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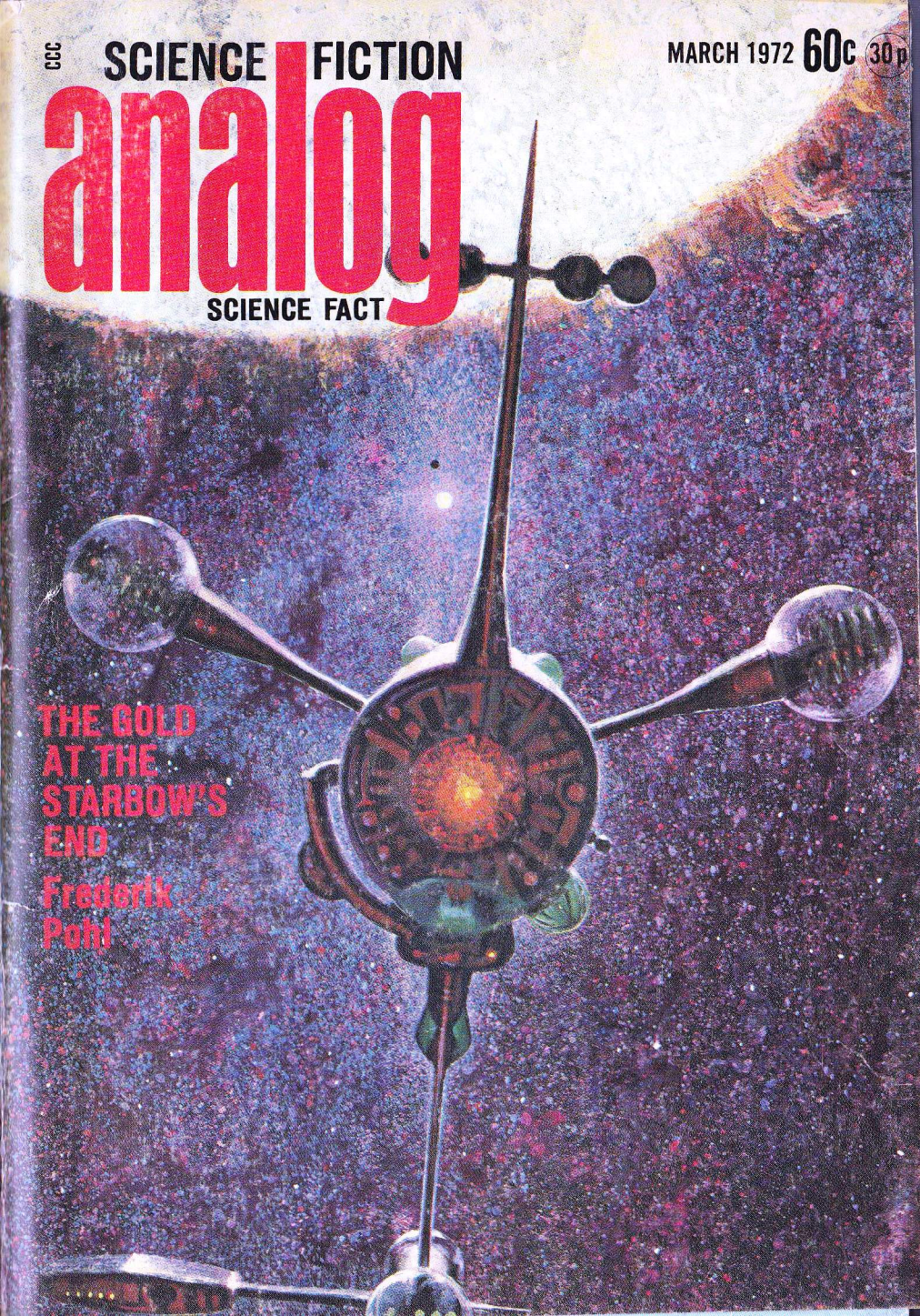
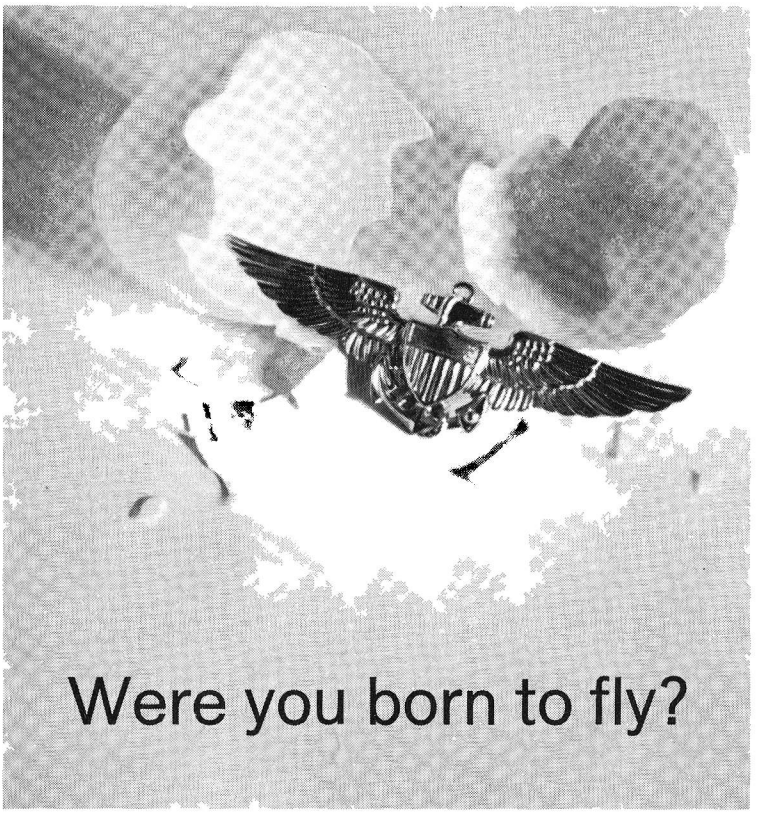


THE GOLD AT THE STARBOW'S END

Frederik Pohl



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NOVELETTES

SHORT STORIES

SCIENCE FACT

READER'S DEPARTMENTS

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The kid wore a classic black leather jacket and the kind of sneer that spells instant trouble. He was too short to swagger, but he tried anyway. On the back of his jacket, silver studs spelled out: BORN TO LOSE.

