, "Because it knows damn well that if it does I'll use the computer to get through this asinine busywork the department saddles mgph!" He clapped his hand over his mouth just as his teeth were leaving, leaned over the table, and stuck his face in front of the camera hole, grimacing horribly.

"What are you doing about my teeth?"

"Don't get yourself all upset," said the Alcalde. "It can be very dangerous, at your age. You've only got another week to go, and then I can look into the matter."

"Huh?"

"If the only people you can afford to get dentures from is the Dentistry Department, then you have to abide by their rules. They say a patient has to be given at least three weeks to adjust before a refitting."

"But you said you were going to look into it!"

"I didn't say when, though, and I'm glad I didn't. Look at how out of sorts you are now. Imagine what you would have been like if I hadn't broken the news to you gently."

"But my point was that these teeth were never fitted to me in the first place! They're somebody else's."

"I suppose that's possible," said the Alcalde. "Unfortunately, there's still nothing I can do about it. I'm only an Alcalde, you know."

Sterling leaned back in his chair and tried to relax. He thought about the assumptions buried in Chao's book: In the days before the Alcalde, humanity was burdened with horribly corrupt administrators, whose hands were always out for a bribe. Since the Alcalde was immune to influence, life became infinitely wonderfuller after his installation.

Sterling wondered. On days like this one, the whole system seemed designed to rain pee on Sterling Amo. He felt rebellious.

"You know," he said, turning to Chao, "I think maybe you're right. If I could complicate the atom, I would. The only problem is, I can't."

"You're talking about Chao's theory?" the Alcalde asked.

"Damn right," said Sterling.

The Alcalde was quiet for a long time—maybe half a minute. Sterling figured it had to be thinking very deeply about something. Then it said, "Why don't you give it a try?"

"Huh? You mean I can?"

"You can try. If you could convince the department, somehow, to change its definition of the atom in the way you

suggest, I'd have to put nuclear physicists in a new category. You wouldn't have to learn about every single subquirk particle, and you could go right on to looking for a thesis subject—which, incidentally, would also be a lot easier to do."

"You see?" Chao said, giving Sterling an I-told-you-so look. "That's exactly what I was saying."

"You sound like you're actually trying to be helpful," Sterling said to the Alcalde. "What brought this on?"

"I always try to be helpful!" the Alcalde said. It sounded terribly hurt. "Everybody blames me for the limitations that are built into me! It's not fair!"

"There, there," said Chao who, when he realized he was stroking the screen soothingly, blushed and jerked his hand away as if he'd burnt it.

"There's no need to feel ashamed of sympathy with a fellow creature, Chao," said the Alcalde. "Even if your sympathy is a response to my Vocal Emotional Stimulation Program. In fact, you should feel lucky. *Some* people are condemned to spend their whole lives ignorant of the finer human feelings."

"OK, OK," said Sterling. "I'm sorry and I thank you for your encouragement. But I still can't see why you'd want the department's definition changed. I thought you said that any action contrary to department policy, even in theory, gave you a pain."

"We aren't taking any action," the Alcalde said pedantically. "We're just *discussing* it. Any action would have to be taken with Dr. Bonnet present, and with his approval. And it'll have to be done quickly. Dr. Bonnet might go any time, and then where'll the department be? I'll be stuck with it forever."

"I knew there had to be something in it for you, too," Sterling said.

"Just don't lose sight of your own interest. How'd you like to be in a department without any more phuds? How'd you like to be in a department with me as chairman . if you even get that. I'm working up to capacity now and I'm only an Alcalde, after all."

"You'll *have* to take over," said Sterling.

"What do you mean, no more phuds?" asked Chao.

"Sammy-Jack Bonnet is the last of them," Sterling explained. "He's the whole department, and he's very old. He'd have been dead years ago if they hadn't jugged him and now, apparently, even the jug can't keep him going much longer."

"Gee," said Chao, "that's a very expensive honor. I've never even known somebody who knew somebody who'd been jugged before."

"Maybe," Sterling added, "I could get my phud before he dies. Then the Alcalde won't have to take over the department."

"I'm afraid you're indulging in wishful thinking, Sterling," the Alcalde said. "Even if you can persuade him to change the rule, I don't think he'll live long enough to preside over your phudding. I'd be surprised if he lives out the month."

"Then you'll definitely have to take over."

"I know," said the Alcalde, "though where I'll get the time is a mystery. Even so—well, you know *I* can't make or change any rules. So it's far better

that I take over after there's a rule-change and you stand a chance of *being* phudded. I don't want to have to baby-sit you forever."

"So," said Chao, "when do we talk to Dr. Bonnet?"

"Just as soon as Sterling's finished with his assignment."

"How about before?" asked Sterling.

"I'm afraid not," said the Alcalde.

"How come?"

"It's a departmental matter. The numbers are due today, and don't ask me to make an exception, because I don't have any choice. I'm only an Alcalde, after all."

Sterling shrugged and began scribbling on his paper again. "This'll take a couple hours at least, Chao," he called. "If you want to join us for the policy meeting you still have time to go out for a bite to eat or something."

"I'll wait," said Chao.

Sterling felt strange. He couldn't keep his mind on his math. As he doodled lopsided spirals, he was plagued with a feeling of incompleteness — something was missing. He pushed the paper to the side of the desk and pondered.

It gave him a little shock when he realized what it was. The Alcalde had cut its voice out without its usual final smidgen of moralizing. It hadn't even said, "Now get to work, Sterling."

"Alcalde?" he called.

"What?"

"You've been awfully quiet."

"I've been devoting all my spare attention to the computer for Dr. Bonnet's jug," the Alcalde said. It sounded strained. "It notified me of a sudden rise in his heartbeat and respiration and then it cut off all communication to it or Dr. Bonnet from anyone. Even from me."

"From you?"

"That's the way it's programmed. When things get serious enough, it cuts off—devotes all its attention to the jug and the patient. Unfortunately, it's very stupid, and I don't think I'll be able to make it realize that I'm an Exception. We're going to have to go there."

"Go where?" asked Chao.

"To the jug, of course. To Dr. Bonnet's place. I know I said I'd be surprised if he lived a month, but that was before I got this latest bit of news. Now I'd be surprised if he lasts the day. We've got to try this policy change out on him before it's too late."

"OK," said Sterling. "Let's get out of here."

The Alcalde's voice rose in pitch. It seemed to Sterling that it almost squeaked with embarrassment and frustration as it said, "I'm afraid we can't go quite yet. You've got to finish your assignment."

"For Christ's sake, Alcalde! How do you expect me to be able to concentrate on it after what you just told me? I'm looking forward to a guaranteed life as a peon if we don't get to Sammy-Jack quick—and maybe even if we do get to him in time, if he's still in the mood he was in earlier."

"I don't suppose it would occur to you that this prospect is upsetting to me, too no, it wouldn't. You're all tied up in your glandular responses."

The Alcalde paused just a little longer than usual—maybe it was only a decisecond, but Sterling was sure he could

detect it. Then it said, "Your work is out of range of the camera. Let me see it."

Sterling pushed the paper back from the edge of the desk to the center. In spite of the dreadfulness of the occasion, he felt his mouth quirk with a suppressed smile.

"You've got a little more than seventy percent of it done," the Alcalde said. "And it's all correct, too, as far as you've gone. "

"It ought to be, after twenty years of practice. So what?"

"Seventy percent," the Alcalde suggested, "is passing ?"

The bronze sign above the building's front door was screwed into a metal backing—obviously designed to be replaced at regular intervals. And just as obviously, it had far outlasted the reckoning of whoever invented the system. It and the screws were green. It said:

DEPARTMENT OF NUCLEAR PHYSICS
DR. SAM J.C. BONNET, CHAIRMAN
FACULTY:
Dr. Sam J. C. Bonnet

They stopped there, suddenly reluctant to go in.

"What are you waiting for?" the Alcalde asked, and added, in a voice reeking of profundity, "Nothing ventured, nothing gained."

Sterling stared dolefully at his "physicist's calculator," a small blue box which was actually a direct link to the university computer. The Alcalde had patched itself through.

"I think," Sterling said, "that we ought to think over what we're going to say."

Chao turned to Sterling. "It's hard to believe this whole building houses only one man," he said.

"One professor," corrected Sterling. "And a handful of poor suckers like me."

"Has it made him weird? I mean you know him and I don't. How do you think we should approach him?"

Sterling thought it over for a while—until he decided he was stymied.

"I guess the Alcalde was right," he finally said. "All we can do is tell him our plan, provided he's having one of his lucid periods, and hope he'll go along with it. If we spend much time trying to prepare a presentation like as not we'll out-think ourselves."

"To say nothing," the Alcalde added, "of the risk of his dying while you're preparing it."

Sterling pulled open the door and hurried Chao through toward the row of grimy elevator doors at the end of the lobby. Their steps clanked hollowly, seeming almost to echo through the whole building.

There was no doubt about Chao's sneezes. The building rang for nearly half a minute after each one.

"This place gives me the creeps," Chao said.

"It's not so dusty on the third floor, where Sammy-Jack lives," Sterling said. He punched the up button and waited impatiently for something to happen.

Just as he was about to succumb to the dust himself, the elevator door ground open. He pulled Chao in and said, "Pray we don't get stuck."

"I've had a small success," said the Alcalde as they sped upwards. "I've at

least convinced my moronic cousin to let me monitor Dr. Bonnet's readouts. They show that he's definitely conscious — for what good that does us — and that his vital signs are stable for the moment. Which isn't to say there's no hurry."

The cab jerked to a stop and with a hard kick from Sterling, the door opened again.

The third floor was clean, but no less empty. The echoes weren't muffled until they entered the hallway to Sammy-Jack's office and residence, a long thing lined with tapestries showing the images of the great physicists of a half-century ago standing next to stylized—almost Pythagorean—pictographs of their experiments.

Near the end of the hall was a door marked "Chairman: Sam J. C. Bonnet." Sterling opened it and ushered Chao in.

Chao gasped involuntarily at the sight that awaited him. In fact, he looked a little sick. Sterling, having grown used to the contraption long since, watched it calmly and waited for Chao to recover.

Dr. Bonnet's wrinkled old body floated naked in clear liquid in an enormous, tinted, transparent vessel that looked enough like a jug that if you disliked the things, the name would occur to you.

From every opening in his body—all those he was born with and a few new additions—tubes snaked up and out the mouth of the jug and twisted their way around the room to various containers and machines. From each of these gizmos came wires which eventually twined into a cable which led into a hole in a closed door, behind which there was a lot of humming and clicking. The only variation from this pattern was on the tube coming from his throat. At the mouth of the jug, a wire branched directly out of it to a speaker which dangled from a mount on the ceiling.

"He's one hundred and two years old," Sterling explained. "He's been on extensive life-support for the past fifteen years. And don't look so disgusted. If it weren't for the jug he'd have been dead those fifteen years, and I'd be in a worse mess than I'm in now."

Dr. Bonnet opened his eyes and the speaker went into action.

"Hi, Sterling," he croaked. His hand drifted in Chao's direction. "Who's the new student?"

"We haven't had a new student in a decade," Sterling said. "Why should things change? This is just a friend of mine."

"That's good," said Sammy-Jack. "It's about time we started beefing up the department again. You've got the right idea. Go out there and *recruit*, by God!"

Chao's and Sterling's jaws both dropped open in surprise. As Sterling grabbed at his mouth to keep his teeth, Chao leaned over the calculator and asked, "What's going on, Alcalde? Is there something wrong with the prosthesis that's hooked to his ears?"

"I'm not sure," said the Alcalde.

"You're not sure!"

"I'm not sure whether I'm ready to integrate that information into my personal awareness yet. Why don't you guys say what you came to say, and we'll see what happens?"

Sterling enterprisingly traced a wire that led under the same door the cable went into to a small black box and from there to a microphone fastened to the jug itself.

"I don't think it's the equipment," he said.

"Just hurry up, please," said the Alcalde.

Sterling shrugged off his annoyance, walked to the jug, and pressed his face against it, next to the mike.

"Dr. Bonnet," he said, "The reason I brought Chao—uh, the young man who came with me—is that he came up with an idea that might be very useful to the department. As you know, things have been kind of dead around here lately "

Maybe that was a bad choice of words.

He tried to rephrase it, but felt a tightness in his throat. Shame choked off his voice. For a long time—it seemed forever—he'd lived the life of a scholar, dedicated to trying at least to find the general direction of the truth. It was humiliating, trying to sell this absurd proposal to a distracted old man.

To strengthen himself, he forced himself to imagine as clearly as possible twenty to thirty years more of that life, without authority, money, or honor. His voice returned.

"What Chao thought of," he said, "was a plan which the Alcalde says would move us back to category five—if you approve it. All it involves is changing one little assumption in the theoretical base we work from."

"Theoretical base?" All the wrinkles in Bonnet's face arched in puzzlement. "An infielder doesn't work from a theory. He works from a real base. Oh, sure, I know you don't actually play *on* the base, but you do *play* the base. See?"

"What's he talking about?" asked Chao. "It sounds like baseball."

"It *is* baseball," Sterling said.

"Hell," said Chao. "Then he's lapsed into senility. We're wasting our time. The Alcalde can't take directions from an irrational person."

"It hasn't been determined whether he's off his head or not," the Alcalde said. "It might be that his ear-box isn't working too well."

"You'd know that better than us."

"Like I said, I'm not ready to integrate that information. Why don't we just get on with it, and we'll judge his mental state by the sensibleness of his answer to the pertinent question. We knew when we came here that he was slipping in and out of dementia all the time—we might get lucky and catch him rational when we need him to be. ."

"Alcalde," said Sterling, "I think you want this policy change even more than I do."

"I don't get it," said Chao. "It's either his brain or the instruments, and in either case . ."

"Please," the Alcalde interrupted. "Don't tell me any more. You just might kill the goose. And Dr. Bonnet's heartbeat and breathing are becoming irregular again, so move it."

"Dr. Bonnet," said Sterling, "I was speaking of nuclear physics, not baseball. In a nutshell, the idea is to suppose that nuclear material is infinitely divisible. In that way ."

"Hold it," said Bonnet, his croak

becoming deeper and fainter. "You're talking about the nucleus of an atom?"

"That's right, sir. The advantages to the department are "

"You're saying if you keep whopping it harder, you'll keep getting tinier pieces?"

"Well, uh yes sir. But if you'll just consider ."

"What a nifty idea!"

Sterling's own heartbeat became irregular with excitement. He spoke into the mike as clearly as he could, saying, "Then you approve of it—as a policy change?"

"Sure. Why the hell not?"

"Hallelujah!" said the Alcalde. "It's all recorded. Dr. Bonnet's being voiceprinted now, and when that's done I'll run it through my computer for a new classification. Nothing to do now but wait for the good news."

There were splashing sounds from inside the jug and Sterling jerked his head back around to face it. Sammy-Jack appeared to be having convulsions of some kind. His belly arched out and back and his arms flailed.

"Looks like we made it just in time, too," Chao murmured.

"I don't know ." Sterling said. "It looks to me like he might be laughing."

"Laughing, you say?" the Alcalde asked. "That could explain it—but if it is laughter, it's too much for him. The jug's life support readings are going whacky."

"What's so funny, Dr. Bonnet?" Sterling asked the mike.

The convulsions subsided. Dr. Bonnet sloshed gently in the jug. The faint voice from the speaker said, "I forgot."

The voice was getting weird. Ordinarily, it reminded Sterling of a ratchet. Now he was hard put to find a comparison. Maybe a lawn mower in the final stages of winding down.

"That's OK," Sterling said. "Don't worry about it."

"Listen, Dr. Bonnet," the Alcalde said. "I don't think you've got much time. Is there anything we can do for you? Maybe ."

"I know this routine! You're going to try to talk me into getting into one of those damned jugs!"

"You don't have to," the Alcalde said soothingly. "We just want to know if there's anything you want us to do for you."

Bonnet's face screwed up for a second, then he asked, "Can you remember what was so funny?"

"Hmm ." the Alcalde said. Chao and Sterling looked at each other and shrugged.

"Good news for you, Sterling," the Alcalde said after a minute of embarrassed silence. "Bonnet's been voiceprinted and your discipline has now been recategorized."

Sterling sighed with relief. "A class one scientist at last!" he cried.

"Uh—not exactly."

"Pardon?"

"You've been moved to category eight."

"That's funny, I thought you said 'category eight.' You know, theology ."

"Your hearing's still in pretty good shape, Sterling."

Sterling felt like all the blood in his body was pumping into his face. "The-

ology!'' he yelled. ''That's an outrage! A slander!''

''Please calm down, Sterling, and be reasonable. You could scarcely expect to be classified with the scientists under your new paradigm.''

''But you said

''All I said was that you'd be reclassified. I didn't say to what because I needed my full computer to check it out.''

''But . theology!''

''You had to be placed in one of the existing categories; it takes a two-thirds majority of the Board of Regents to create a new one, and you know how often *they* meet. And theology is where you fitted least badly. After all, you are dealing with the infinite, now.''

''Grr .''

''You're not being fair,'' Chao objected. ''You categorized on the assumption that my theory was wrong. But what if it's true? You're not giving it a chance.''

''I'm *not* assuming it's wrong,'' said the Alcalde. ''It might very well be true, in some sense. But even if it is true, that doesn't mean it's scientific. How do you test, empirically, the proposition that something can be split into smaller parts forever? You can't. And there are other problems—the assumption that you can changes the whole nature of the discipline, as you yourself .''

''You can't argue with the Alcalde,'' Sterling said bitterly. ''It always wins.''

''I don't see where *you* have a complaint, Sterling. As the first of your department to be phudded, you'll undoubtedly take over the chairmanship and draw a fat salary. And I'll see to it that you get it fast, even if I have to monitor you continually.''

Sterling's teeth seemed to hurt more than ever. He felt his face twist into a fearsome scowl as he said, ''I suppose, really, I ought to be very happy.''

He was about to vent his spleen, unfairly, on poor Chao, blaming him for the whole thing. He was saved from himself by Sammy-Jack's weird croak, coming from above.

''I remember now!'' he said, and went into another, greater series of convulsions. There was no question this time. It was laughter.

''Oops!'' said the Alcalde.

''What?'' asked Chao.

''He's gone for good this time. The machinery can only do so much.''

The quaking subsided—finally—and Sterling peered at Bonnet's face. He still seemed to be smiling.

''What was so damned funny, anyway?'' Sterling asked. ■

● For there are some persons who believe there are many worlds, and some who even fancy that they are boundless in extent, being themselves inexperienced and ignorant of the truth of those things of which it is desirable to have a correct knowledge.

Philo Judaeus (c. 25 B.C.–c. A.D. 45)

ON GAMING

Dana Lombardy

"Just as you have to translate a book to make a movie, you have to translate it to make a game."

This observation was made by author Frank Herbert in an interview for *Analog* about the board game *Dune*, based on his incredibly successful SF novel of the same name.

Herbert's first two *Dune* serials, which originally appeared in *Analog* in the early 1960s, were later combined to form the basis of the novel, published in 1965. Its success was immediate; in 1966 it won the first Nebula Award for best novel, as well as sharing the 1966 Hugo Award.

With over ten million copies sold, *Dune* ranks as the largest-selling SF novel of all time. A measure of the 18-year-old book's appeal is the fact that even today it can often be found on airport newsstands and in most bookstores that feature an SF section. The movie *Dune* is scheduled for release in the spring of 1984.

Dune is a large, complex novel of feudalistic intergalactic politics, involving psi powers and a religion similar to Mohammedanism (which may account for its popularity in the Middle East). But the book's real impact lies in its detailed treatment of the alien environment of the planet Dune. The desert planet's Fremen struggle with scarce water resources, giant sandworms, and complex intrigue among themselves to obtain control of the key element to wealth and power—spice. Spice makes people live longer, is necessary for safe navigation through space, and is subtly addictive.