He sure was.

Memories of that kid come flooding back while the television news shows the bodies being hauled out of Attica State Prison. Maybe that particular kid was one of them. The tragedy of our prison system is that we—all of us—are losers: Prisoners, guards, government officials, families, taxpayers. Born to lose.

The prison system today is a classic example of saying one thing while meaning another. For example, we all know that prisons are meant for criminals. When a man or woman breaks the law, he or she is apprehended by the police, tried by a jury of peers, and sentenced to a prison term when found guilty.

Oh yeah? Most of the real criminals in the country have seldom, if ever, seen the inside of a jail. These are the professionals, the people who make illegal activities their life's work.

Professional men are marked by certain standards, no matter what the profession. They strive for a high degree of quality in their work, and they frown on shoddy, sloppy performances. They don't tolerate freelancers gladly, and do their best to get rid of them. (Medical doctors frown on chiropractors; scientists loath directives from politicians.) Professional people also band together in professional organizations, which serve to further the aims of their chosen field of endeavor. The American Medical Association, the Institute of Electrical and Electronics Engineers, and the Mafia are three examples of such organizations.

Although its principles of organization and qualifications for membership are somewhat different from most professional organizations, the Mafia qualifies in most regards to be ranked with the AMA, IEEE, and similar professional groups. The Mafia has been running continuously in this country for most of this century, although it has changed its name from time to time—once it was called the Syndicate, today some call it the Cosa Nostra—and it has had abrupt changes in leadership. But over the years, despite its internal problems, the Mafia has been

able to nurture, protect, enhance and even glamorize the work of the professional criminal. Top entertainers owe their careers to the organization. Magazines owe their distribution to it. Most of the goods that are bought and sold in this country have a tithe of their retail price sluiced off to the organization. Motion picture stars leap at the chance to portray professional killers. Captains of industry and leaders of labor unions both must reckon with the organization in just about everything they do.

Professional criminals seldom go to jail. They steal, they sell narcotics, they run brothels, they murder. They also bribe, extort, torture and kill anyone who might threaten their empire. But the prison system has relatively little to do with professional criminals. It's the amateurs, the free-lancers, the ignorant ones who find themselves in jail.

So—point number one about the prison system: it isn't for professional criminals.

There are "chronic offenders," men who have spent most of their lives behind bars. When they finish a sentence or get paroled, they quickly stumble into another felony and get shipped back to prison. Psychiatrists have often pointed out that these are men who are crying out for help—a kind of help that society as yet doesn't know how to give.

When a baby very deliberately knocks over a glass of milk, right before his mother's eyes, it's not because he's a hopelessly rotten human being. He's trying to get his mother's attention, trying to show her something that he can't express in words. A fifty-year-old man who gets caught knocking over a gas station two weeks after being released from the state penitentiary is trying to tell us something, too.

Many of the chronic offenders who have spent most of their lives in jail simply can't cope with the outside world. Freed from prison, they quickly get caught at something petty or outright stupid, and end up behind bars again—where they have been since childhood.

an editorial by Ben Bova

born to lose

Point number two about the prison system: many of the inmates are mentally ill.

Sex offenders are another large class of prison inmates that can also be considered mentally ill. Our prison system puts them into a situation where they usually get worse, not better.

Point number three about the prison system is very simple, but not very often understood: most prisoners want to get OUT. Even the many-time-loser who will get himself thrown back in jail as soon as he's freed, usually wants—consciously—to get out of jail just as fervently as anyone else.

Now, the average citizen spends a measurable amount of his time talking about freedom. Our nation was established on the basic concept of individual freedom. We have fought wars to maintain not only our own freedom, but the freedom of other people, other nations. We applauded the bravery of the Hungarian Freedom Fighters in 1956, we plunk down hard cash to watch movies about Prisoners of War trying to tunnel past the barbed wire.

A man in jail wants to be free. Yet we are usually shocked when prison inmates put up a battle to obtain freedom. They're not supposed to do that! Why are we surprised? Do we think that, because a man was legally tried and convicted, he's going to *enjoy* living in jail? He's going to forget about being free? For many convicts, *only* the thought of escaping, or somehow being freed, keeps them going from day to day.

All prisoners dream of being free. All prisoners inevitably come to regard their jailers as inhuman swine, whether the jailers are Nazi SS, Russian labor camp guards, or the correctional officers of a prison like Attica.

Inevitably, the prisoners and jailers are cast into the roles of enemies. The prisoners want to get loose; the jailers must keep them in prison. In the Siberian labor camps, the jailers themselves had to replace any man who escaped—even though the escapee almost invariably died in the wilderness.

The prisoners of any jail far outnumber the jailers. So the jailers must be armed. But more important than any guns or clubs they can carry, the jailers' most important weapon is intimidation. Some call it respect, some call it fear. What it amounts to is the ability of one man to loom dominant over another. Many others.

The best jailers, like the best top sergeants and the best football coaches, can dominate a group of men with hardly a lift of an eyebrow. Lesser men, cast in the role of jailers, must use force—or the constant threat of force. Add to this the fact that the role of jailer is a natural one for someone with unconscious sadistic tendencies, and you have trouble brewing.

Add to *that* the racial tensions that

are racking this nation, and the trouble erupts. In Attica. In the Tombs. In San Quentin and elsewhere.

Point number four about our prison system: it depends on the ability of a small number of armed men to control the behavior of a large number of—relatively—unarmed men. This is a breeding ground for hatred and violence, first class.

On the other side of the coin, the prisoners and their jailers *do* work cooperatively in some areas. There is a flourishing narcotics trade in most large jails, for example. Strictly illegal, it works to the supposed benefit of both the prisoners and the jailers, so there is cooperation. The jailers allow the junk into the prison, get paid for this kindness, and the prisoners receive all the gloried benefits of pot, hash, smack and what-have-you usually admixtured with sawdust, tobacco, backyard dirt and tons of microbes, courtesy of the friendly regional pusher.

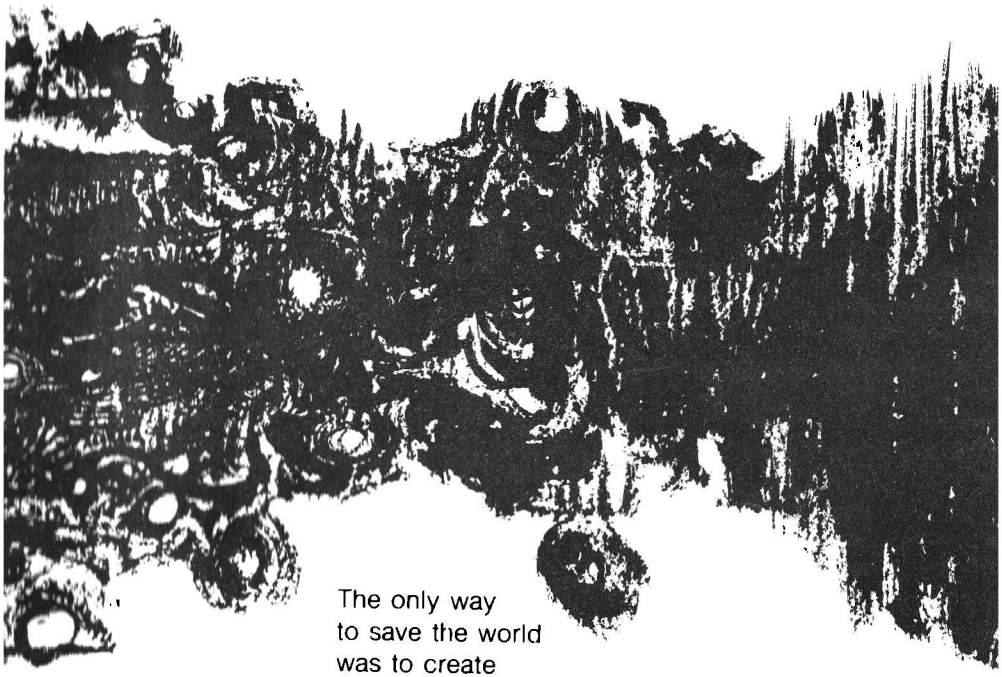
There are other areas of activity where the prisoners and jailers work cooperatively. These usually involve improving the jailers' financial well-being and the prisoners' physical comforts. This underground system of cooperation, all in violation of state laws and prison regulations, goes on regardless of incidental one-on-one bursts of violence. Escape attempts, beatings, suicides—these rarely interrupt the exchange of contraband goods for money or other considerations.

Point number five about the prison system: the laws and regulations on the books don't run the prisons, people do; and people can be bribed, as well as threatened.

What can science and technology do to help fix this mess? An enormous amount—or practically nothing. It depends hugely on the political decisions made by our elected officials. Which, in turn, means it depends on the good old reliable tax-paying voter, who has shown a marked tendency to believe all the myths and avoid all the realities of the prison system.

continued on page 176

JOHN SCHOENHERR



The only way
to save the world
was to create
a group of supermen.
But supermen see things
very differently
from mortals.

FREDERIK POHL

the gold at the starbow's end

CONSTITUTION ONE

Log of Lt. Col. Sheffield N. Jackman, USAF, commanding U.S. Starship *Constitution,* Day 40.

All's well, friends. Thanks to Mission Control for the batch of personal messages. We enjoyed the concert you beamed us, in fact we recorded most of it so we can play it over again when communication gets hairy.

We are now approaching the six-week point in our expedition to Alpha Centauri, Planet Aleph, and now that we've passed the farthest previous manned distance from Earth we're really beginning to feel as if we're on our way. Our latest navigation check confirms Mission Control's plot, and we estimate we should be crossing the orbit of Pluto at approximately 1631 hours, ship time, of Day 40, which is today. Letski has been keeping track of the time dilation effect, which is beginning to be significant now that we are traveling about some six percent of the speed of light, and says this would make it approximately a quarter of two in the morning your time, Mission Control. We voted to consider that the "coastal waters" mark. From then on we will have left the solar system behind and thus will be the first human beings to enter upon the deeps of interstellar space. We plan to have a ceremony. Letski and Ann Becklund have made up an American flag for jettisoning at that point, which we will do through the Number Three survey port, along with the prepared stainless-steel plaque containing the President's commissioning speech. We are also throwing in some private articles for each of us. I am contributing my Air Academy class ring.