Those are the basic ingredients; now, how does one translate what is essentially a non-game medium into a popular board game? Basically, there are two ways. The first and easiest is simply to license the name for the box cover and fill the box with something that bears little or no resemblance to the original book. This is the usual route taken with popular movies, television series, cartoon characters, or anything that has "mass" appeal. Such games are scarcely different from previous board games that use spinners or dice, and pawns that move along a track to reach a goal.

This method is also the less expensive for a business that manufactures games. However, it was not the route chosen by The Avalon Hill Game Company of Baltimore for its game version of *Dune*.

Initially, Avalon Hill considered using a hexagon grid format and a rules system similar to what's used in its successful line of historical wargames. But this approach proved incapable of conveying the essential concepts of the novel—the intrigue, the underlying relationships between the major characters, and the treachery. "Future Pastimes," a design team with SF experience, was brought in to translate Herbert's work into a board game. Over a four-month period the three men—Bill Eberle, Jack Kittredge, and Peter Olotka—totalled more than 1,500 man-hours on the project. Four artists then worked on the design through two more months to final pro-

duction, and the game *Dune* was released in the fall of 1980.

It's been successful. It's among only seven SF and fantasy titles selected by the editors of *Games* magazine for their 1982 "Games 100" list. Two years after its release, it placed third on the Games Day balloting in London in the category of SF board games, and it ranked second in a reader survey conducted by *The Space Gamer* magazine in 1981.

Herbert says, "I don't play games much, but some friends and I sat down with *Dune*. When it's your brainchild, it's difficult to make the leap in association. However, my family and friends liked it and said it's fun. Importantly, the game contains certain systems of play that bring consistent results. That shows it's a game of skill and not luck."

Why go to so much trouble if a superficial game would have sold thousands of copies on the strength of the title alone? Besides the probability that Frank Herbert might not have approved its release, Avalon Hill's reputation is based on offering challenging *adult* games; and that meant a shallow treatment would be a sales liability.

Not that artistic license wasn't taken in translating the novel to game form. For instance, the map provided in the book had to be filled out, and certain areas split into several parts for playing purposes, e.g., Cielago North, South, East, and West for the Cielago Depression. The game is a little more difficult to learn, but easier than most detailed role-playing and SF board games in terms of complexity and playing time.

Each player represents one of the six main factions of the Dune society and has special attributes to use in the competitive psychology and fierce battles that provide the dramatic substance of the book. A player's personal skills with weapons and protective devices is as critical as his deviousness. There's a very fine balance between the number of troops, leaders, spice, wealth, weapons, and attributes each game-player has. Also, each player secretly controls one leader of the opposition.

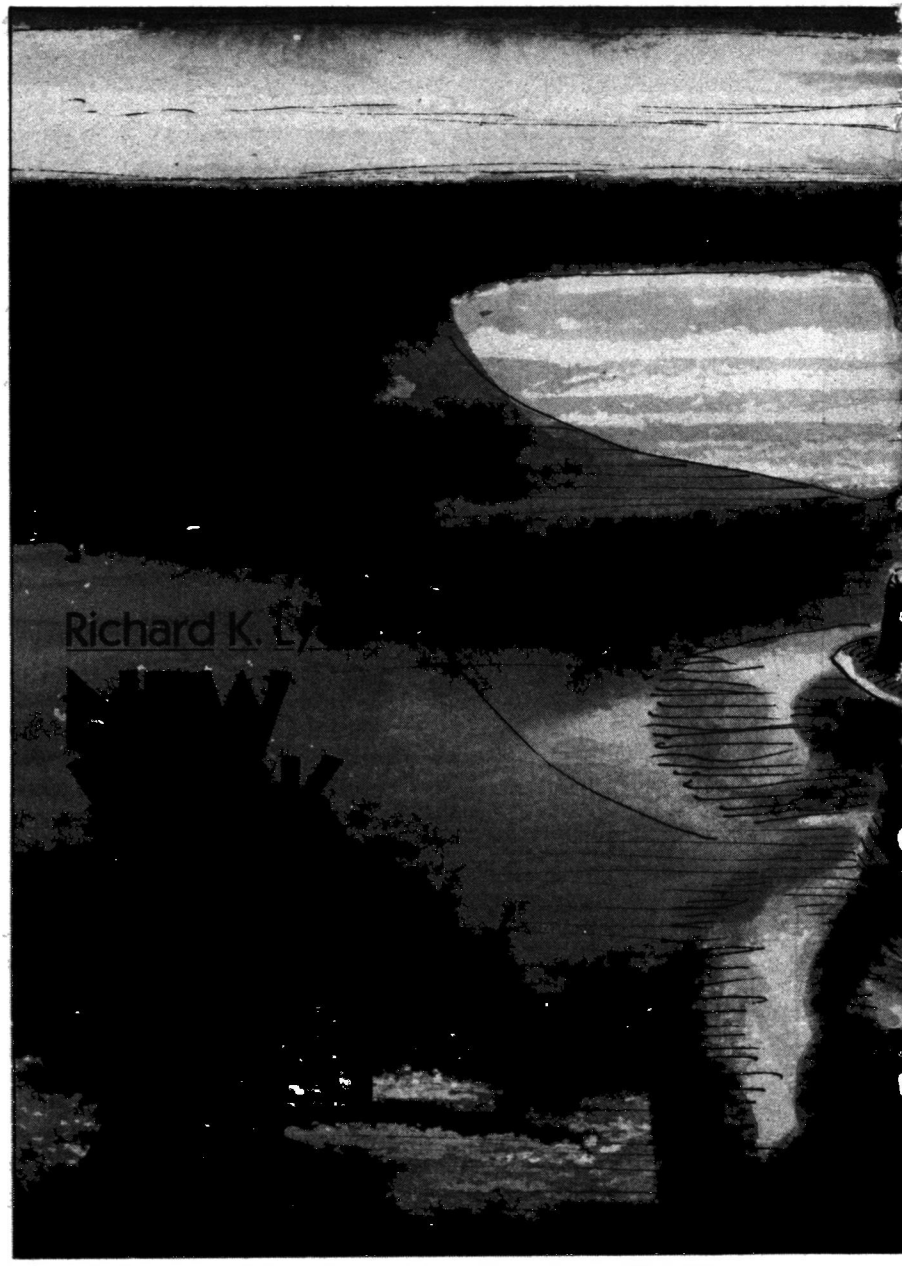
A battle wheel is used to resolve combat when opposing forces occupy the same territory. Each player creates a battle plan on his wheel using the number dialed, the "value" of the leader played, the weapons, and the defenses (treachery cards). The players then reveal their battle wheels simultaneously to see whether a leader lives or dies.

"*Dune* is a multi-layered story, and the game's systems have the flavor of operating on the plot," Herbert says. "These systems are consistent with the plot and give alternative futures. I like that aspect.

"In the limits of a game as in the limits of a movie, you can't be faithful to the entire ethos of the book. It's a translation, and if you understand that translation process, you can appreciate the result." This novelist's compliment is perhaps the game's greatest mark of recognition: that, indeed, "it works." ■

●It is a safe rule to apply that, when a mathematical or philosophical author writes with a misty profundity, he is talking nonsense.

A.N. Whitehead


Richard K. L

Leo
Summers

Methodist Life, August 26, 1963

NEWS AND COMMENTS

The confusions to which modern life is heir were illustrated by recent events in Florida: a Florida highway patrolman arrested a man for sitting in the passenger seat of his bright red sports car while the man's pet chimpanzee drove the machine down the highway.

When the case came to trial, the judge dismissed the charge for reckless driving on the grounds that there was no evidence to show that the chimp was not driving the car perfectly well and in any case the man could not be charged with reckless driving since he was not driving. Likewise the man could not be charged with allowing an unlicensed person to operate a motor vehicle since a chimp is not a person. While the chimp might be guilty of unlicensed operation of a motor vehicle, any charge against it would be a nullity since as an animal it was immune to all legal action.

Furthermore, the judge concluded, after diligent study he was satisfied that this case, unusual as it might be, still involved no violation of Florida law and if the state legislature did not want chimpanzees driving up and down the highways of that state, they must pass an appropriate law.

Subsequently the Florida Legislature, acting with unusual speed, did exactly that, but this scarcely solves the problem. There are still 49 other states where it is fully legal to let your chimp drive. Unless every other state follows Florida's example, the only solution to the problem would be for Detroit to stop making automatic transmission cars. Animal experts are agreed that, while chimpanzees can do reasonably well driving automatics, operating manual transmission vehicles is beyond their abilities.

New Scientist, 24/31 December 1983, page 869

BROOKLYN ZOO ANNOUNCES NEW PROJECT IN ANIMAL LINGUISTICS

Dr. John Thornquest, a research associate at the Brooklyn Zoological Gardens, announced this week that he had received an NSF grant for a study of language development in chimpanzees. Dr. Thornquest explained that, while chimps are incapable of speech, their brains lacking speech centers, previous studies have shown they do quite well with sign language. Individual chimps have been taught vocabularies of hundreds of signs and used them with generally high accuracy. Moreover, spontaneous word invention sometimes occurred, e.g., the animal asking for "candy water" when it wanted Coca-Cola.

Dr. Thornquest's new project will carry these researches the next logical step further: instead of working with a single animal, Thornquest will teach a substantial group of apes, fifty in the initial plan, to use signs. This will create a critical mass of chimpanzees who can use sign language to communicate with each other, and allow a detailed study of language evolution.

New York Times, March 25, 1984, Page 3, Column 4

SENATOR PROXMIRE GIVES GOLDEN FLEECE AWARD TO BROOKLYN ZOO

Yesterday Senator Proxmire announced that he was giving a "special Golden Fleece Award for the most con-

spicuously foolish waste of the taxpayer's money in history'' to the Brooklyn Zoo. ''I wouldn't have believed it, if I hadn't seen it with my own eyes,'' the senator declared. ''The Brooklyn Zoo actually obtained a grant of $267,000 from the NSF to teach apes to walk around making obscene gestures at each other.''

Officials of the National Science Foundation complained that Senator Proxmire was being grossly unfair because NSF's internal auditing procedures had already identified the ape project as ''not developing according to plan,'' and the foundation was in the process of cutting off funding.

Dr. Thornquest, the research scientist in charge of the ape project, protested that both NSF and Senator Proxmire were being shortsighted and that his now defunct research project had been extraordinarily successful. ''Once the first few chimps achieved some sign language fluency, the rate of learning was like a forest fire. Of course, given the nature of chimp society, the way all the males get in line to take their turn when one of the females is in heat, it was only to be expected that what they had to say to each other would have considerable sexual content.''

In addition to being scientifically unjustified, the abrupt cutoff of federal funding left him in an awkward position, Dr. Thornquest complained: he had responsibility for fifty-three educated apes which the Brooklyn Zoo did not have internal funding to feed and care for. Asked how he planned to manage this crisis, the researcher replied, ''Like other scientists denied federal funding, I'm forced to turn to private enterprise.''

FORM 37B-10075/83B6 APPLICATION TO THE SMALL BUSINESS ADMINISTRATION FOR A GRANT UNDER PUBLIC C LAW 10003758J, PARAGRAPH 52 The above may be summarized as follows: Applicant will, upon receipt of the grant funds, purchase a fleet of taxi cabs and equip them for use by persons with severe hearing and vocal handicaps, thereby providing these persons with permanent employment which they could not otherwise obtain, these persons under the categories and definitions of the Equal Opportunities Act, being non-whites.

The New Yorker, August 10, 1984

GOING ABOUT TOWN

So much is written in complaint, that we feel it is important to take notice when someone discovers a creative solution to a problem. In many cities the high and rising rate of crime against cab drivers has made it impossible to get a taxi in the small hours of the morning. In New York, however, thanks to an innovative new company, we have a solution to this problem.

The new company, which for some strange reason has choosen to call itself the Great Ape Taxi Corporation, has deployed a unique fleet of cabs. One hails a Great Ape cab in the usual manner, but once one is inside, the ride is a new experience. The compartments are separated by a steel partition so that one can neither see nor speak to the driver from inside (nor from the outside since the windows are one-way glass). One sits down, puts one's credit card into the slot, and taps one's destination

into the computer keyboard. On reaching that destination, one's credit card pops out and one exits the cab, a somewhat eerie transaction since never in the course of the ride does one have any human contact with the driver. Still, the problem of protecting cab drivers from criminal attack clearly requires stern measures, and it is good to have the problem solved, good to be able to get around our city again.

New York Post, November 3, 1984, Front Page

DA ARRESTS ZOO OFFICIAL AND 53 CHIMPS. CHARGES THEM WITH RUNNING TAXI FLEET—PAGE 2.

In a sensational development D.A. Goldschmidt announced the arrest of Dr. John Thornquest, a researcher at the Brooklyn Zoo, and fifty-three of the zoo's fifty-nine chimpanzees on charges of illegally operating a taxi company, driving without licenses, reckless driving, and bribing police officers. Informed sources state that the other six chimps and the zoo's two gorillas were also questioned and released. While zoo officials were unavailable for comment, it is rumored that

Opinion of Judge Charles Applebe, Superior Court, State of New York,
In Case #1,000,786: The State of New York versus The Great Ape Taxi Corporation

The Court finds that no actionable charge exists against the defendants and orders them released forthwith. The precedent set in the previous Florida case (Reference 1) leaves the Court with no choice but to dismiss the charges of reckless driving, driving without a license, and allowing unlicensed persons to operate a motor vehicle.

The only elements of the prosecution's case which are novel with regard to the Florida case are the charges of bribing police officers. Here, however, the State's case is at best inferential. The evidence before the Court is sufficient to show that if one of the driving chimpanzees were to be stopped by a police officer and asked to step out of the car and/or show his or her license, the ape would instead send out a twenty-dollar bill. This it would do as a matter of habit. The existence of such a criminal habit pattern is not, however, sufficient *per se* to establish the actual occurrence of a crime. Moreover, even if the chimpanzees' criminal actions could be proven, they would still, by virtue of being animals, be immune to legal action. Further, no charge of conspiracy can be brought against Dr. Thornquest, since to conspire one must enter into an illegal plan with another person and the chimpanzees are not people.

The Court notes the prosecution's concerns that numerous taxi companies, long-distance trucking firms, and various others are studying the possibility of using apes. While there may be considerable public inconvenience in having large numbers of apes driving upon this State's highways, this is clearly an ill for which no judicial remedy exists.

The Court also notes Dr. Thornquest's ingenious proposal that his chimpanzees be considered to be legally persons. Granting such a ruling would, of course, be greatly to the advantage of both Thornquest and his apes. If human, the chimps would be guilty of

driving without licenses, misdemeanors punishable by fine or imprisonment. Since they have no money, they'd have to be imprisoned. The Department of Correction, however, lacks facilities for apes and would be obliged to board them at the zoo. Thus the net effect of a guilty verdict would be to provide the apes with free room and board for the duration of their sentence and thereafter to give them eligibility for food stamps, unemployment, and welfare. Dr. Thornquest could hardly want more generous support for his research.

The Court also notes that there is some merit to the arguments Dr. Thornquest advances in support of this proposal. Legally a person is, as he states, a moral agent, a being capable of distinguishing right from wrong. Since the apes have a "no no" sign in their language and are capable of both admitting "did" "no no" and showing shame, they appear to satisfy the minimum requirement of personhood.

The fact remains, however, that Dr. Thornquest is in the position of asking the Court to make a radical, precedent-setting ruling based solely on legal theory. Moreover, the ruling Dr. Thornquest desires would be directly contrary to current social policy. While he wants a ruling that would have the effect of exempting his chimpanzees from work, policy is that those who can work, should. Consequently the only way in which the Court could make such a ruling is if there were proof that chimpanzees were inherently unsuited to work, and the evidence before the Court is quite to the contrary.

* * *

Decision of the Supreme Court, State of New York, in the appeal of lower Court decision of Case 1,000,786: The State of New York versus the Great Ape Taxi Corporation, Justice Lowell for the majority.

The appellant, Dr. John Thornquest, claims that the lower Court ruled improperly, ignoring available evidence, and thereby improperly denied his charges, a group of fifty-three chimpanzees, of the right to be imprisoned at taxpayer expense and other benefits.

The Court finds for the appellant and orders that his charges be imprisoned immediately at the Brooklyn Zoo for a period of ninety days, costs of said imprisonment to be paid by the New York City Department of Corrections.

In reviewing this case the Court discovered that, although Judge Applebe's legal reasoning was substantially correct, he still arrived at the wrong conclusion. Specifically Judge Applebe correctly reasoned that the chimpanzees could be found guilty and thus deprived of the opportunity to work if and only if they were inherently unsuited to work. Judge Applebe erred in ignoring evidence which shows such unsuitability. The evidence available to the lower Court unambiguously demonstrated that chimpanzees could drive automatic transmission cars but could not handle manual transmission machines. Thus it is clear that chimps, though they may be intelligent, are just naturally shiftless. ■

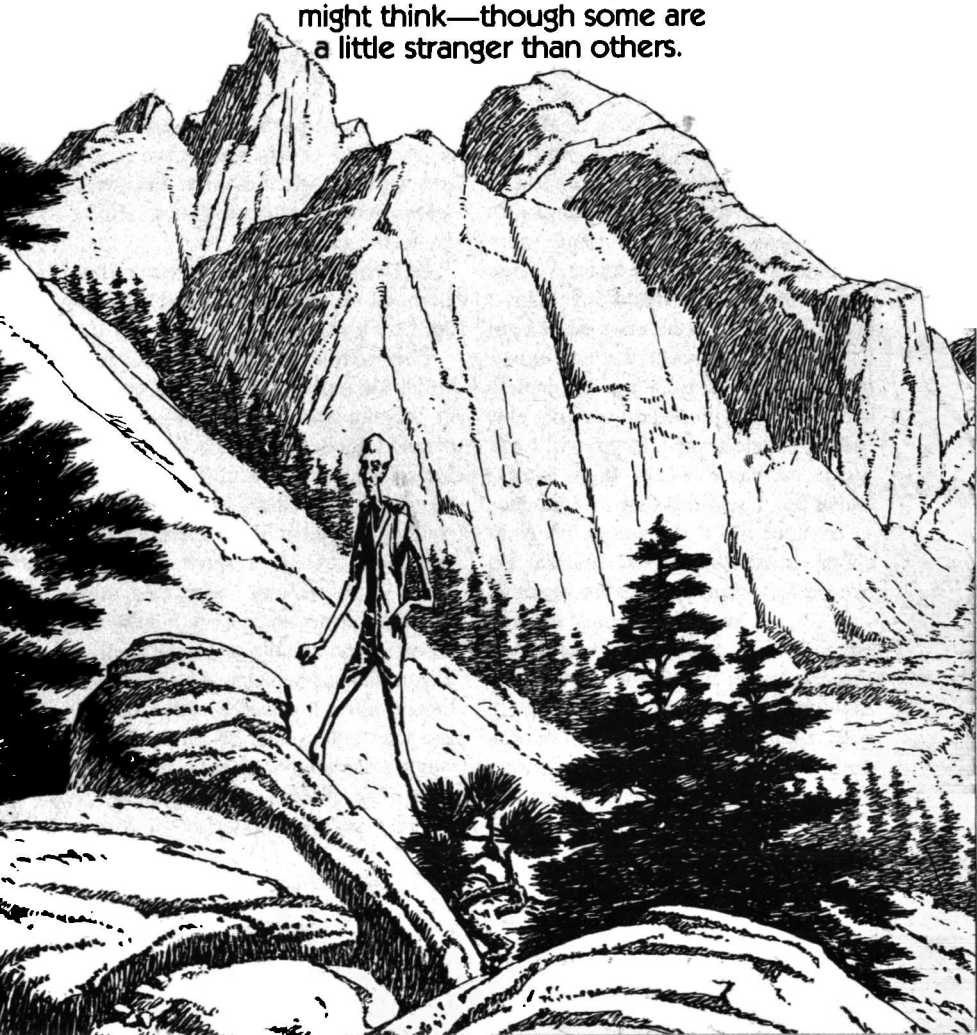
● It does not pay a prophet to be too specific.
L. Sprague de Camp


H.R.
Van Dongen

Jerry Oltion

THE SENSE OF DISCOVERY

There's a saying among backpackers that "No strangers meet on trails." It's truer than you might think—though some are a little stranger than others.



As I trudged up the last half mile of forested ridge, my backpack riding heavily on my shoulders and squeaking with every step, I was not thinking about extraterrestrial beings. I was no doubt a minority in the world at that moment, but I was into the sights and sounds and smells of springtime in the Bighorn mountains, and filtering that out through the smell of my own sweat and the rhythmic eek-eek-eek of my pack frame was more than enough to keep my mind busy. I'd been hiking since dawn, nearly ten hours, and in that time I had started to regain that mental control that I could only achieve in solitude.

The rest of the world was still in shock over the alien landing, but I had left society's concerns at the trail head along with my car. If people wanted to work themselves into a panic over "monsters from Outer Space," then they could do it without my help; I would catch up on the news when I got back and save myself the torment of trying to distill the truth from the endless speculation the press kept spewing out. Not that I didn't care—far from it! I was just as curious about the aliens as anybody, but I realized that my presence in front of a TV set wasn't likely to change matters any, and besides, I'd been counting on this trip for months.

When you're putting yourself through college on the money you make during summer break, that doesn't leave much time for backpacking. I'd finagled a week right after finals from my boss in the print shop, and I swore that nothing short of a nuclear war would keep me out of the mountains. When the Keesh landed the week before finals, two of them in a ship hardly bigger than the space shuttle, I spent a couple of days trying to decide how they ranked beside nuclear war, but in the end I stuck to my plan. Next year I would be a senior, and the following summer I could be anywhere. This might be my last chance to get away for a long time.

I was glad I'd come. The Bighorns are always beautiful in the spring, but this year they were magnificent. I had forgotten how rich and varied colors can be—everywhere I looked I saw wildflowers and butterflies and trees just starting their summer growth, and every stream I crossed was running full and white over its rocky bed, fed by the last few dwindling patches of snow. Every color carried its own sounds and smells and tastes as well. I drank it all in with senses hungry for nourishment, letting myself be swept away.

So I was completely unprepared when I crested the ridge and saw the Keesh not fifty yards away.

They were both resting on a flat rock beside the trail, one stretched out flat in the sun and the other rummaging around in one of the backpacks that leaned against the rock. There was no mistaking who they were, though I couldn't tell them apart. Picture someone seen through a sheet of falling water. Tall, willowy, with long arms and legs, each with an extra joint where the wrist and ankle ought to be, and an elongated head to match. Their skin was brown, like a Spaniard's with a suntan, and they either wore no clothing or it was the same color as their skin. They were close enough to the human shape to make my eyes water at the differences.

The one reaching into the pack stopped

when he saw me and spoke to his companion, who sat up with a start. The first one kept his hand in the pack. I had my thumbs hooked under my shoulder straps to ease the weight off my shoulders; I left them there, in plain sight. I thought briefly of running. My feet kept moving toward them, though, and I tried desperately to think of something to say when I got close.

I thought for a moment that my feet would carry me on past without stopping, as if they were not there, but I managed to stop a few feet in front of the flat rock. It was like pushing in the clutch to stop at a light—part of me was still trying to move ahead, and would if I relaxed control.

I cleared my throat, thought *what if they interpret that as a growl?* I said, "I thought you were in New York." My voice didn't quiver. I was afraid it would.

The one with his hand in the pack removed it, empty. He said, "We were. We wished to see more of your world than its cities." His voice was surprisingly resonant, coming out of so narrow a chest, but I had no idea how he was built inside. He could have had a set of lungs like a Himalayan, or something totally different.

I said, "You couldn't have come to a better place."

"Agreement. No. We agree. Excuse me. I have problems with your language sometimes."

"So do I," I said. I looked beyond them, expecting to see secret service men behind a dozen trees, but I saw only forest. "Does anyone know you're here?"

"Only a few people. The American president and a few of his advisors, and the ahh representative from Wyoming. It was he who suggested this place."

I couldn't remember who our rep was, but I decided I'd find out and vote for him next time. He had to be all right. "I'm surprised they let you come alone," I said.

"They were reluctant, but we persuaded them. Are you tired? Take off your pack and rest with us."

I was tempted to decline and make tracks for familiar ground, but I knew I'd never forgive myself if I did. A chance to talk with humanity's first visitors! You don't pass that sort of thing up. So I said, "Thanks, I'd like to," and swung out of my pack. I leaned it up next to theirs, noticing the difference in design. Theirs were long and narrow to match their bodies, and the straps hooked onto a T-bar that disappeared into a frame much more complex than an ordinary pack. It looked like some sort of machine.

The Keesh who had been silent moved over to give me room on the rock and said, "I am called Kajinjerell." I remembered from the news that Kajinjerell was female. It wasn't physically obvious, at least not to me. I could see now that she wore clothing, but it blended in so well with her body that it looked like her own skin. The other Keesh was similarly dressed. He said, "I am Ladominicsen."

"Scott Morgan," I said. I unzipped a side pouch and brought out a bottle of water, then climbed up between them. I might have been sitting between two active bee hives by the tension I felt in my body. I took a couple of deep

breaths and unscrewed the cap on the water bottle, thinking, *what to say!* All the traditional lines for meeting fellow packers seemed absurd. *Where are you from?* Uh-huh.

I looked at Ladominicsen. "I bet you're glad to get away from the news for a while," I said.

I couldn't read his facial expression, but I thought the wink of his left eye might be amusement. He said, "It is goodness to be outside again, on the surface of a world with nothing artificial near."

A very diplomatic reply, I thought. Don't insult the natives, not even the obnoxious ones. I got my throat working again and said, "I know the feeling. I'd go crazy if I didn't have the mountains."

"Do you live nearby, Scott Morgan?" Kajinjerell asked.

"I used to, when I was a kid. Just call me Scott."

"Scott. Your system of names is different from ours. We have but one name apiece. I regret that they translate into such long words in your language."

"There's always nicknames," I said. "Short names made from longer ones, like Fred from Frederick or Chris from Christopher. I could call you—hmmm. How about Ginger?"

She tried it as she might try a new taste, testing it out in all parts of her mouth. "Ginger. Yes, I like it. It has the same voice as Kajinjerell. What of Ladominicsen? What shall we nickname him?"

I turned toward him, thinking, *Nicksen? No, too close to Nixon. Dominic? Or maybe just*—"Nick," I said. "Or Dominic. Either one is easy to say."

He thought it over for a moment, then said, "If the object of a nickname is to shorten, then perhaps it should be Nick, though that sound already has many uses. Would Nick confuse easily? Be confused, I mean?"

"Not at all. Nick it is. And Ginger." I lifted my water bottle in salute, took a drink.

When I lowered it I had a dilemma: upbringing against caution. "Do you, uh, do you drink water?" I asked.

Nick said, "We do, though a bit carelessly I'm afraid. We've run out."

Now I'd done it! But upbringing forced me to say, "Would it be safe for you to drink some of mine? It's straight out of the creek."

"I think it would," Nick said. "Cross infection is not likely between your world and ours. Thank you." He took the water bottle from me (I hoped he wouldn't notice my trembling fingers) and took a long drink, then passed it to Ginger. I watched, fascinated at the double joint in his wrist. It tilted like a universal joint—each part bending ninety degrees away from the plane of the other.

Ginger held out the bottle to me, nearly empty.

"Go ahead and finish it," I said. "We can get more down the trail a ways."

"Thank you."

I sighed in relief as she emptied the bottle. When she handed it back to me I felt my fingers tingle as they brushed against hers.

"This is crazy," I said, shaking my head. "Nobody's going to believe me when I get back home."

Ginger's laugh was like a fistful of

pebbles thrown into still water. "We were just thinking the same thing about ourselves!"

"How do you mean?"

"None of our people will believe us either, when we tell them about Earth."

"I don't understand. I thought—I mean, didn't you say on TV that planets like Earth are pretty common?"

Nick said, "The planet is not so different, and neither are the types of life on it, but—do not offend—the level of technology here is as rare as anything in the galaxy."

"Technology? You're kidding. We're stone axe and chisel compared to you."

"Not so! You are hardly a century behind us, if that much. That's what makes you such rareness! You are advancing so fast you'll be in space before we can get home to tell about you."

"I don't know about that. It was a decade between Apollo and the space shuttle. But I still don't understand. What makes us such a find? We're just an underdeveloped planet in a whole galaxy-full of space travellers."

Nick waved his arms in excitement. "No, you shouldn't feel that way! Oh, how to explain? You're not underdeveloped; you're just at a—a level—a stage along the way. Nothing can be born into maturity. Your people are still growing, and you should not be ashamed of your youth. What is rareness is finding you at this stage of your growth!"

I felt like I was failing some kind of basic intelligence test. "I still don't see it," I said. "If everybody passes through this stage, then " I left it hanging.

"It's the time scale," Ginger said.

"Yes," Nick went on, "you see, sentient races all travel nearly the same path in their development. It is—there are exceptions of course, but yours is not one of them. Races like yours and ours all go through three very distinct stages: the first evolving of intelligence, the control of their environment, and the expansion into space. The first and last stages may last for millions of years, but the middle stage—the one you are in now—lasts for a very brief time. Perhaps a thousand years, or less. The chances of finding a race that is just on its way into space are so small that—I don't think it has ever happened before."

"You're always either too early or too late, eh?"

"Exactly. It's—there." He pointed at a butterfly that had been exploring near our feet. "These creatures look familiar. Do they have different stages of growing on your world? First an eating form, with many legs, and then later the flying one?"

I said, "Right. We call them butterflies."

"Butterflies. They are like civilizations. Do you often see them change, just by chance?"

I had once. I described watching it emerge from the cocoon, its wings still wet and heavy; watching it open them gently to dry in the sun, and then fly away.

"Finding you here is like you finding that butterfly," Nick said. "But imagine that only one or two butterflies make the change each year. Then think how you would feel if you saw that same sight. The analogy is not perfection, but that is close to how we felt when we found Earth."

I saw it then. I wasn't sure just how

I felt about being a cultural artifact, but it was obvious that Nick and Ginger hadn't meant to put me down. Nonetheless, I felt something akin to embarrassment giving my body temperature a rise. Or maybe it was just the sunlight. I decided I could do without my outer shirt in either case; I'd been wanting to take it off for a couple of hours but hadn't felt like stopping to do it.

I unrolled the sleeves and tugged the shirt off, saying, "So you came here just to watch our society blossom into space?"

Ginger said, "Well, we actually came here to get off the ship. The chances seemed good that there would be a habitable planet here, but we didn't expect to find intelligent life on it."

"Oh." I tossed my shirt and the water bottle toward my pack. "No, I suppose not."

"We didn't find any spaceships around," she continued. "There's usually a—a sphere of influence around an intelligent planet. Inside that sphere you find many signs of technology, but mostly spaceships. We found none for many light-years around."

"So you naturally thought that any life you found here would still be in the developing stage." I felt a laugh building up somewhere inside me as I said that.

"Yes. We didn't realize you were here until we went into orbit."

"That's beautiful," I said, letting a chuckle escape.

"Beautiful?"

I couldn't hold it back any longer. I lay back on the rock and shook my head and laughed at the sky. Ginger tilted her head toward Nick and they exchanged curious glances, then she joined in. Nick's pebble-in-water laugh was slower and deeper.

I must have laughed for a full minute. When I could talk again I said, "You realize—*whoo!*—realize that everybody thinks you're some kind of—missionaries, here to either take over the world or give us the secret of your star-drive?"

Ginger said, "Missionaries?"

Nick said, "Take over?"

Between chuckles I said, "Conquer the planet. Stop the arms race. Set up a world government."

Nick stared, obviously puzzled. Ginger's laugh dwindled to silence. Nick said, "I thought you had a world government. What is the United Nations if not? And what is this arms race?"

Silence. I wished I'd been born without a tongue, to go along with my missing brain. Cautiously, I said, "What *are* your plans, now that you know we're here?"

With equal caution, Nick said, "We would like to observe, and learn what we can about you. We would never interfere."

"That's not possible," I said. "The act of observation changes the system you're trying to watch. It's a physical-law for atomic particles, but it applies here too. You can't expect us to go on the way we would have if you'd never come."

Nick and Ginger both looked genuinely worried. It was more their stance than their expressions that showed it. That, more than anything else, convinced me that they meant no harm. "You see us as a threat, then?" Nick finally asked.

"I don't," I said, "but a lot of people do, I'm sure. The point is, the human race expects *something* to happen, and that alone is going to change us. I don't know just how, but it will. Now that we know for sure that the galaxy is inhabited, we can't go on the way we were."

Ginger said something in a language that sounded like French, but wasn't. Nick said, "Is your planet at war? Is that what you mean by 'arms race'?"

"I don't know," I said, and it was the truth. "We may be at war. It depends on your definition. Every nation on Earth is building up enough power to independently destroy the planet. Nobody uses that power, but everybody makes threats. You tell me—are we at war?"

Neither of them spoke. That was okay; I felt like talking. At last the human race could confess its sins to an unbiased observer, and I was its mouthpiece. I said, "You know, the biggest joke of all is on you. You might have arrived just in time to watch us blow ourselves back to the stone age. Your brand new butterfly might die halfway out of the cocoon. This whole planet could turn into radioactive dust in an hour's time, and any of a hundred nations could start it. Makes you nervous? It makes me nervous. The guys with their fingers on the buttons are nervous too. And it's been that way since before I was born. I've lived my whole life wondering if somebody would be crazy enough to do it.

"That's what you've stumbled across here. I don't know, maybe this is all part of your standard 'emerging civilization' model; maybe this is just a stage that everybody goes through on their way into space; but it's our first time and we're all just a little jumpy. It's — well—a lot of people are expecting miracles from you. Most of them want to know how your spaceship works, and some of them expect you to take over, but everybody hopes you'll make some fundamental change that will stop the arms race."

Nick said, "I don't understand. Your people *want* us to interfere?"

"A lot of us do. A lot of us are just scared, too, and don't know what to think, but I think humanity as a whole wants you to. That's my opinion. I don't know for sure."

Nick said something in his own language, something short and practiced. In English he said, "You said that we have changed things just by being here. I understand now how that is true. We would not have landed if we had known."

"No!" I said, then hastily added, "You're welcome here and that's the truth. Anything that changes just because you're here was based on the false assumption that we're alone in the galaxy, and that sort of ignorance deserves a sudden shock. We're grateful." I was speaking for myself, and I knew it. I wondered how many religions would share my views. "Hey, look, I'm sorry I started all this. I've blown it all out of proportion and spoiled your afternoon for nothing. Let's just forget I said anything, and start over at the beginning. Were you headed anywhere special? To camp, I mean?"

Ginger said, "We were going to stop at Kearney Lake, but we have only a two-dimensional map and I'm afraid I cannot read it very well. We are—our

language has more words for 'lost' than yours.''

''Kearney is only another mile or so, down in the bottom there. You could see it if it weren't for all the trees. I'm going that way too. Would you like a guide?''

''Yes, please! We would like that.''

I glanced at my arm out of habit, then looked up at the sun. I never carry a watch when I'm packing. ''Are you rested?'' I asked. ''We should be there before dark.''

''We're ready.''

We all slid down off the rock and closed up our packs. I heaved mine up to my knee, stiff-armed it up head-high, and twisted into it, just in time to watch Ginger lift hers with one hand and slip into it like you might put on a shirt. It had to be nearly empty, or else Nick slipped his on the same way. But I had seen what he carried in his, and it was full. He didn't look that strong.

I thought of another possibility. I looked at the way the straps hung over his shoulders; loose, like they were only supporting a few pounds. I suspected that they were. I stepped up close to Ginger and listened. No hum. But that didn't prove anything. Who says an antigravity generator has to hum?

I was suddenly very conscious of the weight pressing into my back. ''Let's go,'' I said, and stepped forward to take the lead.

Twilight was settling into the hollow around Kearney Lake. The tops of the surrounding peaks still glowed with pink sunlight, but none of it reached down into the trees where we had set up our camp. The fire was not yet providing most of the light, but it soon would be.

I sat on the flat end of a stump by the fire and looked out at the lake. We were at my favorite campsite, alongside a tiny stream that fed into the lake, about a hundred yards up the slope from the water. From there I could look out and see fish rising in golden ripples all across the lake, and I could see the peaks reflected in upside-down perfection. Nick and Ginger were just out of sight through the trees, taking a walk along the bank. I was trying to use the time alone to relax.

I'd calmed down a lot since those first few minutes with them, but now my xenophobia was being replaced by something equally disturbing. Though we hadn't spoken any more about Earth and its problems, I had been thinking about it all along, and I was beginning to feel what I can only describe as a racial inferiority complex. Nick and Ginger couldn't help being what they were, but I was constantly being reminded that they were ahead of us in almost everything, and I was getting a little depressed by it. The more they told me about the places they'd been, the more hopeless I felt. Everybody thought that they were part of some galactic survey or trading mission or something equally serious, but they were only sightseeing. Nearly everybody had a ship, Ginger had explained, and it was no big thing to take off for a thousand-year trip when you got bored with the way things were on your home planet. With relativity working for you, you could see a lot of worlds in a year's subjective time, and when you got back home things would be changed enough

to make life interesting again. Or you could move to a new world, settle on an empty one if you could find it—whatever you wanted to do. Theirs was a very mobile society.

That was what got to me. Their level of technology was so high that they hardly needed a society at all. Nobody was forced to live on a world that they didn't like; nobody was even forced to work at a job they didn't like. From what I gathered, nobody had to work at all if they didn't want to. Their technology was self-perpetuating.

They didn't mean to embarrass me. I don't think they realized they were doing it, for they felt that I should be proud of what humanity had done so far. I knew they were right, but that didn't prevent me from feeling like an idiot anyway. And when I realized that they weren't even planning to give us a hand up

I tossed another log on the fire and watched the sparks swirl into the air. I wasn't relaxing. I got up, went over to my pack, and searched in the side pockets until I found my Rubik's Cube, and took it back to the fire. I sat down on the stump and began to twist it.

Six faces divided into nine squares each, each face a different color and able to rotate around its center. The small cubes can thus move from face to face until the entire puzzle is a jumble of different colored squares. The object is to put all the colors back in order again by twisting the faces in the right sequence. It doesn't sound as hard as it is. I had been working on mine off and on for over two weeks, and I still hadn't figured it out. I had a book that told how to do it, but I hadn't gotten that desperate yet.

It was a good way to tune out the world. Once I got started on it I could spend hours trying to discover the different ways to move a colored subcube without disturbing the ones I had already placed, completely oblivious to my surroundings all the while. When my brother had given it to me for my birthday, I had not thought of it as anything but frustrating, but lately I had come to see it as relaxing in its own way. I was confident that I would get it eventually, and the search for the right sequence was fun in itself.

I concentrated on moving a yellow-green edge cube into position. Within a minute I was immersed in it, and I had completely forgotten about Nick and Ginger. I wound the faces around one another in a memorized pattern, checking to see if the result was the same as always. Okay. So how can I modify it for an edge cube? I tried a few twists, got lost, backed up, and started again.

The high crack of a rifle shot brought me out of the puzzle. In my peripheral vision I saw blue light flare like a halo around a tall, willowy form. I looked up toward the lake. Another shot, and the other figure flared blue. A streak of white shot out from the first figure, and I felt the ground tremble just as a thunderclap slammed through the trees.

I was on my feet and running toward the lake, shouting, "Take cover!" The two shapes didn't move. I careened off a rock, fell against a tree, and stumbled on. They waited for me by the edge of the water.

Nick held a weapon in his left hand,

and I could see a flap of his brown clothing dangling free where he must have kept it concealed. He said as I approached, "We were fired upon. I returned a warning and scared the attacker into the trees." As he spoke, a figure sprinted across an open space about a quarter of a mile away and disappeared into the trees beyond. A ragged patch of ground steamed about halfway between us and him.