Little change since previous reports. We are settling down nicely to our routine. We finished up all our post-launch checks weeks ago, and as Dr. Knefhausen predicted we began to find time hanging heavy on our hands. There won't be much to keep us busy between now and when we arrive at the planet Alpha-Aleph that is really essential to the operating of the spaceship. So we went along with Kneffie's proposed recreational schedule, using the worksheets prepared by the NASA Division of Flight Training and Personnel Management. At first—I think the boys back in Indianapolis are big enough to know this—it met with what you might call a cool reception. The general consensus was that this business of learning number theory and the calculus of statement, which is what they handed us for openers, was for the birds. We figured we weren't quite desperate enough for that yet, so we fooled around with other things. Ann and Will Becklund played a lot of chess. Dot Letski began writing a verse adaptation of "War and Peace." The rest of us hacked around with the equipment, and making astronomical observations and gabbing. But all that began to get tiresome pretty fast, just as Kneffie said it would at the briefings.

We talked about his idea that the best way to pass time in a spaceship was learning to get interested in mathematical problems—no mass to transport, no competititve element to get tempers up and all that. It began to make sense. So now Letski is in his tenth day of trying to find a formula for primes, and my own dear Flo is trying to prove Goldbach's Conjecture by means of the theory of congruences. (This is the girl who two months ago couldn't add up a laundry list!) It certainly passes the time.

Medically, we are all fit. I will append the detailed data on our blood pressures, pulses, et cetera, as well as the tape from the rocket and navigating systems readouts. I'll report again as scheduled. Take care of Earth for us we're looking forward to seeing it again, in a few years!

WASHINGTON ONE

There was a lull in the urban guerrilla war in Washington that week. The chopper was able to float right in to the South Lawn of the White House no sniper fire, no heat-seeking missiles, not even rock-throwing. Dr Dieter von Knefhausen stared suspiciously at the knot of weary-looking pickets in their permitted fifty yards of space along the perimeter. They didn't look militant, probably Gay Lib or, who knew what, maybe nature-food or single-tax; at any rate no rocks came from them, only a little disorganized booing as the helicopter landed. Knefhausen bowed to *Herr Omnes* sardonically, hopped nimbly out of the chopper and got out of the way as it took off again, which it did at once. He didn't trouble to run to the White House. He strolled. He did not fear these simple people, even if the helicopter pilot did. Also he was not really eager to keep his appointment with the President.

The ADC who frisked him did not smile. The orderly who conducted him to the West Terrace did not salute. No one relieved him of the dispatch case with his slides and papers, although it was heavy. You could tell right away when you were in the doghouse, he thought, ducking his head from the rotor blast as the pilot circled the White House to gain altitude before venturing back across the spread-out city.

It had been a lot different in the old days, he thought with some nostalgia. He could remember every minute of those old days. It was right here, this portico, where he had stood before the world's press and photographers to tell them about the Alpha-Aleph Project. He had seen his picture next to the President's on all the front pages, watched himself on the TV newscasts, talking about the New Earth that would give America an entire colonizable planet four light-years away. He remembered the launch at the Cape, with a million and a half invited guests from all over the world, foreign statesmen and scientists eating their hearts out with envy, American lead-

ers jovial with pride. The orderlies saluted then, all right. His lecture fees had gone clear out of sight. There was even talk of making him the Vice Presidential candidate in the next election—and it could have happened, too, if the election had been right then, and if there hadn't been the problem of his being born in another country.

Now it was all different. He was taken up in the service elevator. It wasn't so much that Knefhausen minded for his own sake, he told himself, but how did the word get out that there was trouble? Was it only the newspaper stories? Was there a leak?

The Marine orderly knocked once on the big door of the Cabinet room, and it was opened from inside.

Knefhausen entered.

"Come in, Dieter, boy, pull up a pew." No Vice President jumping up to grab his arm and slap his back. His greeting was thirty silent faces turned toward him, some reserved, some frankly hostile. The full Cabinet was there, along with half a dozen department heads and the President's personal action staff, and the most hostile face around the big oval table was the President's own.

Knefhausen bowed. An atavistic hankering for lyceum-cadet jokes made him think of clicking his heels and adjusting a monocle, but he didn't have a monocle and didn't yield to impulses like that. He merely took his place standing at the foot of the table and, when the President nodded, said, "Good morning, gentlemen, and ladies. I assume you want to see me about the stupid lies the Russians are spreading about the Alpha-Aleph program."

"*Roobarooba,*" they muttered to each other.

The President said in his sharp tenor, "So you think they are just lies?"

"Lies or mistakes, Mr. President, what's the difference? We are right and they are wrong, that's all."

"*Roobaroobarooba.*"

The Secretary of State looked inquiringly at the President, got a nod and said: "Dr. Knefhausen, you know I've been on your team a long time and I don't want to disagree with any statement you care to make, but are you so sure about that? There are some mighty persuasive figures comin' out of the Russians."

"They are false, Mr. Secretary."

"Ah, well, Dr. Knefhausen. I might be inclined to take your word for it, but others might not. Not cranks or malcontents, Dr. Knefhausen, but good, decent people. Do you have any evidence for them?"

"With your permission, Mr. President?" The President nodded again. Knefhausen unlocked his dispatch case and drew out a slim sheaf of slides. He handed them to a major of Marines, who looked to the President for approval and then did what Knefhausen told him. The room lights went down and, after some

fiddling with the focus, the first slide was projected over Knefhausen's head. It showed a huge array of Y-shaped metal posts, stretching away into the distance of a bleak, powdery looking landscape.

"This picture is our radio telescope on Farside, the Moon," he said. "It is never visible from the Earth, because that portion of the Moon's surface is permanently turned away from us, for which reason we selected it for the site of the telescope. There is no electrical interference of any kind. The instrument is made up of thirty-three million separate dipole elements, aligned with an accuracy of one part in several million. Its actual size is an approximate circle eighteen miles across, but by virtue of the careful positioning its performance is effectively equal to a telescope with a diameter of some twenty-six miles. Next slide, please."