"Are you okay?"

"Intact," Nick said, just as Ginger said, "Yes." She continued: "Our shields protected us."

I nodded. "I'm sorry this happened," I said.

Nick replaced his weapon, saying, "He was in likeness just frightened. Not your fault."

"Yeah, but still, it's no way to welcome somebody." I thought I could see a glint of metal near the burned patch of ground. "Hold on a minute," I said, and jogged off down the bank toward it.

It was the rifle, dropped when whoever it was fled. I picked it up and jogged back. "I don't think he'll be back," I said. "He's probably halfway down the mountain by now."

"Probably. Yes. Shall we return to camp?"

"Yeah. Come on." I led the way back up the tents. I leaned the rifle up against a tree beside my pack, threw another log on the fire, and went to fill a pan with water from the little stream. When I came back, Nick had picked up my cube and was studying it curiously.

"What is this?"

I nestled the pan into the fire. "It's a Rubik's Cube," I said, and told him how it worked.

"May I try it?"

I thought of the hours I had already put in on getting it as far as I had, then said, "Sure." Starting from scratch might be good for me anyway.

Ginger watched over his shoulder as he sat down and began to twist the faces. After a minute she came over to where I was digging in my pack for dinner. "Don't feel bad about what happened," she said. "We were in no danger."

I looked at the rifle leaning against the tree: a 30-06 hunting rifle. "I suppose not," I said, "but that's no excuse for shooting at you." I couldn't see any evidence of a shield around Ginger, but I knew it had to be there. Some kind of energy field? "You guys are full of surprises."

"Is that what's bothering you?"

"Well, part of it. It's the whole backwards, ignorant state the world is in, and that idiot with the gun is just another part of it. I—I feel like I should apologize for my race."

"Don't apologize for being what you are. You're not backwards or ignorant; you're just young. You shouldn't expect everything all at once."

I looked up at her, smiling. "I know. I can't help it though, especially when I see things like your shields, or your packs."

"Gadgets," she said. "You will discover the principles behind them soon enough." She picked up the rifle and looked at it. "Your leaders were also anxious to have the things we have. They offered to trade for the secret of our stardrive."

"I figured they had."

She set the rifle down again. "I don't think they understand why we won't trade."

"I'm not so sure I do either."

"It's because you should make that achievement yourselves. Along with the gadget you need the experiences that come with it. That is the most important part of any invention.

"You asked before if other worlds have gone through what you call the arms race. Some have and some haven't. Some have made the mistake of using those arms; most haven't. But no matter how it turns out, on every planet I know of, going through that stage has been an important part of their development as a race. It may sound heartless, but I would not stop your arms race if I could, nor would I give you the stardrive. Both are problems each race must solve for itself if it is to grow into its own maturity."

"*Star Trek*," I said. "General Order Number One. It's a two-edged sword."

"What?"

I explained about science fiction, and how one of the most popular TV programs of the '60s had come up with the doctrine of noninterference. "But I don't think anybody suspected that it would apply to us as well."

"You see that it has to, though, don't you?"

I nodded. "Let's say I understand your argument. It may take a while for me to accept it." I pulled a packet of freeze-dried dinner out of my pack and looked at the label. Beef Stroganoff. I carried it over to the fire.

Nick was hard at work on the cube. He had it completely randomized again, and I watched him try to get the top face back to one solid color. He got a few pieces right, then lost them again. He looked up at me. "Can you do it?"

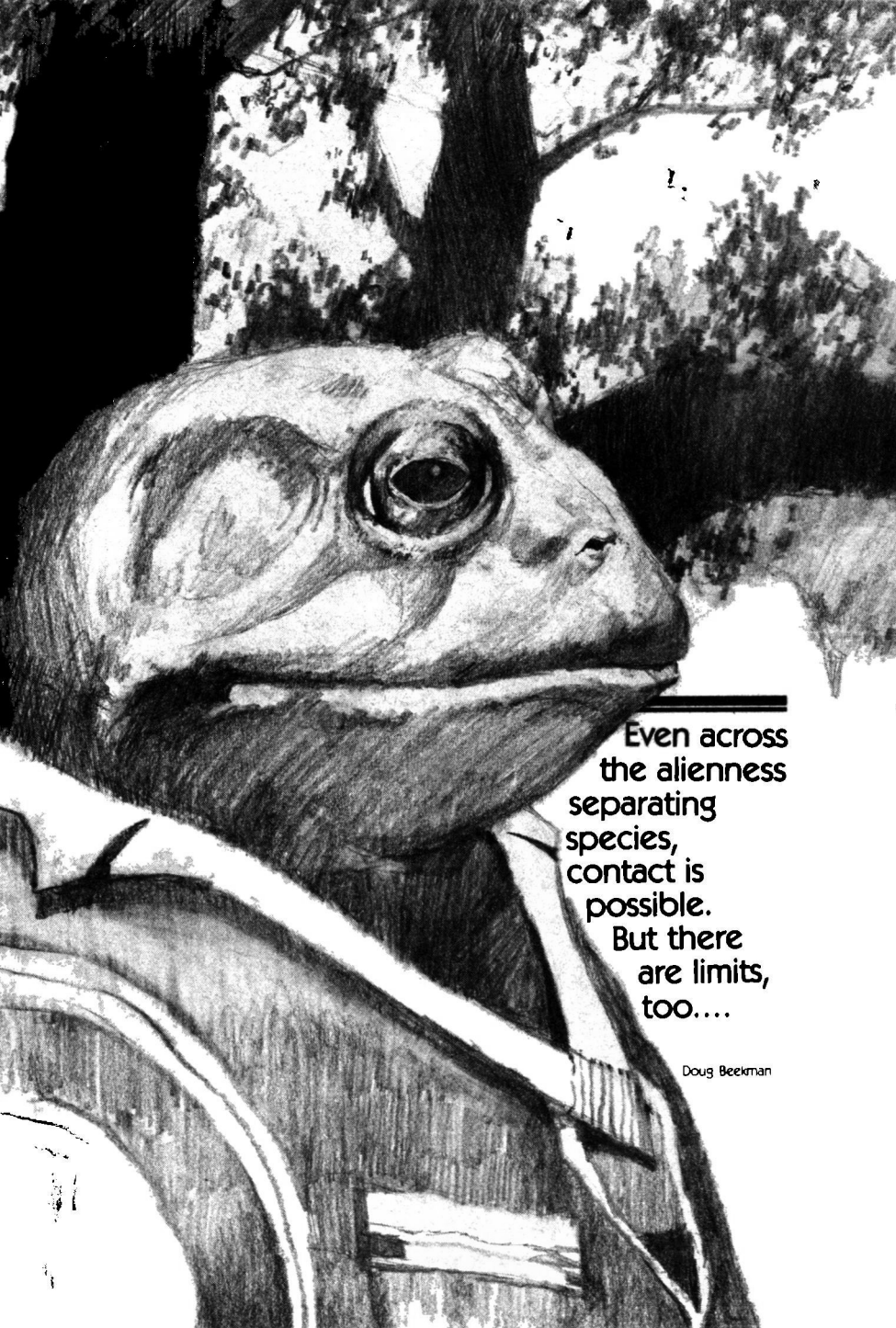
"Not all the way. I can get one face right, but it gets tougher the further you go."

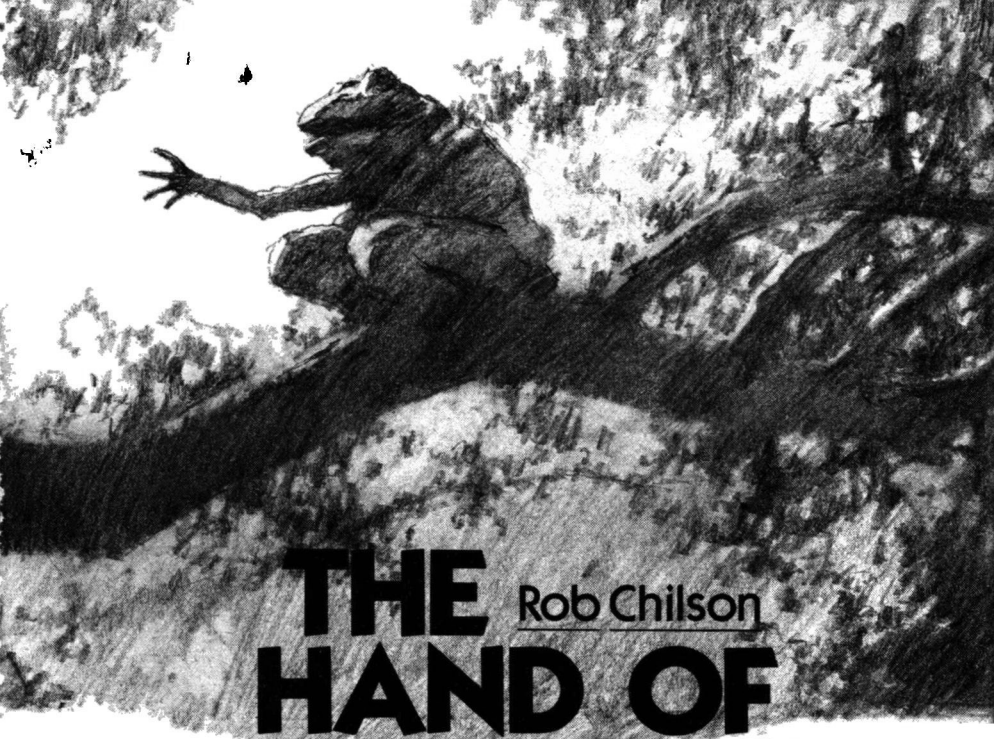
"Agreement. This is incredible! I've never seen anything like it. You're sure it's even possible?"

"I've got a book that shows how."

"Could I see it?"

I felt a smile grow across my face. "No," I said. "No, I think not." ■


Even across the alienness separating species, contact is possible. But there are limits, too....
Doug Beekman



THE HAND OF FRIENDSHIP

Rob Chilson

When I was a boy I once stirred up a nest of wasps. I hadn't meant to; I was just standing there, watching them come and go, working over their big paper honeycomb, when I absently made some rapid motion. Several of the wasps had stopped work and were motionless — watching me closely, though I hadn't realized it—and that sudden movement produced a whining snarl that rose, fell, rose again—a chillingly menacing sound in the hot still air.

The first night after my landing on Trill I found those old sensations recurring. The night was hot, sweaty, and still, and my host, Bunundigh the Star Traveler, was up in one of the trees that his house was built around, trilling to burst his throat—and half a million Trills were in full cry with him. The rising, falling, swelling, dying burbling was loud but not deafening. In other circumstances I might have found it soothing. But these were intelligent beings. There was something so mindless, so animal-seeming, about this communal trilling that I couldn't sleep. I sat up, sweating and thinking of wasps.

Of course I knew as well as you do that this trilling is their normal method of arriving at a conclusion. I knew that Trills regard our human usage of voting to arrive at a decision with much the same emotions we have toward trilling in chorus. I'd read Miyahara's lyrical report on it—it was he who dubbed it "communion"—and had even been ready to accept it as the wonderfully

mystic experience he believed it to be.

It's different when they are deciding whether to kill you.

Since I have been ordered to write an article for popular publication from my official report, I begin with a "narrative hook." But things started farther back. I suppose the public is aware, though it may have forgotten the details, of Morgan's going renegade. He took blueprints and specifications to the Trills, hoping to teach them how to build interstellar ships. His idea seems to have been to be the "Great Human Benefactor." Such a being could (he hoped) form an army and lead it against human planets, probably non-Federation ones, and build an empire.

So they sent me, Silvio Kenyon. Despite my diplomatic mission and the rank they gave me for it, I am an officer of the Federation Police. A cop, sent on a cop's mission.

Our contact on Trill was a person called Bunundigh the Star Traveler. He was the first to spend a year on a human planet, studying us, and was still their top expert on humans. He was waiting for me when I got off the ship.

Trills look rather like frogs—see picture. Thick throat, wide mouth, big black-and-silver eyes, skin a gray-green color. I recognized Bunundigh because he was wearing human clothes modified to fit, in a style five or six years out of date.

"Mr. Kenyon?" he said in an excellent imitation of human tones. "I am *Bunundigh* the Star Traveler." He always gave his name the irreproducible Trill pitch. Each separate syllable was a high-pitched bead of sound, the whole name a staccato burble impossible to imagine if you've heard nothing like it. The ending is much like the fricative of "ach" or "loch."

Custom has solved such little problems between human and Trill; I didn't attempt to reproduce that sound, and he always accepted "Boo-noon-dig" with its too-hard "g."

"Pleased to meet you. I hope your authorities will let me have Morgan."

We shook hands in the human fashion—almost. Trill hands are long, lacking a finger, and claw-tipped; they don't fit well into human palms. But he was used to this; he deftly slid his hand through mine and gripped my wrist, and I gripped his. His skin was cool and felt callused; thicker than human, and his body temperature lower.

"That presents a problem, Mr. Kenyon," he said. "It will have to be discussed."

"I see."

Despite all my reading and conditioning, I was thinking in human terms—terms for that matter common to all known sentients except Trills. For the moment I had forgotten that Trills don't have a government.

"If you will come with me, sir."

I grabbed my bags and followed; he made no offer to help with them.

We walked out of the port circle through a crowd of Trills wearing skirts and shawls and tasseled crowns on their heads. They looked at me bluntly, almost staring; some became bored quickly and looked away disinterestedly. I was a little shaken; their reactions were so *unhuman*, even for nonhumans. I'd never been treated this way on any other nonhuman planet.

The car Bunundigh escorted me to was not an aircar; it was wheeled and ran on the ground, powered by a primitive nuclear-electric can. It jounced as it ran over roughnesses in the paving as we rolled through the forest that is Trill's capital and major city.

Even the port area's streets are lined with trees, and there are many dwelling trees with modest cottages under them. The residential section is one solid forest. Bunundigh said nothing and I remembered a comment by Miyahara: Trills don't talk much. I wasn't used to the low seat with its short legroom—or to the sight of objects rushing by at elbow's distance. It was a relief when the car stopped.

Not until we got out did I realize that this was a residential section—more than that, that this expansive house with its three trees was Bunundigh's own.

A Trill faced me as I turned from the car, bags in hands.

"You are the human Federation man Mister-Silvio-Kenyon?" he—she, I decided after a moment, though it's not obvious—asked. Her voice was high-pitched but gravelly and I had to replay her words in my mind to make them out.

"Yes," I said. "And you—?"

Ignoring the hint, she said, "Did you see on Earth a—" she made the high burble that meant Trill "—named—" another trilling roll of sound.

After a moment I decided that she meant Tirtirdin. There were only three Trills on Earth at that time; the Diplomatic Service had tried to arrange a meeting with one to help give me the feel for the species, but none were available.

"No," I said. "He was busy, studying in concentration mode."

She had been looking at me with those silver eyes, the oval black pupils varying in size slightly as the leaves overhead let in more and less light. Now she shifted them so that they no longer focused on me. I had been dismissed totally from her thoughts and stood open-mouthed by the finality of it as she slipped past and disappeared. Their eyes are not really wide-set like a frog's, in fact the placing is almost human; but in that moment she had seemed very frog-like.

"What was that all about?"

Bunundigh gestured me into the house after him, again making no move to help me with the suitcases. After a moment he said, "No doubt she is associated with him."

I'd had quickie language lessons. I knew the sound that means "association" in Trill. It is an important word to them. It means, loosely: incorporation, marriage, confederation, union, partnership, local government, business company, gang of robbers—it means any kind of voluntary relationship between two or more Trills. The planetary government is technically an "association of associations."

In the house, Bunundigh clapped his hands sharply twice, and gestured me into a human chair. He sank into a Trill's half-crouch on a thing like a stool. A half-grown Trill appeared immediately in the door and a burst of sound came from Bunundigh's wide throat, so rapid I couldn't make out a single word. The young Trill didn't even blink, much less answer; it wheeled about and vanished.

I leaned back and looked around. The house was not unlike an ancient Greek house, one side open, facing on the trees. The three trees formed a triangle, and the house was in the shape of a lop-sided three-pointed star around them. The resulting irregular courtyard was pretty small by human standards and littered with odds and ends. But of course a Trill doesn't use the ground—he uses the trees. Though not tall, they were massive. Their thick limbs extended over the roofs of the building around them. Windows in the upper story looked out on them, and slender boards bridged the gaps between windows and limbs. There were platforms and ladders in the trees.

The room around me was attractive in a quiet, bucolic way. It was made primarily of natural substances, mostly wood and the bamboo-like sheeting they get from bark. Fishbone added a slick yellow touch to the silver-gray patina of the wood and the bark matting. Cloth, of shimmering Galactic fabrics, veiled some walls and covered some items of furniture, just enough to give the room a pleasant cosmopolitan ambience.

"Nice," I said. "A very attractive room; it seems a restful house."

Bunundigh just looked at me and said nothing. My embarrassment was broken by the re-entrance of the youngling with a quite human-appearing tray made of glued fishbone. On it were two tumblers full of ice and a yellow-amber liquid; fruits or nuts of unfamiliar hues and aspects balanced the tray.

"This you might call 'shtona'; that is similar to our name for it, and is a pun on 'stoned.' An alcoholic drink, which I chose because of its similarity to Earthly whiskey."

"Thank you," I said. "That's very thoughtful of you." I sipped the stuff and it wasn't at all bad, a trifle sweet perhaps. Not much like whiskey, but with a smoky flavor I could learn to like. I said as much, but Bunundigh just blinked solemnly and didn't answer.

Might as well get down to it, I thought. "You said there'd be some difficulty about permission to take back Morgan. Is there any doubt that I'm authorized to do that? You haven't asked for my credentials." I pulled them out in their holder and passed them over.

The Diplomatic Service could have found agents who knew more about the Trills than I, but not a whole lot more, though I'd only been studying them for three months. It takes years to learn about a whole new species, its languages, history, customs, laws, its biology, psychology, and reaction-patterns; still more years for the information to spread out and trickle down through the intellectual community. And still more to unlearn the errors of those first on the ground, as I was to unlearn so many of Miyahara's.

This process is still not complete for Trills. I knew about as much as was known.

Tapping the papers thoughtfully, Bunundigh said, "This changes nothing."

"Then what's the problem?"

"The concept of granting of permission. The concept, corollary to that, of limiting of action. Had your government not asked our Association for such permission, you would have landed, sought out Morgan, and done whatever you judged best, without any reaction on our

part. There might have been individual reactions, but no collective one."

My head spun a little. Yet I knew that Trills are the greatest known individualists. I hadn't considered all the implications. Neither, apparently, had the Federation.

"The idea having been suggested to them, then, they may well consider forbidding me?" I felt a sharp twinge of anxiety.

"Yes."

"If so, what do I do?"

"If so, we may kill you. Or we may watch you and send you back on the first ship in. What you would call house arrest. The discussion—what you call communion—does not touch on fine details."

I think I gulped. I hadn't dreamed that I—my mission—would be of such importance as to send everyone in the capital to the top of his tree to burble at the misty stars, trilling till they all trilled in chorus. One faction, undoubtedly led by Bunundigh, would be trilling in my favor; others would be opposed; and the rest, undecided, would gradually fall in with one or the other. Whichever one gained the most adherents would win. I would be either stopped or permitted to proceed. But just how they chose to "stop" me—

"How do they decide what to do with me?"

"We don't; that depends on the mood of the sounding. The emotions generated by the trilling. If the struggle is harsh, an association will form, very like a human mob. If it is not so harsh, we will decide the following day, and I will probably be able to take charge. I will send you back."

"Thanks," I said. It came out steadily, but I admit I took a sip of shtona before going on. "So the communion tonight will decide—?"

"Yes. By the way, our word for what

you call communion is closer in meaning to 'sound.' It means to sound, to make a meaningful noise, to sing a decision. I prefer, in English, 'sound off.' A play on words that pleases me very much."

My attention was focused on my chances for survival and I admit I thought some harsh things. Then I remembered a teaching robot assuring me: *Trills are as emotional as humans; do not think of them as cold-blooded.* They fight fiercely to defend their youngling mates, for instance.

"One question has aroused some little curiosity," he said. "Morgan's crime. We gather that it has to do with landing on Trill, which is judged an undeveloped world, and attempting to instruct us in sciences and technologies which are restricted."

I cleared my throat. "Substantially, yes. You understand," I said nervously, "the Restrictive Acts are intended to protect you as much as us."

"That is not so clear to me, and less clear to other Trills, but then we do not have wars and find it difficult to imagine them. However, we recognize your caution in not revealing dangerous information to a possible opponent. But that is at a tangent to the problem, which is the concept of limiting of action. Trills will not tolerate that, but if it is accepted for non-Trills, where will it end? Our Association could end, and with it our civilization."

"And they're defending a traitor of *our* association," I said. "The Federation does not take treason lightly."

"So we understand, from our studies."

My studies hadn't prepared me for this, a perfectly obvious point. I should have thought of it; after all, they don't have wars. "You don't have treason or traitors, do you?"

"Traitor: one who betrays his fellows, or trust reposed in him. No, we do not. Trust isn't reposed, in your sense. No Trill helps another, or associates with another in any way except out of self-interest. To end an association is not betrayal, since we are not bound together by strong emotions, as other races seem to be. In the old days," he added, "agreements were formal and some quite elaborate rituals and ceremonies accompanied their termination — the exchange of ritually broken gifts and the like. In the modern age most cultures of Trills are informal and matter-of-fact. Agreements are ended by simple verbal statements. Some cultures require that all interested parties witness the breaking, but most accept recordings or printed statements."

I hadn't realized termination could be so casual. "Suppose the party of the second part doesn't want termination? Can't he sue?"

"Courts and so on? No. Your courts can compel you to fulfill an agreement of association—a contract—only because humans can be compelled. Trills can't. They would die."

That was true. Slavery is psychologically impossible for them—they have tried it and it didn't work, unless the slave was only indentured for a short time. That is how Trills raise their children.

Getting back to the point, I said, "I know Trills are profiting by Morgan and may consider harboring him out of self-interest. But his intention is known; it

is to build a fleet and descend on some portion of the human sphere. He's merely using you."

"We wondered about that. We have heard that humans and other races not infrequently help others without any expectation of profit. Few of us can believe anything so foreign to all our experience. So his actions are not altruistic; thank you for that information."

"Do you think it'll help in the sounding off?" I asked eagerly.

"No. We accept his help or not, according to whether we profit, regardless of his reasons. For that reason his notion is harebrained, a term that has two very close parallels in my native language and other parallels in other Trill languages. Trills would never follow him or anyone in an attack on the human race. There's nothing in it for them."

Bunundigh rose and left the room. I sat pondering the conversation for some little time, becoming more frightened despite myself at the prospect of being pulled apart by a screaming mob of Trills. Or would they trill while doing it?

One of the younglings entered and removed the tray and Bunundigh's glass, leaving me mine and the nuts and fruit on the chair-arm table. She made no move to replenish my glass and I hesitated to speak, not sure how far my wishes would be respected. Then she was gone.

Trills adopt children of the opposite sex at about the age of five or six and raise them up. When they reach puberty they have sex with them as a matter of course such is a Trill family. When the younglings achieve full growth they move out, to establish their own households. Thus Trills educate the young out of self-interest. The younglings exchange labor and sex for education and the acquisition of skills; also they gain acquaintance and recognition. That is important, for Trill society is a series of interlinking "old-boy" networks.

The sexes are of course completely equal on Trill, male Trills being raised by females. Trills being oviparous, no one knows whose children are whose. They lay their eggs in incubators set up in sunny places in the tops of trees — primitive Trills still build nests—and leave them. The children survive on their own—or don't—for the first several years.

Birth control is a simple matter; Trill eggs are a market staple.

Bunundigh didn't return. I stood up and paced about the room for a while, brooding over all I'd seen here today. The light faded and I became hungry, but still Bunundigh didn't return. Lights were turned on in other parts of the house, but no one came to turn them on here, and I didn't recognize the switch.

Finally I went prowling and found a youngling doing something to a bark panel.

"Where is Bunundigh?"

She understood Interstellar English, as I would expect of a member of the household of the Star Traveler.

"He is at the communicator."

"When do we eat?" I asked bluntly. That was ambiguous, I immediately realized, but Trill younglings have no social standing, though they are fully as independent in their way as the adults.

"We" from an adult could only mean "we adults."

"Bunundigh has eaten. You will be served whenever you wish."

I blinked at this suggestion of Trill hospitality, but said, "I am hungry now." I instantly regretted it.

Courtesy is necessarily elaborate and ceremonial between different species — this the Diplomatic Service had impressed firmly on me—because one cannot take reactions for granted. But the Trill was not put off. She led me to a room near one from which odors of cooking arose and the trilling of younglings came.

A short Trill table was elevated with blocks and one of the human chairs fetched. Food was carried in and I automatically thanked the youngling. She gave no response, simply left. What a strange society, I thought. Miyahara might call sounding off "communion" and think of it as forming a mystical union of the Trills, but this unity didn't extend to the simplest courtesies.

When I had finished eating, I sat around for a while, expecting I don't know what. What I wanted was for Bunundigh to come and reassure me that the Trills wouldn't tear me apart in the morning.

For a human it's hell to be totally ignored.

A youngling entered and asked if I were through. I said yes, and she began to clear the table.

"Where is Bunundigh?"

"He is in his study, in concentration mode."

Like a hibernating bear. It is difficult to get the attention of a Trill in that mode. But I was more impressed by the importance of the master of the household; every youngling knew just where he was and what he was doing at all times.

"Then probably I won't see him again tonight?"

"No."

I was feeling more and more lost, ill at ease, and out of place. "Where are my suitcases?"

"They have been taken to the room assigned to you. Do you want to go there?"

"Yes."

The room was spacious and comfortable, especially to Trill notions. It was on the second floor and its windows were open on a balcony nearly brushed by a limb; ready access to the trees. Cool moist air was already flowing in. In one corner was a bathroom equipped with excellent imitations of human fittings, though Trill facilities would have done—they squat over a hole. The shower was primitive but, when I had puzzled out its workings, soothing. There were chairs to fit the human form, and the bed, though low, was thick.

When I had taken a shower and prowled the room, I stretched out on the bed with a libriscope and a record of my texts on Trill life, but I couldn't concentrate. Time passed slowly.

Then, after sunset but before darkness, there came the first questing trill over the forest. It had begun. Somewhere a Trill was squatting in the top of a tree and burbling on a high-pitched note. Another answered, and then, after a silence, yet another, from very far away. Three or four more came on the air at the same time, paused, listened to what were not echoes but answers

from a great distance, then repeated their soundings. Within minutes trills were rising from all across the city, a high-pitched hash of sound.

The trilling died away, to be replaced by the chirrings and elfin notes of bugs and small animals like lizards. Then it began again as before, first one, then another, then the whole city. There was no harmony in the sound; they trilled at random.

Warming up, I realized. I had Miyahara's description in my hand.

I don't remember how many times the sound swelled and died, three I think. Then there was a prolonged silence and I listened intently; away off there, so far away I could barely make it out, was a group of Trills all in concert, trilling on in the city's silence.

After a minute or so there came a loud, short, questioning burr from a nearby tree. I jumped at the sound. It was repeated from other trees on all sides of us. Then from just outside my window there came a loud trill, full-throated, measured, confident; and I jumped again.

Bunundigh was sounding off.

I went to the window and looked, finally made out a dark lump in the farther tree, high overhead, that had to be him. Here and there on the lower platforms I saw the dark shapes of younglings, their day's work done, listening. Others were still at work behind lighted windows.

From here and there across the city came trills joining Bunundigh's, on precisely the same pitch, the same timing. Our faction was in full cry, and the sound began to be picked up in spreading circles like the rippling of water after the throwing of a handful of pebbles.

It's impossible to describe this trilling. The Trill name for Trill, their planet, for instance, is commonly rendered as *Drrrrrrrt*, but this is actually seven "syllables" or, as I have called them, beads of sound, very distinctly articulated despite the speed of pronunciation. To the untrained ear all this trilling sounds about alike. In speech, words are distinguished by labial and dental beginnings and endings, and by slight breaks in the flow of sound, pauses as in human speech.

But in the sounding off, no words are used. It's as simple as a scream. Bunundigh put out a pattern of trilling that started and stopped as he ran short of breath but had no real beginnings or endings; broken into syllables but not into words. The distinction between his and the opposing faction was in the length of the beads of sound and the spacing between them.

Once his followers had hit his pattern—and this varies according to the time of night, the humidity, and so on—they needed only an occasional trill from him to keep them on track. The united trilling swelled and swelled like the roaring of a storm till I thought my head would split with the sound. It was so oppressive I moved cautiously lest I fall down. Yet I was amazed when, limply releasing the libriscope, it fell to the floor with a distinctly audible thump. The trilling was not really so loud as it seemed. There were no lower-pitched noises in the night to compare it with.

As it began, so it went on, all night long.

I lay down, and got up and paced

about, by turns. A time or two I tried to read, but no luck. Impossible to concentrate with that going on—even discounting its mortal importance to me.

I thought about Earthly parallels. Crows, for instance. Whenever a crow is found guilty of some infraction of crowish law, the flock will gather and caw and yell at each other, all at once, for some little time, until some decision is reached. There is a moment of silence, then they will either swoop on the offender and peck it to death, or simply fly away, the pardoned crow with them.

Of course crows can't talk or reason on abstractions such as justice. They have extensive vocabularies but can't argue. All they can do is the equivalent of yelling "Yes!" "No!" and "Yah-yah-yah!" at each other; so a crow trial is simply a matter of one group outshouting the others. There can't be any inquiry into guilt, any narration of the offender's misdeeds, or any attempt to find out what's what. The most ignorant crow in the lot may be the most influential if it has a loud voice and determination. As many guilty crows go free as innocent, no doubt.

I hoped Bunundigh and his followers had strong throats.

The hell of it was that I couldn't argue with them. Trills don't debate in human fashion. In the week or so preceding my arrival, Bunundigh and others had made known their conclusions. TV broadcasts there carry no entertainment; its "Personal Statements" or "Positional Statements"—not speeches—take the place of editorials and letters to the editor in human newspapers.

But though they state their positions, they don't argue. They don't bother to give more than a slight sketch of the reasons for their positions, or of the process of reasoning by which they reached them. In short, no real debate. Miyahara claims the debate is internal. Each Trill, using his own information, tries to understand the positions, and recreates the reasoning himself.

I didn't find that very reassuring as that terrible night wore on.

I found myself thinking more and more of those wasps. They too were individualists who nevertheless cooperated to form an "association." And they fought furiously to defend it. I remembered how some of them watched me. When I made that rapid motion, they buzzed snarlingly, a sound that alerted all the others. Even those who hadn't seen the movement knew there was an enemy about, and the flight of the first wasps led them to me.

It was the buzzing that alerted them. The mob action followed that.

Light shining in my eyes awoke me. I found that I had fallen asleep sprawled across the bed in my bathrobe, or more like passed out. I felt a thrill of fear when I realized that morning had come. The sounding was over, and I didn't know what the decision was. I peered out the courtyard windows but saw only a couple of younglings asleep on a platform.

I sat on the edge of the bed, groggy. That was uncomfortable because it was so low, so I stretched out on it to think. I didn't want to get up and go prowling about. Surely everybody was asleep, having sat up all night. Nor did I care to let them know how anxious I was to

learn my fate. But as I was deciding to wait another hour, I went to sleep again.

When I woke up, feeling quite muzzy but not so tired, I heard water running across the courtyard and other sounds of life in the household.

It was now midmorning. And the wasps had attacked on the instant. Bunundigh had said that the association that would form was quite like a human mob, and that its formation would depend on the mood of the sounding. I couldn't imagine them waiting until they'd all gotten some sleep. Ergo, no "association" had formed.

Still, I cut my shower short and went looking for people. It hadn't occurred to me that I could get service by clapping my hands. When I found a youngling I asked her where Bunundigh was.

"At the communicator. He is arranging for his departure."

"Departure?" I was startled.

"To—" she gave a burring trill, added, "The location of Morgan."

I stood and digested this while she waited patiently. I had firmly determined I wasn't going to ask how the sounding had gone, but this was further evidence that it had gone in my favor. I hadn't been able to think past this morning.

"I'm hungry," I said weakly. Moments before it hadn't been true, but now I was ravenous.

She preceded me to the dining room I had used last night. I had not been sitting and waiting long when Bunundigh entered from the kitchen. I stood up to greet him.

"As you know, our faction outsang those in favor of limiting actions," he said abruptly, ignoring my greeting. "You now have authority to seize Morgan. That presents difficulties of another sort."

"He has gathered an association of outcast Trills who will defend him?"

"Substantially, yes, that is the problem. In defying the Federation it puts itself in grave danger, and all Trill with it. Will not the Federation declare war against us?"

"No," I said. "You don't have war, so you don't know how destructive it is. The Federation will go to almost any length to avoid it. And my report that it is only a small faction that resists—and that it is in defiance of the Trill government—will prevent that.

"Unfortunately it will take time to persuade the Federation of the necessity of sending in a Special Order Squadron."

"I labor under a similar unfortune." Bunundigh made a low-pitched burr that after a startled moment I identified as laughter.

"It will take time to form an association of concerned Trills from the planetary Association to arrest Morgan. Ultimately it will be done, if only to prevent attack by the Federation. But it gives them time to entrench."

I nodded. "Can we bluff them into giving him up?"

"That was my thought." He churred laughter again. "When I learned that this word also means a high steep bank of mud or dirt, I connected the two in my mind, so that such a deceit assumed the aspect for me of a high brown wall barring the passage of one's opponent. But I understand that these are two words, of different origins."

"I didn't know that. It seems that

we'll also have to bluff the Trill Association."

"Yes," he said, rising. "We'll threaten the whole race with the reprisal of the Federation in order to convince the Association members that Morgan's Association must be put down. The existence of *that* bluff will convince the said association that harboring Morgan means its destruction, and there will also remain the direct threat of the Federation itself. I will mention the Special Order Squadrons specifically; I am glad you reminded me of them. I learned many disquieting things about those commandos, which I don't doubt Morgan also knows." He laughed again. "His Trill associates will be asking him what the S.O.S. are; the answer will go far to convince them."

That was true. I grinned. "I do hope they won't have to be called in. They carry mininukes and can be quite destructive. I wouldn't want anyone to get hurt."

He nodded in the human manner and went to build up our bluff while I finished breakfast.

A couple of hours on the communicator, broadcasting that threat, a few orders to his younglings about management of his affairs, and Bunundigh was ready to go.

One of the younglings drove us to the airport, where we took passage on a ship for what I will call Splrrt. The ship was of Trill make—they are up to reactionless flight and make their own interplanetary space ships. It was a human-looking needle-nosed football. More important was the economics of its operation. The ship was made by an association of Trills and sold by them to another which operated it for profit, quite in the human fashion.

I said to Bunundigh, "That unsettles me. No sooner do I get used to the idea that Trills are alien than they go and do something the human way."

He gave his burring laugh. "I had a similar reaction many times on Neo Europa. I learned there, though, a thing that is the basis of the Diplomatic Service's philosophy: A true alien is one who *feels* differently from yourself. He will probably *think* the same, since reason and logic deal with the external universe, which is the same for all species. I interpret this to mean that one may deal with an alien on the basis of reason and logic and understand him so long as both are dealing with external realities—trading hats for gloves, as one of my dons was fond of saying—without ever coming to understand him in any fundamental way. Certainly I find humans alien beyond all understanding, despite my year of study there."

"I've read that maxim—one of Chu Teh's, isn't it? Certainly our experience is limited, but we've never yet found a race we couldn't make our desires known to. And we always came in peace; really it's harder to understand trading than killing."

"Yes; a blow is immediately understood, or as we say, A cuff speaks plainly." He added, "I have not been able to make a good pun on that, though 'cuff' has two meanings in your tongue."

The suborbital run to Splrrt took about an hour. The ship was human-like in layout, though I got cramped from the low seat, and was manned by younglings with one adult forward in nominal command. The air within was tense;

none of the passengers or crew ignored me now.

We put down at an airport to transfer to a similar but smaller ship for the short hop into the mountains. This is undesirable land, in that it will grow neither food crops nor trees large enough to be comfortable. The city—called something like "Drrrnt"—is a series of terraces on which trees have been planted, with buildings around and between them. It is a poor place, though no slum. Outcasts live here.

It was Miyahara who used this term for them; it is not strictly accurate, but it would be difficult to find a human term that is. These "outcasts" are such unattractive or recalcitrant youngsters that no one wants to be bothered with raising them. They scramble around on the fringes of Trill life, educating themselves and growing up as misfits, terribly handicapped. Though they are helped by such losers (Trills insufficiently prosperous to set up households and raise younglings) as come their way, and from older younglings from time to time, they have no connections. Not having been raised in the normal manner, they are not a member of an "old-boy" network.

Drrrnt is a city of outcasts; here they had foregathered, to build their own network of connections.

Morgan had talked them into converting the airport here into a shop for turning small old Trill spaceships into interstellar ones. The outcasts' motives were easier to understand than his; Bunundigh said that it was believed that they hoped to open the first Trill interstellar line, thereby making a place for themselves in Trill society.

"Sounds very human," I said. "They're going to show the rest of you that they are, too, good for something."

That startled him and made him think. "Is this not essentially Morgan's cracked plot?" he said.

"Substantially. Obviously we have our 'outcasts,' " I said wryly.

Their airfield at Drrrnt was paved with brick, a scene out of Oz. When we got out into the heat, every Trill who saw me there stopped whatever he or she was doing and looked me over very deliberately. A human on Trill—and here—I could only be the agent of the Federation. None approached us. I wished I could read their expressions and stances.

"I have gravers in my suitcase," I said, chilled despite the tropical sun. "Should I put them on?"

"A concealed weapon would be better."

"I'm wearing one." Good in a pinch, but in a long battle it would overheat. I preferred the big official graver with its thick prong.

"I would say do not show weapons; we are outnumbered."

He strode purposefully toward one of the locals, a mechanic wearing what looked very much like coveralls, stained with grease or dirt. The other hesitated, decided to await us.

Bunundigh gave a chirr in which the human word "Morgan" sounded alien.

The response was a short chirp: "No."

Bunundigh brushed past him and confronted another Trill, this one naked but for pocket harness, the Trill tropical dress. Her reply was not the same, but added up to it: another refusal.

I had begun to sweat from the heat of the sun and now I was sweating in earnest. As Bunundigh stalked a third Trill with grim patience, I noticed others approaching slowly from several sides, carrying long things that had to be weapons. Probably solenoidal rifles firing bullets by electromagnetic repulsion. A graver is more elegant, but rifles and explosive bullets have by no means been supplanted in the Federation Forces.

The third Trill responded at some length and there was almost a colloquy, but a short one.

"She says she cannot conduct us to Morgan, not knowing where he is. But she gave me his call symbols."

"No point in calling him; we didn't come here to argue," I said, sounding firmer than I felt. Sweat trickled down my chest and dripped from my armpits. The dust smelled peppery. The armed Trills watched us, standing or approaching slowly, keeping their distance. No one spoke.

Bunundigh looked about. Trills looked back; every bit of shade held a pair of gleaming eyes. They had ceased to come and go about their concerns; the Trills who'd followed us off the passenger ship also stood waiting.

Bunundigh pointed his wide mouth at the sky and his throat bulged. From him there burst that chill, cool, dewy night-sound, odd and strained here in the flat heat of the dusty field. I felt the relentless pressure of the sun, smelled my own reek, Bunundigh's loamy odor.

He snapped his head alertly down, looking from side to side. The trill had been a short one. No one answered.