Click. The picture of the huge RT display swept away and was replaced by another similar—but visibly smaller and shabbier—construction.

"This is the Russian instrument, gentlemen. And ladies. It is approximately one-quarter the size of ours in diameter. It has less than one tenth as many elements, and our reports they are classified, but I am informed this gathering is cleared to receive this material? Yes—our reports indicate the alignment is very crude. Even terrible, you could say.

"The difference between the two instruments in information-gathering capacity is roughly a hundred to one, in our favor. Lights, please.

"What this means," he went on smoothly, smiling at each of the persons around the table in turn as he spoke, "is that if the Russians say 'no' and we say 'yes,' bet on 'yes.' Our radio telescope can be trusted. Theirs cannot."

The meeting shifted uneasily in its chairs. They were as anxious to believe Knefhausen as he was to convince them, but they were not sure.

Representative Belden, the Chairman of the House Ways and Means Committee, spoke for all of them. "Nobody doubts the quality of your equipment. Especially," he added, "since we still have bruises from the job of paying for it. But the Russians made a flat statement. They said that Alpha Centauri can't have a planet larger than one thousand miles in diameter, or nearer than half a billion miles to the star. I have a copy of the Tass release here. It admits that their equipment is inferior to our own, but they have a statement signed by twenty-two academicians that says their equipment could not miss on any object larger, or nearer, than what I have said, or on any body of any kind which would be large enough to afford a landing place for our astronauts. Are you familiar with this statement?"

"Yes, of course, I have read it—"

"Then you know that they state positively that the planet you call 'Alpha-Aleph' does not exist."

"Yes, sir, that is what they state."

"Moreover, statements from authorities at the Paris Observatory and the UNESCO Astrophysical Center at Trieste, and from England's Astronomer Royal, all say that they have checked and confirmed their figures."

Knefhaußen nodded cheerfully. "That is correct, Representative Belden. They confirm that if the observations are as stated, then the conclusions drawn by the Soviet installation at Novy Brezhnevgrad on Farside naturally follow. I don't question the arithmetic. I only say that the observations are made with inadequate equipment, and thus the Soviet astronomers have come to a false conclusion. But I do not want to burden your patience with an unsupported statement," he added hastily as the Congressman opened his mouth to speak again, "so I will tell you all there is to tell. What the Russians say is theory. What I have to counter is not merely better theory, but also objective fact. I know Alpha-Aleph is there because I have seen it! Lights again, Major! And the next slide, if you please."

The screen lit up and showed glaring bare white with a sprinkling of black spots, like dust. A large one appeared in the exact center of the screen, with a dozen lesser ones sprinkled around it. Knefhausen picked up a flash pointer and aimed its little arrowhead of light at the central dot.

"This is a photographic negative," he said, "which is to say that it is black where the actual scene is white and vice versa. Those objects are astronomical. It was taken from our Briareus XII satellite near the orbit of Jupiter, on its way out to Neptune fourteen months ago. The central object is the star Alpha Centauri. It was photographed with a special instrument which filters out most of the light from the star itself, electronic in nature and something like the coronascope which is used for photographing prominences on our own Sun. We hoped that by this means we might be able to photograph the planet Alpha-Aleph. We were successful, as you can see." The flashpointer laid its little arrow next to the nearest small dot to the central star. "That, gentlemen, and ladies, is Alpha-Aleph. It is precisely where we predicted it from radio-telescope data."

There was another buzz from the table. In the dark it was louder than before. The Secretary of State cried sharply, "Mr. President! Can't we release this photograph?"

"We will release it immediately after this meeting," said the President.

"Roobarooba."

Then the committee chairman: "Mr. President, I'm sure if you say that's the planet we want, then it's the planet. But others outside this country may wonder, for indeed all those dots look alike to me. Just to satisfy a layman's curiosity, *how* do

you know that is Alpha-Aleph?"

"Slide Number Four, please—and keep Number Three in the carriage." The same scene, subtly different. "Note that in this picture, gentlemen, that one object, there, is in a different position. It has moved. You know that the stars show no discernible motion. It has moved because this photograph was taken eight months later, as Briareus XII was returning from the Neptune flyby, and the planet Alpha-Aleph has revolved in its orbit. This is not theory, it is evidence, and I add that the original tapes from which the photoprint was made are stored in Goldstone so there is no question that arises of foolishness."

"*Roobarooba,*" but in a higher and excited key.

Gratified, Knefhausen nailed down his point. "So, Major, if you will now return to Slide Three, yes—And if you will flip back and forth, between Three and Four, as fast as you can Thank you." The little black dot called Alpha-Aleph bounced back and forth like a tennis ball, while all the other star points remained motionless. "This is what is called the blank comparator process, you see. I point out that if what you are looking at is not a planet it is, Mr. President, the funniest star you ever saw. Also it is exactly at the distance and exactly with the orbital period we specified based on the RT data. Now, are there any more questions?"

No, sir!" "That's great, Kneffie!" "I think that wraps it up." "That'll show the Commies."

The President's voice overrode them.

"I think we can have the lights on now, Major Merton," he said. "Dr. Knefhausen, thank you. I'd appreciate it if you would remain nearby for a few minutes, so you can join Murray and myself in the study to check over the text of our announcement before we release these pictures." He nodded sober dismissal to his chief science adviser and then, reminded by the happy faces of his cabinet, remembered to smile with pleasure.

CONSTITUTION TWO

Sheffield Jackman's log. Starship *Constitution.* Day 95.