He strode forward confidently, me following, gripping my suitcase. Not far from the first place he did it again. After a pause he turned half about and repeated his trill yet again.

From several places came buglings, liquid bubblings of bell-like sound that had the force, I think, of preliminary throat-clearings. There was another pause, an embarrassed one I thought, then someone far across the field trilled back in a tentative fashion. It too was short and stopped abruptly.

Bunundigh was in no hurry to answer. He looked about, moving his head and eyes quickly, but no one else said anything; there was only a single "throat-clearing." He trilled again. My suitcase felt very heavy and I wondered how fast I could get the big graver out of it. It was terribly hot and still.

The other Trill answered him quickly and was joined by another. After a pause another Trill sounded off from another direction. Concentrating, I thought that this was like neither Bunundigh's nor his first respondent's.

There was a silence, then a tentative trill from one side, another from another side, then two more, then another, then half a dozen, some clashing. Some of these were earlier speakers repeating. Again silence fell.

Bunundigh "cleared his throat"—up close it sounded more guttural and less clear—then produced a long, long, long trill. It was answered immediately by three other Trills, one being the first respondent. Then they all fell silent and looked at each other.

I had to clear my throat, hoping the sound wouldn't carry far. "What is it?"

Bunundigh understood. "Our bluff is working already. They have no consensus. Some would defend Morgan;

most would not. No one will publicly support us. Come."

I followed him across the field. The gun bearers remained steady, expressionless of course, and watched us go. I couldn't get enough air after we passed through their line, must not have been breathing much before. Bunundigh led up to a car and spoke to its driver. That Trill looked at us for a long time, her eyes not shifting but, I thought, thinking hard. She was old, her face a mass of fine wrinkles. Her throat worked, worked again.

Then without a word she climbed to the driver's cubicle. Bunundigh opened the lower door and we eased into the cool, dim interior.

"She'll take us to him?"

"No telling. She could be meaning to drive us into a trap. But she obviously thought it over; her hesitation indicates she isn't a plant."

Relief. "She can't be a plant," I said. "Plants are fixtures; she can move about." And he laughed briefly with me.

The ground car rolled easily away across the field and its surrounding yards. The forest higher up opened out, revealing dull-colored houses. Here and there buildings peered over the treetops. Those would be office buildings or industrial buildings. The Trill way of life eliminated bureaucracy, but still some public buildings were needed.

We stopped before such a building. Bunundigh looked out at it, making no move to open the door. "This is no dwelling."

"Morgan's human; he might prefer to live near his work."

Without a word Bunundigh opened the door. I checked my hide-out graver in its holster as I followed him in. Inside, occasional Trills paused in their comings and goings and looked at us.

One led us wordlessly to a not very large room with wide windows through which streamed hot sunlight. Five Trills awaited us here, two of them quite old, three of them female. Two others entered shortly afterward, these last bearing weapons.

Bunundigh didn't bother to introduce me to them or them to me; he took one look and began to churr and trill at them. They answered in equally short phrases. The colloquy was over in three minutes or less. Bunundigh led me aside and put a pair of claw-tipped fingers in my palm, shielding the action with his body. Claws retracted, he tapped on my palm with one and two fingers rapidly in Interstellar Morse, like the deaf-blind used to do:

They refuse to release him to us. We must intensify our bluff.

I replied the same way: *Can we?*

Possibly. They have no consensus. There will surely be a sounding tonight; it could unite them against us, but I doubt it.

I thought it over. I was almost lost, but this lack of consensus surely meant that there were those among them who supported us. No; who feared our double bluff.

How do we intensify our bluff? Sit tight?

I can think of nothing better. I like that phrase. If we sit with mouths tight—

I nodded, but looked at the Trills. Our presence would put terrible pressure on them. These were the beings Morgan had approached with the offer of—

whatever he offered them. What does a Trill want? Power? No, to a psychology such as theirs, power meant nothing. I'd have to take that up with Bunundigh. Whatever, could I offer them anything better? Obviously not, by Federation law, and they knew it.

All I could offer was threats.

Still, there was that. I did represent, after all, a genuine and terrible threat, though the Federation had gotten off on the wrong foot. The threat remained. If I pointed that out—

Let me reason with them.

Bunundigh tugged me back. *No. Trills do not debate as humans do. They know all your points. They will think them over, make decisions. Tonight they will vote. Reason and argument do not affect decisions; that is an emotional process. It only sets up the problem to be decided.*

I could only nod; I was stricken with a sudden blinding flash of insight about democratic election processes.

Bunundigh turned and strode for the door, taking me by surprise. I followed, paused in the door to say farewell, to thank them for hearing us, to I don't know what. We shouldn't leave on so hostile a note. But they looked unreadably back at me and I had nothing to say; I realized they were waiting for me to go out before they spoke.

In a culture without courtesy, there is no such thing as rudeness, I thought, and left.

The car was there. Entering, Bunundigh trilled to the driver and it pulled smoothly away. Quite a number of Trills had gathered to watch us leave. None of them made a sound. But it had begun to be borne in upon me that their expressionless silence covered as much emotion as the shouts of an Earthly crowd.

Still, they do not experience the emotion of hate, only something like angry frustration. That was something.

"He was probably in that very building; that's where she took us. But it's futile to go looking for him."

"Where to?"

"To a hotel. Possibly you should report to your people. I must report to mine."

The hotel was a ramble of cottages punctuated by trees. We drove among them till we found one with no flag over the door, walked in. I looked it over, finding it very like Bunundigh's house but much smaller and less luxurious.

"Make your report brief and noncommittal," Bunundigh told me, and that was an obvious precaution.

We went out to eat in the queer tension, which reminded me of the period just before a storm breaks. Trills looked at us but did not speak. Waiting to see which way it goes, I thought, and reflected that here again they were very human despite their seeming alienness.

I remarked as much to Bunundigh, but he said, "That is a matter of reason and logic. In a similar situation humans and Trills respond similarly; the situation dominates. But are the underlying emotions the same?"

I had that to think about, as darkness climbed the sky.

The trilling began early, before the evening mist had formed, starting up without preliminary from three centers. Bunundigh paced about from window to window, listening, but made no move to climb a tree.

"The natives are restless tonight," he said.

I laughed. Then I said, "I'm going to have a restless one myself. The second one in a row. Maybe tomorrow night I can sleep."

"It's doubtful if they can settle this in one night."

Tension was like drugs in my veins; I could have leaped up and kicked the ceiling. Another night like last night I felt I couldn't take; and there might be several. Abruptly I said, "Let's go get him."

"What?"

"We can guess that Morgan's in that big building. Let's go winkle him out."

"You have the authority, yes—but how to get to the building? And how to locate him in the building?"

"I have the authority, also arms. I take it we're being watched? Why not go up over the roof and jump to the roof of that unoccupied unit next door? As for the building, we'll cross that bridge when we come to it."

"We say, 'We'll jump to that limb when we have to.' " After a moment he said, "Perhaps we can evade the watchers. Things are probably very much out of order here, a not-very-good pun on 'chaotic.' We can hail a car; that would be safer than trying to walk. Your gait is distinctive, though it doesn't squeak. But to find Morgan?"

"Suppose we stuck a gun in some Trill's ribs and told him to take us there?"

"That might work, assuming it knew his location. However, we can but try. Excelsior!" Gesturing to the roof. "To do or dry!—here in the mountains they used to dehydrate their dead."

It was easier than I expected. We moved quietly, jumped to the next roof, circled its court, scrambled by way of a tree between units, and crossed another building. That brought us to the street well away from the watchers. I suppose those were younglings who were distracted by the sounding. We stayed in the darkened residential section lest my gait be noticed, till Bunundigh had hailed a cruising car.

The driver blinked quite humanly and his throat pulsed a couple of times when he saw me. But at Bunundigh's trill he obediently pulled away into the lighted streets.

Around us the trilling swelled and died, heterodyning and blending, an unbearably poignant crystalline sound like pouring marbles endlessly into a glass bowl. It drummed in my head, my tension and lack of sleep causing it to echo.

"Look," I said suddenly. "Why are you doing this?"

Bunundigh looked at me, apparently startled. "For the obvious reasons. Morgan represents a threat to the Trill race, if not to the Federation. If he is not stopped now, he will require—and receive—a major punitive mission by the human race. And of course, by making myself your close associate, I enhance my value to the Federation. Thus I shall prosper."

Prosper. So that was what Trills wanted: not power, but merely to flourish. Power, I thought, is for those who glory in the attention of others, and any reasonably prosperous Trill gets all kinds of attention from his or her younglings.

"Fair enough," I said. "You're willing to risk your life for those ends?"

"Not for either alone, perhaps—not this kind of risk. But for both, yes. I am of an adventurous disposition; that is why I am the Star Traveler. In those early days few Trills cared to risk themselves among total aliens. You humans have your traders, missionaries, general explorers on the periphery, your policemen and so on within your sphere. Adventurous beings, all. May I ask why you are willing to risk your life?"

"For the same reasons, I guess. Mainly because I don't think I could've stood another night without sleep. See, I need my nightly nightmare, and if I can't have it sleeping I'll get it waking."

He gave his churring laugh. "You are not so alien after all."

I grinned back at him, feeling quite close to the cold-blooded frog.

Then we pulled around behind the building where Morgan was hiding. It was big, ten stories high, and no trees grew near it. That indicated ruthless power to Trills, characteristic of mechanical civilization—a contemptuous disregard for Trill "human nature." No

Trill would live in such a place.

"We need a ladder," I said. "Time for a second-story job."

I had to explain that to Bunundigh, who was delighted. "An expressive phrase; and we have burglary in mind."

I remembered a trick from my training, though I'd never ridden in a ground car before. "Have him pull up next to the building; we'll scramble up on the car's roof."

We made the driver get out and I covered him while Bunundigh dealt with the window. As soon as he was in, I leaped through. The building was quiet but occupied. In a minute or two we flushed a leathery, wrinkled specimen out of an office and Bunundigh trilled at him.

He blinked at our guns and agreed to lead us.

I had both my gravers. Bunundigh had declined my offer of the loan of one, as they didn't fit his hands; he had a big handgun throwing slugs. Their most advanced energy weapon is a three-color beamer, but without electron-frustration their laser technology is primitive; these beamers heat up rapidly in handgun size.

We moved fast, despite the bandy Trill legs, and fortunately everybody was caught by surprise. The adults were of course taking part in the sounding, one reason Bunundigh agreed to the enterprise. We reached the suite where Morgan was held and Bunundigh opened a murderous fire on the guards without warning.

I joined in, and having a technologically superior weapon, was the better shot. Both guns were silent, mine making only a faint sharp whistle at each bolt, but the gravitonic beam defocused in flesh and punched out fist-sized holes, as effective as Bunundigh's explosive bullets. The Trill guide flattened himself against the wall and caused no trouble.

But the guards set up an almost human shrieking as they were cut down.

"Who's out there? What's going on?"

Startled, I looked at Bunundigh. A human voice! Though I was here to get him, I'd been hearing Trill voices so long it sounded odd.

"He's locked in!" said Bunundigh. The rest of it was drowned out by shriekings that echoed through the building. "Damn! They're alerted, and these younglings may kill us. We must get out fast and hole up till we can dicker with the adults."

I was having trouble keeping from laughing, which is not unusual with me in tight places. "So the great conqueror must be rescued from his own would-be troops!"

I raised the prong of my graver, the big one, which throws a seventy-kilojoule bolt, and started punching holes around the edges of the metal door. There was a human cry of pain from inside, and the excited shout: "That's a human weapon! Who's out there?"

"Kenyon, Federation Police! You're under arrest—"

"Thank God!"

The door was jerked down, one hinge having been destroyed, and Morgan blundered out, shouting, "Don't shoot!" There was blood on his face from a minor splinter wound, but otherwise he

was unhurt, and must have put on ten kilos.

I grabbed him and whirled him in the direction we had come, saying, "Quick march! Away!" Bunundigh chirruped at the oldster and we left him there. Bunundigh's disregard for him made plain that he was a loser.

We met them at the foot of the stairs, and would probably have met opposition sooner except that Trills are no more likely to go armed on their own streets than humans. Even as it was they had only minor pocket weapons, not the rifles and heavy pistols the guards had had, or even the long-barreled solenoidal pistol Bunundigh carried.

There was a flurry of shots, then an authoritative voice cried out in Trill; the Trills retreated. They naturally didn't want to hit Morgan. I looked around. Apparently all the bullets had missed us, and none had exploded. Morgan and I were both wearing heavy mineral-fiber clothing; now it sported hot, stiff, partly melted tracks where their beamers had described scrawling lines across us. Bunundigh had red scrawls, weals, but his tough hide hadn't been burned through. They were shooting wildly.

"Let's go!" he said, and shoved Morgan ahead of us.

We ran forward, Morgan protesting and trying to hang back. I kicked him on, and Bunundigh clawed at his shins from the other side. The Trills gave way, ran into rooms and closed doors behind them. We ran for the ground floor. Once there, we opened the door of the nearest room and made for the window, not wanting to risk an ambush at an entrance.

I held Morgan with me for a shield, keeping an eye on the door of the room. Bunundigh leaped out. I grabbed the sill, pulling Morgan back with me—he was slobbering and saying, "Don't leave me!"—when I heard Bunundigh cry out. He had fallen into a sprawled heap under the window. I looked along the side of the building, saw a shadowy movement, shot at it, saw it flop.

Then I was down beside Bunundigh, Morgan almost falling on him in his haste. Bunundigh stirred. Apparently he had a solid bullet hole all the way through him. Those solenoidals turn out projectiles with superhigh velocity, and they were using hard-nosed bullets.

"The toad's dead, Kenyon; let's go. Come on, man!"

"No; he's alive, and still conscious even." I had no way of guessing how serious the wound was, but Bunundigh was even trying to sit up.

"Grab his arm, Morgan. Come on, that way!"

"You're crazy, Kenyon, you'll get us both captured—"

I pointed the graver at him. Seventy kilojoules is a big argument. "Grab his arm or I'll punch your head off. Let's go!"

"No. Leave me. You can't—" Bunundigh's voice was faint, whispery. I ignored it.

"Hup!"

Trills are smaller than humans, thank God. We hauled him more or less to his feet and once up he made weak efforts to move his legs. We were gone among the trees in a rush.

Our escape route had been agreed on. This being in the mountains, the city was a series of shelves separated by

steep mountainsides. A short distance among the trees took us to a retaining wall. Once over that, we were in the wild land, a steep slope with a shelf above and one below. This was cut by a gully; above and below us were large ponds or small lakes. In the gully we were out of immediate view.

Only their desire to preserve Morgan alive saved us, of course; we must have been in range of a dozen or more guns at one part or another of our flight across the level. Once in the gully we settled down and I drew a breath, wiped sweat; heavy exertion at moderate altitude in the tropics takes it out of you.

Belatedly I sent half a dozen bolts ripping through the brush in the direction of our pursuers, hoping I wouldn't hit anyone.

"You crazy fool, what did you stop here for? The toads'll be all over us—"

"Shut up," I said dispassionately, and clouted the fool alongside the head.

He quieted but looked around, eyes rolling, the very picture of over-acted fear. "Don't try running," I said, gesturing with the graver, "or I'll put a bolt through your leg."

That caused him to sit back a little, gulping, while I stepped down the power of my bolts. Partly not to tear his leg off if he did run, partly to save energy. It might be a long siege.

Bunundigh began to regain consciousness, having passed out as we tumbled into the gully. He looked at the high-tech weapon. "Good thing it wasn't a graver," he whispered. There was yellow foam at the corners of his mouth. "A pun on grave digging; was that deliberate?"

I said it was.

"I like that. Or engraving. Engraving tool. For engraving epitaphs. Shoot me with a graver today and I shall be a grave man tomorrow."

I wiped at the blood, but he didn't cough. I didn't know if that was good or bad.

"In your language, to speak gravely is to speak in a deep voice. Now we have high-pitched voices. We say he speaks deeply it means, he is dead."

He passed out again, still muttering puns on death. I didn't know how to find a pulse, or if he was alive or dead. If dead, I thought it was appropriate.

"His epitaph should be, 'Lightly did I live and lightly died,' " I said to Morgan.

He didn't respond. He was staring wild-eyed up at the top of the gully and looked ready to bolt.

I waved the graver at him admonishingly and looked up. Nothing in sight, but I heard footsteps.

"Silvio-kenyon! *Bunundigh!* Silvio-kenyon! *Bunundigh!*"

I shot the limb off a shrub, and in the silence called, "I hear you!"

"Truce! Is that the word? To speak to you!"

"Truce! Send one person down!"

"I come myself!"

And with no more ado than that, a head poked over and then down he came. She—the Trill was female and a young adult—spread her hands horizontally. I covered her with the graver, notwithstanding she was naked.

"I take it you want a compromise," I said hoarsely, not forgetting Bunundigh, but first things first. "I can and

will shoot Morgan before letting you have him back, so you've lost him for good and all. I hope you hadn't expected to talk me out of him."

"No; we recognized that we had lost him. But we must retain his plans and blueprints. I warn you that we have copies hidden away."

"I will be criticized, but I'm not expected to do the impossible, so that is granted." I had expected that. Without Morgan, it would be a long path to the stars. Not impossible, but they'd probably have to have help from the planetary Association. "Now, I must have medical attention for Bunundigh immediately, the best available."

She looked at him. "He may not live."

"He must live! Do the best you can, and get cracking on it."

She looked at me dispassionately for a moment, then Morgan spoke. "If you save him, he will be your contact with the Association."

I stared at Morgan in surprise. He seemed cool now, and he was right—the man did have experience in negotiating with Trills, after all. The one thing these outcasts wanted and needed was contacts in other associations.

"I'll do what I can for you among the Federation worlds," I added.

She looked up and trilled a long sentence, said, "We have no aircars in this city, but there is a boat on one of the ships. It can maneuver down into this gulchie and drop a straighter. Stretch?"

"Yes," I said, not bothering to correct her. "And as far as I'm concerned, let us get away with Morgan and you see to it that Bunundigh's cared for, and you can keep the rest. No reprisals, I mean, and our best efforts to help you, short of bending the Restrictive Acts. Okay?"

She thought it over for some little time, not as long as it seemed to me. I suppose she was giving up their dreams of opening the first starship line out of Trill. I kept my gun on Morgan, taking no chances; one bullet, even if it didn't kill me, would give them all they wanted.

"I agree, for my association," she said at last. There was no audible emotion in her voice, but she stared at me forlornly. "It is okay."

Bunundigh survived—he is now the Federation's Resident Agent there—and though I wanted off Trill as soon as possible lest they recapture Morgan in a counter-raid, one bit of business or another with the Trill Association kept me till Bunundigh was out of danger and back home. There his younglings gave him more faithful care than any hospital would have. He was still bedfast when I last saw him.

He lay propped up as a human would, but his legs were folded under him in almost a yogic pose. His eyes were very bright and thoughtful as we "shook hands."

"Tell me," he began, ignoring —brushing aside—my cheerful hello-glad-to-see-you-how-are-you babble, "why did you save me? Logically, you should have been killed, burdened with my weight."

I was surprised. "Because you were still alive. I wasn't going to leave you!"

He blinked. "I see. You never thought;

you reacted instinctively. Wouldn't you say?''

I suppose I had. I nodded.

''I noticed many things about your behavior I couldn't understand. You treat me quite as if I were another human being. Isn't this so?''

''Well,'' I said slowly, ''I *think* of you as a human being. Ideally, we try to think of all nonhumans as people like ourselves; as persons rather than as things. In your case I've quite succeeded; I even like you, Bunundigh.''

It was true—it still is. I like him—his dry humor, his brutally direct, straightforward manner, his detachment, his courage—hell, even his trilling!

''Ah! You *like* me! Would you call me a friend, Silvio Kenyon? You offered to lay down your life for mine —though I wouldn't have been killed, of course. A dead Trill is of no use, but a live one may be held for ransom if it is of value to someone.''