According to Letski we are now traveling at just about fifteen percent of the speed of light, almost 30,000 miles per second. The fusion thrusters are chugging away handsomely; as predicted, the explosions sequence fast enough so that we feel them only as vibration. Fuel, power and life-support curves are sticking tight to optimum. No sweat of any kind with the ship, or, actually, with anything else.

Relativistic effects have begun to show up as predicted. Jim Barstow's spectral studies show the stars in front of us are shifting to the blue end, and the Sun and other stars behind us are shifting to the red. Without the spectroscope you can't see much, though. Beta Circini looks a

little funny, maybe. As for the Sun, it's still very bright—Jim logged it as minus-six magnitude a few hours ago—and as I've never seen it in quite that way before, I can't tell whether the color looks bright or not. It certainly isn't the golden yellow I associate with type GO, but neither is Alpha Centauri ahead of us, and I don't really see a difference between them. I think the reason is simply that they are so bright that the color impressions are secondary to the brightness impressions, although the spectroscope, as I say, does show the differences. We've all taken turns at looking back. Naturally enough, I guess. We can still make out the Earth and even the Moon in the telescope, but it's chancy. Ski almost got an eyeful of the Sun at full light-gathering amplitude yesterday because the visual separation is only about twelve seconds of arc now. In a few more days they'll be too close to separate.

Let's see, what else?

We've been having a fine time with the recreational-math program. Ann has taken to binary arithmetic like a duck to water. She's involved in what I take to be some sort of statistical experimentation—we don't pry too much into what the others are doing until they're ready to talk about it—and, of all things, she demanded we produce coins to flip. Well, naturally none of us had taken any money with us! Except that it turns out two of us did. Ski had a Russian silver ruble that his mother's uncle had given him for luck, and I found an old Philadelphia transit token in my pocket. Ann rejected my transit token as too light to be reliable, but she now spends happy hours flipping the ruble, heads or tails, and writing down the results as a series of six-place binary numbers, heads for 1 and tails for 0. After about a week my curiosity got too much so I began hinting to find out what she was doing. When I ask she says things like, "By means of the easy and the simple we grasp the laws of the whole world." When I say that's nice, but what does she hope to grasp by flipping the coin, she says, "When the laws of the whole world are grasped, therein lies perfection." So, as I say, we don't press each other and I leave it there. But it passes the time.

Kneffie would be proud of himself if he could see how our recreation keeps us busy. None of us has managed to prove Fermat's Last Theorem yet or anything like that, but of course that's the whole point. If we could *solve* the problems, we'd have used them up, and then what would we do for recreation? It does exactly what it was intended to. It keeps us mentally alert on this long and intrinsically rather dull boat ride.

Personal relationships? Jes' fine, fellows, jes' fine. A lot better than any of us really hoped, back there at the personal-hygiene briefings in Mission Control. The girls take the stripey pills every day until three days before their periods, then they

take the green pills for four days, then they lay off pills for four days, then back to the stripes. There was a little embarrassed joking about it at first, but now it's strictly routine, like brushing our teeth. We men take our red pills every day—Ski christened them "stop lights"—until the girls tell us they're about to lay off—you know what I mean, each girl tells her husband then we take the Blue Devil—that's what we call the antidote—and have a hell of a time until the girls start on the stripes again. None of us thought any of this would work, you know. But it works fine. I don't even think sex until Flo kisses my ear and tells me she's getting ready to, excuse the expression, get in heat, and then like wow. Same with everybody. The aft chamber with the nice wide bunks we call Honeymoon Hotel. It belongs to whoever needs it, and never once have both bunks been used. The rest of the time we just sleep wherever is convenient, and nobody gets up tight about it.

Excuse my getting personal, but you told me you wanted to know everything, and there's not much else to tell. All systems remain optimum. We check them over now and again, but nothing has given any trouble, or even looked as though it might be thinking about giving trouble later on. And there's absolutely nothing worth looking at outside, but stars. We've all seen them about as much as we need to by now. The plasma jet thrums right along at our point-seven-five G. We don't even hear it any more.

We've got used to the recycling system. None of us really thought we'd get with the suction toilet, not to mention what happens to the contents, but it was only a little annoying the first few days. Now it's fine. The treated product goes into the algae tanks. The sludge from the algae goes into the hydroponic beds, but by then, of course, it's just greeny-brown vegetable matter. That's all handled semi-automatically anyway, of course, so our first real contact with the system comes in the kitchen.

The food we eat comes in the form of nice red tomatoes and nourishing rice pilaf and stuff like that. (We do miss animal protein a little; the frozen stores have to last a long time, so each hamburger is a special feast and we only have them once a week or so.) The water we drink comes actually out of the air, condensed by the dehumidifiers into the reserve supply, where we get it to drink. It's nicely aerated and chilled and tastes fine. Of course, the way it gets into the air in the first place is by being sweated out of our pores or transpired from the plants—which are irrigated direct from the treated product of the reclamation tanks—and we all know, when we stop to think of it, that every molecule of it has passed through all our kidneys forty times by now. But not directly. That's the point. What we drink is clear sweet dew. And if it once was something else, can't you say the same of Lake Erie?

Well, I think I've gone on long

enough. You've probably got the idea by now: We're happy in the service, and we all thank you for giving us this pleasure cruise!

WASHINGTON TWO

Waiting for his appointment with the President, Dr. Knefhausen reread the communique from the spaceship, chuckling happily to himself. "Happy in the service." "Like wow." "Kneffie would be proud of himself." Indeed Kneffie was. And proud of them, those little wonders, there! So brave. So strong.

He took as much pride in them as though they had been his own sons and daughters, all eight of them. Everybody knew the Alpha-Aleph project was Knefhausen's baby, but he tried to conceal from the world that, in his own mind, he spread his fatherhood to include the crew. They were the pick of the available world, and it was he who had put them where they were. He lifted his head, listening to the distant chanting from the perimeter fence where today's disgusting exhibition of mob violence was doing its best to harass the people who were making the world go. What great lumps they were out there, with their long hair and their dirty morals. The heavens belonged only to angels, and it was Dieter von Knefhausen who had picked the angels. It was he who had established the selection procedures—and if he had done some things that were better left unmentioned to make sure the procedures worked, what of it? It was he who had conceived and adapted the highly important recreation schedule, and above all he who had conceived the entire project and persuaded the President to make it come true. The hardware was nothing, only money. The basic scientific concepts were known; most of the components were on the shelves; it took only will to put them together. The will would not have existed if it had not been for Knefhausen, who announced the discovery of Alpha-Aleph from his radio-observatory on Farside—gave it that name, although as everyone realized he could have called it by any name he chose, even his own—and carried on the fight for the project by every means until the President bought it.

It had been a hard, bitter struggle. He reminded himself with courage that the worst was still ahead. No matter. Whatever it cost, it was done, and it was worthwhile. These reports from *Constitution* proved it. It was going exactly as planned, and—

"Excuse me, Dr. Knefhausen."

He looked up, catapulted back from almost half a light-year away.

"I said the President will see you now, Dr. Knefhausen," repeated the usher.

"Ah," said Knefhausen. "Oh, yes, to be sure. I was deep in thought."

"Yes, sir. This way, sir."

They passed a window and there was a quick glimpse of the turmoil at the gates, picket signs used like battleaxes, a thin blue cloud of tear gas, the sounds of shouting. "King Mob

is busy today," said Knefhausen absently.

"There's no danger, sir. Through here, please."

The President was in his private study, but to Knefhausen's surprise he was not alone. There was Murray Amos, his personal secretary, which one could understand; but there were three other men in the room. Knefhausen recognized them as the Secretary of State, the Speaker of the House and, of all people, the Vice President. How strange, thought Knefhausen, for what was to have been a confidential briefing for the President alone! But he rallied quickly.

"Excuse me, Mr. President," he said cheerfully, "I must have understood wrong. I thought you were ready for our little talk."

"I am ready, Knefhausen," said the President. The cares of his years in the White House rested heavily on him today, Knefhausen thought critically. He looked very old and very tired. "You will tell these gentlemen what you would have told me."

"Ah, yes, I see," said Knefhausen, trying to conceal the fact that he did not see at all. Surely the President did not mean what his words said, therefore it was necessary to try to see what was his thought. "Yes, to be sure. Here is something, Mr. President. A new report from the *Constitution!* It was received by burst transmission from the Lunar Orbiter at Goldstone just an hour ago, and has just come from the decoding room. Let me read it to you. Our brave astronauts are getting along splendidly, just as we planned. They say—"

"Don't read us that just now," said the President harshly. "We'll hear it, but first there is something else. I want you to tell this group the full story of the Alpha-Aleph project."

"The full story, Mr. President?" Knefhausen hung on gamely. "I see. You wish me to begin with the very beginning, when first we realized at the observatory that we had located a planet—"

"No, Knefhausen. Not the cover story. The truth."

"Mr. President!" cried Knefhausen in sudden agony. "I must inform you that I protest this premature disclosure of vital—"

"The truth, Knefhausen!" shouted the President. It was the first time Knefhausen had ever heard him raise his voice. "It won't go out of this room, but you must tell them everything. Tell them why it is that the Russians were right and we lied! Tell them why we sent the astronauts on a suicide mission, ordered to land on a planet that we knew all along did not exist!"

CONSTITUTION THREE

Shef Jackman's journal, Day 130.

It's been a long time, hasn't it? I'm sorry for being such a lousy correspondent. I was in the middle of a thirteen-game chess series with Eve Barstow—she was playing the Bobby Fischer games and I was playing in

the style of Reshevsky—and Eve said something that made me think of old Kneffie, and that, of course, reminded me I owed you a transmission. So here it is.

In my own defense, though, it isn't only that we've been busy with other things. It takes a lot of power for these chatty little letters. Some of us aren't so sure they're worthwhile. The farther we get the more power we need to accumulate for a transmission. Right now it's not so bad, but, well, I might as well tell you the truth, right? Kneffie made us promise that. Always tell the truth, he said, because you're part of the experiment, and we need to know what you're doing, all of it. Well, the truth in this case is that we were a little short of disposable power for a while because Jim Barstow needed quite a lot for research purposes. You will probably wonder what the research is, but we have a rule that we don't criticize, or even talk about, what anyone else is doing until they're ready, and he isn't ready yet. I take the responsibility for the whole thing, not just the power drain but the damage to the ship. I said he could go ahead with it.

We're going pretty fast now, and to the naked eye the stars fore and aft have blue-shifted and red-shifted nearly out of sight. It's funny but we haven't been able to observe Alpha-Aleph yet, even with the disk obscuring the star. Now, with the shift to the blue, we probably won't see it at all until we slow down. We can still see the Sun, but I guess what we're seeing is ultraviolet when it's home. Of course the relativistic frequency shifts mean we need extra compensating power in our transmissions, which is another reason why, all in all, I don't think I'll be writing home every Sunday between breakfast and the baseball game, the way I ought to!