I had already learned that my heroic rescue was foolish. ''Yes,'' I said. ''I'd call you a friend—with your permission. I'd be proud to.''

''Yes,'' he said, as if to himself. ''That is the human fashion. To approach each other cautiously but not fearfully, to offer advances and accept them, finally to forge emotional ties that may actually transcend the instinct of self-preservation itself. I heard your statement of position to the Trill Association. You apologized, quite needlessly, for the violence in capturing Morgan, then offered us what I would call the friendship of the Federation. No? It seemed to me that this was the same thing on a larger scale as your attempts to win my own friendship.''

''It is—that's a very good analogy. By forging such emotional ties with all sapient species around it, the human race hopes to avert war. As I said, a place in the Federation is open to you.''

''But don't you see the fallacy of your reasoning? Friendship is an emotion totally alien to Trills. Even I who have studied it cannot comprehend it. And so is enmity. You react to me not as if I were a thing, but a person like yourself. But I am not a person like yourself. I am the only person I recognize. All others, Trill or nonTrill, are but things to me.

''I am not your friend. I do not like you, Silvio Kenyon.

''*We don't want to be your friends.* We don't want to be your enemies, either. We only want to be—'' and here he used a word usually translated as ''citizens.'' It means, literally, ''members of the community.''

But this is a *Trill* community, not a human one, or any other known kind of society. All our societies are held together by emotional bonds—friendship —loyalty—pride. But Trills cooperate solely for gain. Like wasps.

This is not to say, as I later decided, that they have no social instincts; even wasps have those. Bunundigh wouldn't have been killed save by accident after he was out of the fight, but the excuse—that he might be of use, or even valuable—is merely a rationalization of their social instinct, which I should say is by no means faint or primitive merely because we have stronger ones. And their family life must be as much emotional as rational. Or so I think, though of course I am only a cop.

''I see,'' I said slowly, stricken by

the realization. "Friendship is a burden you don't want."

"Quite. Which brings up a serious problem. Is there a place in the human Federation, Silvio Kenyon, for a race no one loves?"

God but he is smart, considering that he has no true understanding of our emotions. "Not much of one," I said soberly. "We'll keep making friendly overtures because that's our instinct, and you'll keep ignoring or repelling them because that's *your* instinct—"

"Yes." He looked bleakly into the future. "For us, so many worlds well lost. " ■

● Quite a few months ago, a reader commenting on some items we had published made the claim that man's survival cannot be achieved by the destruction of another species. My reply was that it's painfully easy to imagine situations in which human survival *would* depend on the destruction of another species, and that such a situation would pose, to put it delicately, "an interesting ethical dilemma." In the irritating tradition of *Analog* editors, I posed the question to writer Susan M. Shwartz and suggested that she try to create such a situation and explore how the people involved might cope with the dilemma. Since it *is* a painful problem, she grumbled a bit, but then she went off and wrestled with it until she came up with next month's thought-provoking cover story, "Heritage of Flight." The cover it inspired, by H. R. van Dongen, is pretty striking in its own right.

I'm writing this a little too early to say exactly what else will be in the issue, but I'm pretty sure I can promise you a novella by Joseph H. Delaney and an article by Joseph Goodavage which raises some intriguing (and important) questions about how well you need to *understand* a tool before you can *use* it.

IN TIMES TO COME

the reference library

By Tom Easton

The Tricentennial Report: Letters from America, Atlantic Richfield Co., 80 pp., free.

Manseed, J. Williamson, Ballantine, 192 pp., $10.95.

Voyage from Yesteryear, J. P. Hogan, Ballantine, 377 pp., $2.95.

Where the Evil Dwells, C. D. Simak, Ballantine, 224 pp., $11.95.

The White Plague, F. Herbert, Putnam, $14.95, 445 pp.

Eye of Cat, R. Zelazny, Timescape, $14.50, ? pp.

Clique, N. Yermakov, Berkley, $2.50, 233 pp.

Amazons II, J. A. Salmonson, ed., DAW, $2.95, 239 pp.

Alien Encounters, J. H. Finder, ed., Taplinger, $11.95, 233 pp.

Hollywood Unreel, M. H. Greenberg and C. Waugh, eds., Taplinger, $14.95, 308 pp.

Isaac Asimov, J. Fiedler and J. Mele, Ungar, $10.95 hardcover, $5.95 paper, 122 + vii pp.

Infinity and the Mind, R. Rucker, Birkhäuser, $15.95, 342 pp.

In 1976 the Atlantic Richfield Company ran a series of magazine, newspaper, and TV ads asking people to fill out questionnaires or write letters to ARCO about their visions of Tricentennial America. ARCO got some 60,000 responses, and in 1977 they published an 80-page book summarizing them, setting them in context, and analyzing the feasibilities of some of the ideas. The book was **The Tricentennial Report: Letters from America**. You can get a free copy by writing L.C. Bershon, Public Affairs, ARCO, Box 2679—T.A., Los Angeles, CA 90051. I did, once Gerald Cooper tipped me off.

The book is interesting, not least because many—if not all—of the ideas the American public thinks might bless or curse our future are old hat to SF readers, and by "old" I mean 20 or 30 years. This seems to be about the same dat-

edness as TV and movie SF, so it may simply represent the sources of the public's sense of the future. Then again, it may reflect a general shortage of foresight; maybe we SF folks *do* have a monopoly on vision.

I'm not about to give you many examples of the great American public's ideas—the book is six years old, after all—but I will show you a bit of the questionnaire results. There were thirty-five questions and almost 36,000 respondents; the results appear in the back of the book in the standard form of agree-disagree-no opinion percentages. If we interpret them as meaning that any idea with which half or more of the respondents agree will be adopted by acclamation and come to pass, then in 2076 we will have early retirement; education stressing careers, quality of life, liberal arts, and culture; less government at all levels but stronger local government; revived interest in religion; equality; universal health care; controlled labor unions; marriage and the family as we know it now; restricted individual credit; rapid communications and direct public participation in government decisions; more rural and slow-paced life; and greater individual sacrifice to protect the environment.

The stress on conservative values is not surprising. The inconsistencies are, for it is difficult to imagine anyone believing that everything in the above list can possibly be obtained simultaneously. The high-tech communications alone that the public envisions imply a fast-paced life based on information transactions and deadly to traditional values.

I suspect that the American public does not really know what it wants or, more likely, does not appreciate the implications of what it wants. The problem is familiar. When the U.S. entered World War II, it was for good and sufficient reasons, but no one guessed the war's impact on future economic patterns or, for that matter, on the later civil rights movement. A shift to career-oriented education would be a blow to the liberal arts ideal and to culture; it might also strengthen the unions' hand. Universal health care, controlled labor, and direct public participation in government decisions would enlarge government, especially at the federal level, not shrink it.

America's ideas of 2076 are varied enough that almost everyone should be able to find something satisfying in the actual future, whatever it may be, as well as something unsatisfying. We can say the same for SF, with its multiple visions of days to come. The difference is that SF, in single stories and in sequences of stories exploring similar ideas, examines implications. It addresses interactions of, say, immortality and religion, communication and government, philistinism and art.

If only more people read SF! The public's visions of the future might be clearer and less self-contradictory. They might also be more imaginative.

Jack Williamson's latest is **Manseed**. It recounts the culmination, of a sort, of a project begun when a private foundation designed, built, and launched a thousand "seed ships" to plant humanity among the stars. The ships were too small to carry people, but technology had progressed to the point where the human genetic code could be read out as pure information, stored in a computer memory, and then read out again as a string of nucleotides, as DNA, as a genome within a synthesized cell. The seed ships would grow their own colonists, equip them with memories, tools, seeds, and domestic animals, and loose

them on whatever fertile ground the seed ships found. At the same time, the ships could edit their stored genomes to pre-adapt the colonists to new environments, as well as to special roles such as defense. In fact, the ships were designed to produce "Defenders" specially equipped by "memory" and physical endowment to protect ships and colonists.

One such Defender is *Manseed*'s protagonist and narrator. He awakens in the depths of space to find his ship damaged and adrift, his memory a hodgepodge of the seed ship's designers, as recorded for training purposes (a handy gimmick for showing the reader the background). He soon realizes that he has been assembled in order to rescue his ship, for it is nearing a star. He succeeds, the ship lands on an apparently deserted world after a brief confrontation with a hostile robot satellite, and he sets out to find suitable raw materials the ship can use to make colonists. As he travels, he finds ruins. Eventually he finds an immense military base (which somehow did not show from orbit) and gains his raw materials.

The rest of the story is, in part, familiar—the first steps of a new-born colony. It is also, in part, new, for it hinges on the seed ship's damaged drift, apparently for millennia. During this time, other seed ships planted their colonies successfully, the colonies grew and matured, and people proved that the ships either could not or did not edit out certain basic human propensities.

The book is a good read, and its point—that even "altruists may have to be defended"—is worth making. But two things about it bother me. One is a nit—the seed ship is posilutely paranoid about avoiding a world with any sign of inhabitants (such as robot satellites), and it searches this world assiduously for signs of intelligence; but it somehow misses a humongous, domed base that turns out to be essential to the story. The other is larger, for I find it difficult to swallow whole the proposition that space travel and colonization will necessarily bring out the savage in our descendants. They may; Williamson is certainly not alone in his use of the idea (it does make good theater), and the papers show precious little sign that we are growing up as a species. But the personalities of the seed ships' colonists are amalgams of several people of good will and maturity. How can they retrogress as thoroughly as the book says they do? Given that they do, how can the same personalities—for the seed ships are supposedly identical, and their initial colonists likewise—be so adamant in the novel about taking a different tack? Perhaps my questions are rhetorical. Perhaps Williamson's point is that we are each one of us many, and that we *can* see the errors of our ways and reform. I can swallow that. Nevertheless, I would find the *story* more believable, and even more pointed, if the seed ships had each been programmed with different personality stocks.

Enough. My grand objection may impress you not a whit, especially since it may be rhetorical. Let's go on to another book, though one with a very similar gimmick.

It's **Voyage from Yesteryear**, by James P. Hogan, in which the U.S. and its allies, sensing war, chaos, and possible extinction ahead, modify a single Centauri star-probe to carry taped genomes and construct colonists at the far end of the trip. The story is set some decades after arrival, when the colonists have grown up to run a society based on the economics of abundance, the next step in social evolution. People do what

they like and are good at. Goods are free. The "currency" is respect for competence.

To this society comes a ship from Earth, carrying some 30,000 future Americans: products of war, collapse, and reconstruction, gung-ho on religion and colonialism. They aim to bring the colonists back into the fold and correct their doubtless aberrant thinking, born of a lack of proper advantages.

The story is one of social confrontation. It displays how well people might function if only they could escape their conditioning (as through education solely by computers) and create *de novo* a society tailored to their *present*, high-tech civilization, in which scarcity is unknown because wealth flows without limit from the liberated, educated, robot-assisted human mind. The colonists not only defeat the colonialists, but absorb them as well.

My objections? It doesn't bother me to be reminded of Ayn Rand's *Atlas Shrugged*. It does that the colonists succeed too easily. Hogan makes his colonialists stupider than they need be, perhaps displaying a contempt for certain power-tripping mentalities. They deserve contempt, I agree, but they should not be underestimated, and I suspect Hogan does that.

Objection Number 2, and a mild one, is that Hogan's stories typically contain long lectures. The spiels slow down the action even when they are as interesting as his simplification of particle physics (the two ultimate subatomic particles are dums and dees; their study is "tweedledynamics").

Voyage is a utopian story. It shows us how lovely things could be if only we . . . *Manseed* is not. It's grittier, for its focus is what prevents us from achieving a utopia. I suggest that you read both, for they play against each other to some extent, and they show the very different things two writers can do with the same initial idea.

Clifford Simak's **Where the Evil Dwells** is less jolly than his *Goblin Reservation*, though it, too, is full of goblins and is as "folksy" as ever. It is set in an alternate world where the Roman Empire never fell, apparently because the "Evil" or Faery served as a buffer zone between civilization and barbarism. We see a frontier zone somewhere in Europe, on a river which marks the border with the lands of the Evil. Life smacks of a romanticized Middle Ages, with a strong Roman Catholic church, monasteries, and feudal lords. A wandering uncle returns with word that a crystal containing the soul of a saint lies in a stronghold deep in Evil lands. Nephew, abbot, girl, and the Knurly Man (an ancestral type) set out to find the crystal. Along the way to eventual success, they solve a mystery or two about identity and display for us much of their world, one that might have been real if Faery were real and had chosen to fight back instead of fade away before the Christian onslaught.

I enjoyed the book, but not as much as other Simak stories. Perhaps the world seemed too arbitrary, unjustified. Perhaps the folksy style felt too anachronistic here. Perhaps I'm just not feeling very folksy. My wife's about to move out on me (a "trial" separation, right?), and my mood *is* fairly bleak. So don't let me put you off. I *did* enjoy it, and you can count on Simak for good, readable stories.

Frank Herbert's **The White Plague** fits my mood better. Here we have John O'Neill, an American molecular biologist visiting Ireland with his wife and five-year-old twins. He's there to do

some research, but as he waits in the bank to complete a funds transfer, he looks out the window just in time to see a car-bomb turn his family to jelly. You can guess what this does to his head, and you can sympathize with his wish to get even. Having the knowledge and skills, and genius as well, he goes home, sets up a genetic engineering lab, and devises a disease to kill women, only and all. He then releases it on those he deems responsible for his own loss: Ireland, England, and terrorist-training Libya. Unfortunately, it escapes into the world at large.

The story follows the impact of the plague, the efforts to find a cure, and O'Neill's own visit to Ireland to savor his vengeance, ending with a victory of conscience, a cure, and signs of severe social change. It's absorbing, gripping, exciting; but I have to say it seems more melodrama than drama. It should, therefore, make the best-seller lists and a hit movie.

What bothered me most, besides the unlikeliness of the disease and the slowness of science to solve the problem, was Herbert's way with the details of genetic engineering. Enough is known to let any writer who takes the time to absorb the knowledge sketch quite a realistic scenario. Herbert didn't take the time. He scrambles some details and invents unheard-of complexities. He manages to make legitimate material sound like gobbledygook.

Eye of Cat is better than Roger Zelazny's other recent novels and may be one of his best to date. The hero is William Blackhorse Singer, a Navaho who has lived past his time. He is aged well beyond our norm (though not beyond his time's), and he has seen the passing of the old ways, the coming of new. Yet he is not wholly reconciled to the change, either within him or without him.

Singer has lived his life as a hunter of alien beasts, a supplier of material to a zoo of aliens. The story begins as he is summoned from retirement to help protect an alien diplomat from an assassin who has the power to change its shape. For help, he recruits another alien from the zoo, the Cat of the title, a "beast" that is both intelligent and the last of its kind. The Cat's price for its help is that Singer give it a chance to avenge its capture. It wants Singer's life.

Together they save the diplomat. Then Cat claims its fee. When Singer does not object, it complains that he denies it the joy of vengeance and offers Singer a chance to live. If he will run, and if he can stay alive for a week, then Cat will let him go. The ensuing chase occupies much of the book.

However, the book is no mere chase story. It is far more than that, for Zelazny has woven into it a Navaho mysticism, myths and attitudes, to turn his tale into a myth of its own. His concern is the reconciliation of past and future and the foundations of destiny in myth. He handles this concern most effectively.

I recommend *Eye of Cat* highly. Don't be surprised when it cops awards.

Nicholas Yermakov is one of the more imaginative and thoughtful writers of recent years. He shows it now with **Clique**, starring Ross Cleary, ad-man supreme, a successful seller of Auras. Auras are holographic projectors that envelop their users with alternate (Beethoven, Jesus Christ, etc.) or idealized personas. Pressed to forego his independent life-style, become a "company man," and move up, Ross chucks it all and enters a crisis. He emerges with a

new philosophy that asks people to doff their Auras and "come clean," to be themselves as they really are. He does not realize that the resulting cult is merely another form of character armor until story's end, when a competitor offers a new projector that can leave the user's head unadorned, thus letting the user have the best of two philosophies.

Ross's tragedy may be that he refuses to see the likeness of the new product —and the old—to traditional clothing, but Yermakov sees it and makes the reader see it too. All such things serve to enhance image and hide certain aspects of the self—aspects that may be best hidden. They serve legitimate purposes, though they can be over-used.

Yermakov is a careful writer, and his world breathes for us. His characters seem well rounded, though they do have their flat moments. He adds nice touches, such as the wife who divorces her husband who doffs his Aura, claiming he is no longer the man she married. He's a pleasure. Don't ignore him.

Amazons II, edited by Jessica Amanda Salmonson, is an anthology of fantasies with female heroes. The contributors include F.M. Busby, Tanith Lee, Phyllis Ann Karr, Lee Killough, Jo Clayton, and George R.R. Martin. None of the stories is terribly striking, but none is awful either. All are perfectly readable. Karr's "The Robber Girl" may be the best of the lot.

Buy it if you like amazons.

Jan Howard Finder has assembled a much better anthology in **Alien Encounters**, including two potential award-winners. Lee Killough's "The Lying Ear" concerns a SETI project about to be ended for budgetary reasons; the project's computer, however, is secretly sentient, and it manufactures a discovery; its own unveiling is handled in a cute but nonobvious way. Dorothy Guin Tompkins's "Gift" is a gruesome tale of love and a blood-drinking alien changeling with a touching, again nonobvious ending. The book also includes stories by Mark McGarry, Ian Watson, Lynn Abbey, Barry B. Longyear, Jayge Carr, George Guthridge, Ron Montana, Jeff Duntemann, Craig Gardner, and David Langford. It closes with Watson's "The Ultimate One-Word First-Contact Story": " Ouch!"

Hollywood Unreel, edited by Martin Greenberg and Charles Waugh, is a theme anthology focused on the silver screen. It offers one story each for Hollywood the City, the writer, the script, the producer, the director, actors, extras, sets, props, special effects, theaters, critics, and the audience. Contributors include C.S. Forester, Gahan Wilson, Ben Hecht, Robert Bloch, Robert Sheckley, Ray Bradbury, Jack Finney, Robert Silverberg, Tom Disch, Henry Slesar, and more. The best story in the book, and arguably the best SF story of all time, say the editors, is T.L. Sherred's "E for Effort," in which a time machine solves many of the problems involved in making historical epics.

The book's well worth your attention, and it's the perfect gift for a film buff. I only wish this column could come out in time to guide your 1982 Christmas shopping; as is, you'll have to buy it now—if you can still find it—and save it for the end of 1983.

Tom Staicar once reviewed SF for *Amazing*. Lately he has been overseeing the production of a series of volumes discussing aspects of SF for Frederick Ungar Publishing Co. The first is **Isaac Asimov**, by Jean Fiedler and Jim Mele.

It's a reasonable, brief overview of the man and his work in SF, and it may be a good substitute for Asimov's own multivolume autobiography, for it repeatedly refers to that work for facts about Asimov and the ideas behind various stories.

Future volumes in the series will address Ray Bradbury, Writers and Themes, Women in SF, Frank Herbert, Ursula K. LeGuin, and Ted Sturgeon.

Rudy Rucker has been wowing readers—some, I'm sure—with his novels based on odd wrinkles of physics and math. He's a mathematician himself, on the faculty of Randolph-Macon Woman's College in Lynchburg, Virginia, and he seems to favor the mind-blowing side of math.

How mind-blowing can math be? Try Rucker's **Infinity and the Mind: The Science and Philosophy of the Infinite**. Its topic is the infinities, of which there are several. The smallest is the one we ordinarily think of, "one more than the highest you can count"; its symbol is ω, a lower-case omega. But if you can think of ω, you can think of $\omega + 1$, and so on through 2ω, 3ω, ω^2, ω^3, etc. Eventually you reach Cantor's transfinite numbers, aleph-null, aleph-one, etc., and then on to Absolute Infinity, Ω.

Rucker shows them all to us, along with their inverses, the infinitesimals. He then goes on to treat paradoxes that lead to infinite regresses. What is the name of the smallest number that cannot be named in less than one billion syllables? In a sense, didn't I just name it? Or give a Truth Machine the statement, "This machine will not say this statement is true"; if it does, it isn't; if it doesn't, it is. It is such paradoxes that led to Gödel's Incompleteness Theorems. Rucker loves them.

However, the towers of logic he and the mathematical philosophers construct on such paradoxical foundations — culminating in the identification of Ω with God—seem strangely fantastical and tenuous. The premises or axioms may be fine, the steps of logic impeccable, and the conclusions inevitable, but the non-mathematician has to ask whether he has missed the point somewhere (Rucker does admit there is controversy in the ranks). The logicians seem to be chasing will-o'-the-wisps, irrelevant fancies. They seem close kin to the antique Schoolmen who fought over how many angels could dance on the head of a pin.

The book is beautiful for the hobbyist of numbers or as a gift for a college math major. It will also do for those who like to make their heads feel funny without using drugs. (Wasn't it Greg Benford who once gave that as his reason for liking both physics and SF?) Rucker says the book should be accessible to the average person ("Most of the main text should prove digestible, if chewed"), but it's gristly and takes a lot of chewing. I don't recommend it for any reader without a modicum of mathematical sophistication. ■

● The heaven and the earth have become terribly alike since Einstein. No longer can we find a reassuring contrast to chaos in the night sky... Order is not there.

E. M. Forster

brass tacks

Dear Dr. Schmidt,

I greatly enjoyed your January and mid-September editorials on morality and "moral engineering." I am currently on leave from a graduate program in mathematical modeling for techno-economic problems, and one of my favorite classes was a philosophy department course on ethics in international relations, so you've managed to touch several of my major bases at once.

The problem I have with "Anyone should be free to do anything he wants unless it hurts someone else" as a moral code is that it refers to an empty set. Our existence hurts others by the inevitable consumption of resources; our suicide would preclude further contributions to the world and hurt those close to us in particular. Whether the rule is billed as absolute moral truth, or "merely" a good approximation worth formalizing into the social/legal code of conduct, its only reasonable interpretation is "unless it hurts someone else seriously and directly enough."

Examples: Suppose A is close to dying from thirst, and the only available source is B's private stock. Reader Orr and Ayn Rand's logic aside, it's perfectly clear to my moral intuition (and, I believe, to that of 99% of the adult population) that in the failure of all other methods of persuasion, A would be morally justified in using (not unlimited!) force against B, or in enlisting a third party for the purpose. Now suppose A is the mass of malnourished Third Worlders, while B is an American citizen who prefers to spend his money on cigarettes and home video recorders rather than donations to foreign charities. Even many of those who find B's choice immoral would consider the hurt to be indirect and small enough to make interference with his freedom (by individual "victims" or government inter-

mediaries) the greater of the evils. Yet I submit that the examples differ only in degree; thus the qualification to your original rule.

This defect is implicitly addressed by your mathematical reformulation. The original rule would have been translated as, "Intervention is justifiable only for actions whose 'consequence vector' contains some negative values," which I have argued includes all actions; instead, the idea of "seriously and directly enough" was introduced under the definition of an overall negative *total*.

However, this approach exposes your logic to another question. It is possible to assert that certain classes of actions are inherently immoral and therefore always unacceptable regardless of their consequences; e.g., initial use of force, killing (but what if you could've gotten Hitler?), or interference against actions with positive totals. But such a position (the "deontological" theory of ethics) seems inconsistent with your cost/benefit ("teleological" or "consequentialist") approach to morality. (It is, of course, the deontologists who will object to your call for moral engineering. You may get more on this subject than I did out of C. West Churchman's *The Systems Approach and its Enemies*, which discusses—in language I found abstruse — morality, politics, religion, and aesthetics, and their criticisms of rational, you-have-to-look-at-the-whole-picture analysis.) It would seem more consistent to assign interference (or its consequence of restrictions on freedom) a negative value like anything else and simply include it in the general rule, "Those actions are moral which produce the highest possible totals."

There is one more possible justification, which I alluded to above and which I think is the one you intended. Somewhat between the deontological and teleological positions, its argument is that, while it's consequences that are ultimately important, society requires (for the education of children and legal coercion of those with stunted moral sensibilities) simple rules identifying actions whose results are *generally* good or *generally* bad. Of course, any such approximations, regardless of their legal status, will at times be morally incorrect. In this particular case, the closeness of the approximation is not self-evident, since the boundary point of zero (presumably the status quo) seems morally arbitrary. How about, "Intervention is justifiable only when the contemplated action is sub-optimal by an amount exceeding X"? Note that this does not require the intervenor to know the optimal value, but he must know *some* alternative which would result in an improvement larger than the "handbook" cost of (that type of) interference. The requirement of a better alternative seems reasonable to me; your present formulation allows for interference whenever the contemplated action has a negative total, even if it's the best available in the situation.

Moving away from the question of interference, I'd like to propose for discussion a moral code which refines the definition of a positive total. (After all, stating that morality requires us to strive for positive totals and avoid negative ones is largely a tautology—though useful in reminding us that the more common "right" and "wrong" or "good" and "evil" are not solely determined by the first-order effects of our actions.) Namely, "Those actions are moral which maximize the availability of meaningful choices." This is certainly not an operational yardstick—intrapersonal comparisons of "meaningfulness" are hard enough, let alone those interpersonal or intertemporal!—but it does seem to pro-

vide a unifying framework for understanding moral issues. For example, consider the case posed by "Infant Doe"—does there come a point where the choices a severely deformed child will ever be able to make are limited enough so that they are not worth the cost in restricted lives of the parents? It also, to me at least, provides a sensible justification for treating humans differently from "lower" life forms: animals genetically capable of only a limited range of behavior should count less in adding up costs and benefits.

Finally, concerning your call for moral cost/benefit models, it is important to remember the limitations of models, which are *simplifications of reality*. Models are very good tools for expanding human ability to do consistent calculations within their simplified worlds. They are even pretty good at reminding users of certain assumptions that were used in their construction and may need to be modified for different circumstances. They are *not* very good at pointing out domains of reality that lie completely outside their paradigms. For example, in using an economic model of some world market, you would probably remember to recalibrate the demand elasticity when you used it on a different product, and you might even think to modify it to include the demands and supplies of close substitutes, if that were relevant. But nothing about the model is likely to remind you that political considerations might be important—and what if the product you were now looking at was oil? Thus the usefulness of moral models hinges on whether the difficulty we have in making moral judgements is more one of quantifying the importance of a known set of interacting factors, or of identifying the relevant factors. I think the latter problem must be solved first if moral quantitative models are not to lead to large "blind spots" in our ethics.

Thanks again for two stimulating essays. As I'm currently trying to decide whether my decreasing budget of SF-reading time can accommodate an *Analog* subscription renewal, you've helped your case a great deal.

PERRY BEIDER

3514 30th St., NW
Washington DC 20008

Dear Dr. Schmidt,

I have been an *Analog* subscriber for many years. I do not normally write letters to the editor, but in your case I think it might be worth the effort.

Since you became editor, the philosophical tone of the magazine has increased markedly. In fact, your recent editorials have become a regular philosophical debate with your readers which I have very much enjoyed reading. Your efforts to bring reason to morality have been quite refreshing.

I have decided to write you this letter to make two points. My first one is that you appear to have recognized the crucial importance of philosophy in the affairs of men (i.e., you take ideas seriously). The "moral postulate" you asserted was obviously the result of a great deal of thought. You made the observation that, if as much effort was put into philosophy as has gone into science, some progress might be made. The fact of the matter is that, as man's oldest intellectual discipline, a staggering amount of effort has been put into it. The premise implicit in your argument is that today's intellectuals WANT philosophical progress. Yet, as should be readily apparent to anyone who has tried to read the obfuscating verbiage that most of them put out or tried to hold a rational discussion in a college philosophy class, the type of rational prog-

ress you mean is NOT what they want. They are not doing their job. What could motivate them to a default of such magnitude?

My other point is simply to recommend a book. I sincerely hope you take a few hours and read it. If you are as rational a man as you seem, you will find it the most important book you ever read. You should be pleased; a substantial portion of the work you suggested has already been done. In fact, the political system is based on your "moral postulate."

The book is called *The Ominous Parallels*. The author is Leonard Peikoff and it is published by Stein and Day/Publishers, Scarborough House, Briarcliff Manor, N.Y. 10510, copyright 1982.

GREGORY J. CZORA
Hamburg NY

Thanks for the suggestion; I'll look into it, and others may want to, too.

Dear Dr. Schmidt:

While I agreed with your editorial of January 1982, that of Mid-September made me rethink that approval and realize that the first had left much unsaid. Specifically, it was entirely one-sided in its view that ethics could be based simply on "Don't Hurt Anyone." The new one, "Moral Engineering," rang a lot of old bells in my mind—and, since you ask, I'll give you a piece of it.

Your reference to *The Ethical Equations* of 1945 was quite appropriate, but it would be extremely valuable for you to go back to its source. That is the short article by George David Birkhoff, "A Mathematical Approach to Ethics," which appeared about 1930. The best way to find it is in the splendid four-volume "The World of Mathematics" edited by James R. Newman (Simon & Schuster, 1956), pages 2198–2208. However, before going into that, it would be best to quote what he cited as the source of some of his ideas—the "utilitarian calculus" of Jeremy Bentham from about 150 years before (page 1221 of the same publication):

"Nature has placed mankind under the governance of two sovereign masters—PAIN and PLEASURE. It is for them alone to point out what we ought to do, as well as to determine what we shall do. On the one hand the standard of right and wrong, on the other the chain of causes and effects, are fastened to their throne. They govern us in all we do, in all we say, in all we think: every effort we can make to throw off our subjection will serve but to demonstrate and confirm it. In words a man may pretend to abjure their empire; but, in reality, he will remain subject to it all the while. The PRINCIPLE OF UTILITY recognizes this subjection, and assumes it for the foundation of that system, the object of which is to rear the fabric of felicity by the hands of reason and of law. Systems which attempt to question it deal in sounds instead of sense, in caprice instead of reason, in darkness instead of light."

With that for a start, you will see how limited was your attempt to define morality in terms of pain (or hurt) alone. That is as bad as the definition of a gentleman as "one who never gives offense unintentionally"; clever, but incomplete. Birkhoff tried to utilize the Bentham concept, and actually produced four examples of the sorts of equations that could solve ethical problems. Unfortunately, in the first one he failed to take into account the rights of one participant, and the second and third are all tied up with the concept of friendship as an "intangible good." That precludes putting it into common units with the other pain-pleasure variables. How-

ever, it is not the specific examples that make Birkhoff good reading, but his courageous approach in attacking an old problem in what was then a wholly new way.

Acting on your suggestion that we deal with these matters as a design engineer would, I have programmed my computer with Birkhoff's four examples—in chemical engineering rather than automotive style. That means I reduced everything to monetary units, since energy units were not readily applicable. In one example I added the missing participant and the operating cost, while in the others it was possible to use two assumptions to replace the fuzzy concept of pleasure in friendship: A) Guilt feelings wipe out half the pleasure from ill-gotten gains, and B) Revenge by a wronged friend could wipe out all such gains.

The results were very gratifying, in that they agreed perfectly with Birkhoff's as to what the ethical decision should be, and were quantitative rather than qualitative. However, it must be realized that each program was built around a specific question; I am very far from anything that could be generalized. Furthermore, as you anticipated, there are many kinds and degrees of "hurt," and the vaguer they are, the tougher programming gets. Any insurance company can quote you the price of a lost finger, hand, arm, or even life—but what is the price of a hurt mind? Even when mental health is not impaired, we have lesser ills. As some visiting alien remarked, "Earth people spend a LOT of time nursing hurt feelings," and those are real enough to lead to horrendous court cases if the offender is rich enough to be worth suing.

The worst kinds of all are the cases in which people's "sensibilities" are offended. If I should choose to do something NASTY in my front yard, even though it injured no one, my neighbors would have a very legitimate grievance and I should be forced to stop. On the other hand, the Moral Majority (very strong here) is much pained that I can watch "R" movies on HBO after 8 PM, and would dearly love to cut my cable. Would you call them "hurt"?

ALAN BEERBOWER

San Diego CA

No, I would not. As many people have pointed out, defining "hurt" (or the variables measuring it) is the crux of the matter, and it ain't easy. Anybody can say *he's "pained" by your watching R movies; I, at least, require something a little more substantial before I'll admit the hurt is real enough to warrant his cutting your cable.*

Dear Dr. Schmidt:

Great Mid-September editorial, probably the best you've done! After three years of Social Anthropology at University (required for Archaeology—a true science and what I really wanted to study) I am thoroughly fed up with what passes for reasoning in the social "sciences." I call this the "I think therefore I know" syndrome. Lots of thinking, but little—if any— comprehension of that key axiom of the scientific method which states that all the thinking in the world will do you no good unless you have some methodology for determining whether your ideas correspond in any way to reality. That is, you must observe and experiment, and then pay attention to what your experiments and observations are telling you. The problem, I think, is the uncritical acceptance by some self-styled "liberals" of some intellectual methodologies which have not been seriously questioned since the Greeks, e.g., the Socratic method of asking questions.

(Donald's axiom: any method of thought which does not directly incorporate observation and/or experimentation is not worth the paper it's printed on.) In short, it is good to see a social science *treated* as a science.

However (there is always a "however!") much as I like some of your arguments, I think your logic has some problems. Applying the scientific method to the question of morals, how can "Hurting other beings is wrong" be your axiom? That is your preconceived conclusion. Continuing with your engineering analogy, what you've done is like taking, say, anti-gravity, the way we all would like things to be, as your axiom and attempting to derive the laws of the universe and a workable anti-gravity machine therefrom. It won't work.

What I think we must do is start with the observation that, of all the intelligent beings we know of, by far the majority are mean, cruel, and selfish (you work in New York, take a look around; or visit Sacramento). Our axiom, then, must be: "Hurting people is right." (That, after all, is the American Way: "I've the right to take more than my share of money (oil, food, cars) before anyone else, and I shall shoot anyone who tries to take it back." We might simplify this into: "Hurt others before they hurt you." We call it Capitalism.)

From our axiom we must then, through the use of experimentation and logic, derive the reasons for this state of affairs: the laws of culture. Some archaeologists are attempting to do just this with what might be called systems theories of civilization. Any culture is a *system* which must function in its environment, which in turn imposes definite and measurable constraints upon the culture, and even upon the individuals within.

Here we can see the earliest beginnings of a "science of culture" from which may someday evolve a discipline that could be called "cultural engineering."

I don't expect to see it in my lifetime.

DONALD F. ROBERTSON
Sacramento CA

You're confusing "science" and "engineering." Science attempts to understand and formulate the principles *of* how *all systems, real and artificial, function. Engineering attempts to design new systems, using additional criteria which are "normative," that is, which tell how things "should" be. Your suggested observation of existing cultures is useful for determining the principles which govern social interactions, but "Hurting other beings is wrong" is in the* normative *category. It's not a basic principle in the sense of "F = ma," but rather in the sense of, "Inefficiency is undesirable in machine design."* ■

● The medieval alchemists said there were four states of matter: Earth, Water, Air, and Fire. On the other hand, we now know that there really are four states of matter: Solid, Liquid, Gas, and Plasma. Thank God for progress!

Kelvin Throop III

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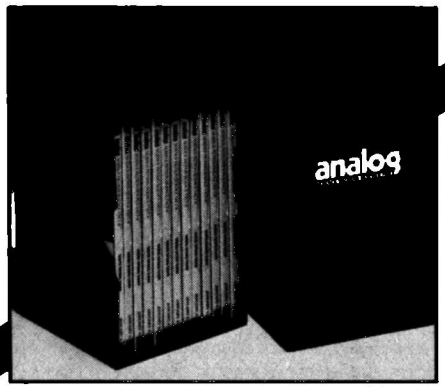

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a calendar of analog upcoming events

28 February-3 March
COMPCON SPRING '83: Intellectual Leverage for the Information Society at San Francisco, Calif. Info: Frederick W. Clegg, Hewlett-Packard, 11000 Wolfe Road, Cupertino CA 95014.

4–6 March
CONCAVE 4 (13th Upper South regional SF conference) at Park Mammoth Resort, Park City, Ky. Registration—$6.50 until 14 February 1983. Relaxacon, some films. Info: ConCave, Morgan Building, 512 East 12th Street, Bowling Green KY 42101.

11–13 March
WICHACON II (Kansas regional SF conference) at the Holiday Inn Plaza, Wichita, Kan. Guest of Honor—Wilson "Bob" Tucker; Science Fact Guest of Honor—Stan Nevins; Art Guest of Honor—Nelson Schmidt; Toastroid—Gordon Garb. Art show, hucksters, masquerade ball, Unknown Fan, Carl Sagan look-alike contest. Registration—$10. Info: Wichacon II, 211 North Oliver, Wichita KS 67208.

18–20 March
LUNACON '83 (New York City-area SF conference) at the Sheraton Heights Hotel, Hasbrouck Heights, N.J. Guest of Honor—Anne McCaffrey; Artist Guest of Honor—Barbi Johnson; Fan Guests of Honor—Don and Elsie Wollheim. Registration—$14 until 1 March 1983, $17 at the door. Info: Lunacon '83, P.O. Box 149, Brooklyn NY 11204.

21–25 March
General meeting of the American Physical Society at Los Angeles, Calif. Info: A.P.S., 335 East 45th Street, New York, NY 10017.

27–30 May
THE SOL III CONVENTION (UK Star Trek convention) at the Grand Hotel, Birmingham, England. Guests—James Doohan, Walter Koenig, Anne McCaffrey, Bob Shaw. Speakers, films, videos, fancy dress & drama comps, dealers, art, etc. Info: SOL III Committee, 39 Dersingham Avenue, Manor Park, London E12, England. (Use airmail.)

1–5 September
CONSTELLATION (41st World Science Fiction Convention) at Baltimore Convention Center, Baltimore, Md. Guest of Honor—John Brunner; Fan Guest of Honor—Dave Kyle; TM—Jack Chalker. Registration—$10 supporting at all times. Attending—$30 until 31 December 1982, more thereafter. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: ConStellation, 41st World Science Fiction Convention, Box 1046, Baltimore MD 21230.

—ANTHONY LEWIS

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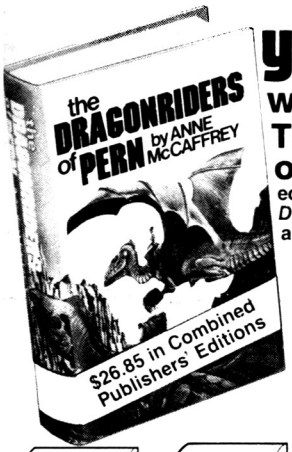

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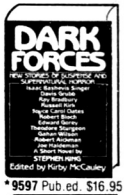

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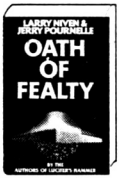

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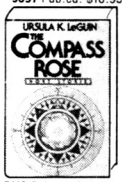

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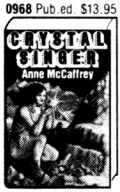

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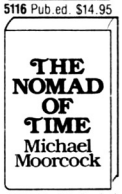

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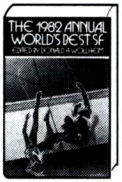

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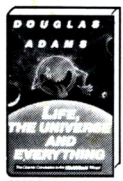

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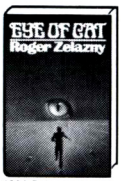

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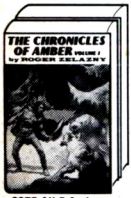

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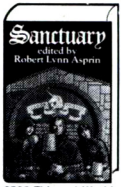

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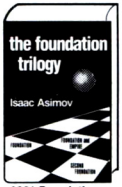

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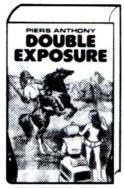

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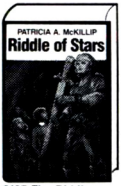

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