But the mission's going along fine. The "personal relationships" keep on being just great. We've done a little experimental research there, too, that wasn't on the program, but it's all O.K. No problems. Worked out great. I think maybe I'll leave out some of the details, but we found some groovy ways to do things. Oh, hell, I'll give you one hint: Dot Letski says I should tell you to get the boys at Mission Control to crack open two of the stripey pills and one of the Blue Devils, mix them with a quarter-teaspoon of black pepper and about 2 cc of the conditioner fluid from the recycling system. Serve over orange sherbet, and oh, boy. After the first time we had it Flo made a crack about its being "seminal", which I thought was a private joke, but it broke everybody up. Dot figured it out for herself weeks ago. We wondered how she got so far so fast with "War and Peace" until she let us into the secret. Then we found out what it could do for you, both emotionally and intellectually: the creative over the arousing, as they say.

Ann and Jerry Letski used up their

own recreational programs early—real early. They were supposed to last the whole voyage! They swapped microfiches, on the grounds that each was interested in an aspect of causality and they wanted to see what the other side had to offer. Now Ann is deep into people like Kant and Carnap, and Ski is sore as a boil because there's no *Achillea millefolium* in the hydroponics garden. Needs the stalks for his researches, he says. He is making do with flipping his ruble to generate hexagrams; in fact we all borrow it now and then. But it's not the right way. Honestly, Mission Control, he's right. Some thought should have been given to our other needs, besides sex and number theory. We can't even use chop bones from the kitchen wastes, because there isn't any kitchen waste. I know you couldn't think of everything, but still. Anyway, we improvise as best we can, and mostly well enough.

Let's see, what else? Did I send you Jim Barstow's proof of Goldbach's Conjecture? Turned out to be very simple once he had devised his multiplex parity analysis idea. Mostly we don't fool with that sort of stuff any more, though. We got tired of number theory after we'd worked out all the fun parts, and if there is any one thing that we all work on—apart from our private interests—it is probably the calculus of statement. We don't do it systematically, only as time permits from our other activities, but we're all pretty well convinced that a universal grammar is feasible enough, and it's easy enough to see where that leads.

Flo has done more than most of us. She asked me to put in that Boole, Venn and all those old people were on the wrong track, but she thinks there might be something to Leibniz's "calculus ratiocinator" idea. There's a J. W. Swanson suggestion that she likes for multiplexing languages. (Jim took off from it to work out his parity analysis.) The idea is that you devise a double-vocabulary language. One set of meanings is conveyed, say, by phonemes, that is, the shape of the words themselves. Another set is conveyed by pitch. It's like singing a message, half of it conveyed by the words, the other half by the tune—like rock music. You get both sets of meanings at the same time. She's now working on third, fourth and nth dimensions so as to convey many kinds of meanings at once, but it's not very fruitful so far —except for using sex as one of the communications media. Most of the senses available are too limited to convey much.

By the way, we checked out all the existing "artificial languages" as best we could—put Will Becklund under hypnotic regression to recapture the Esperanto he'd learned as a kid, for instance. But they were all blind alleys. Didn't even convey as much as standard English or French.

Medical readouts follow. We're all healthy. Eve Barstow gave us a medical check to make sure. Ann and Ski

had little rough spots in a couple of molars so she filled them for the practice more than because they needed it. I don't mean practice in filling teeth; she wanted to try acupuncture instead of procaine. Worked fine.

We all have this writing-to-Daddy-and-Mommy-from-Camp-Tanglewood feeling and we'd like to send you some samples of our home handicrafts. The trouble is there's so much of it. Everybody has something he's personally pretty pleased with, like Barstow's proof of most of the classic math problems and my multi-media adaptation of *"Sur le pont d'Avignon"*. It's hard to decide what to send you with the limited power available, and we don't want to waste it with junk. So we took a vote and decided the best thing was Ann's verse retelling of "War and Peace". It runs pretty long. I hope the power holds it. I'll transmit as much of it as I can. . . .

WASHINGTON THREE

Spring was well advanced in Washington. Along the Potomac the cherry blossoms were beginning to bud, and Rock Creek Park was the pale green of new leaves. Even through the *whap, whap* of the helicopter rotor Knefhausen could hear an occasional rattle of small-arms fire from around Georgetown, and the Molotov cocktails and tear gas from the big Water Gate apartment development at the river's edge were steaming up the sky with smoke and fumes. They never stopped, thought Knefhausen irritably. What was the good of trying to save people like this?

It was distracting. He found himself dividing his attention into three parts—the scarred, greening landscape below; the escort fireships that orbited around his own chopper; and the papers on his lap. All of them annoyed him. He couldn't keep his mind on any of them. What he liked least was the report from the *Constitution.* He had had to get expert help in translating what it was all about, and he didn't like the need, and even less liked the results. What had gone wrong? They were his kids, hand picked. There had been no hint of, for instance, hippiness in any of them, at least not past the age of twenty, and only for Ann Becklund and Florence Jackman even then. How had they got into this *I Ching* foolishness, and this stupid business with the *Achillea millefolium,* better known as the common yarrow? What "experiments"? Who started the disgustingly antiscientific acupuncture thing? How dared they depart from their programmed power budget for "research purposes," and what were the purposes? Above all, what was the "damage to the ship"?

He scribbled on a pad:

With immediate effect, cut out the nonsense. I have the impression you are all acting like irresponsible children. You are letting down the ideals of our program.

Knefhausen

After running the short distance from the chopper pad to the shelter of the guarded White House entrance, he gave the slip to a page from the Message Center for immediate encoding and transmission to the *Constitution* via Goldstone, Lunar Orbiter and Farside Base. All they needed was a reminder, he persuaded himself, then they would settle down. But he was still worried as he peered into a mirror, patted his hair down, smoothed his moustache with the tip of a finger and presented himself to the President's chief secretary.

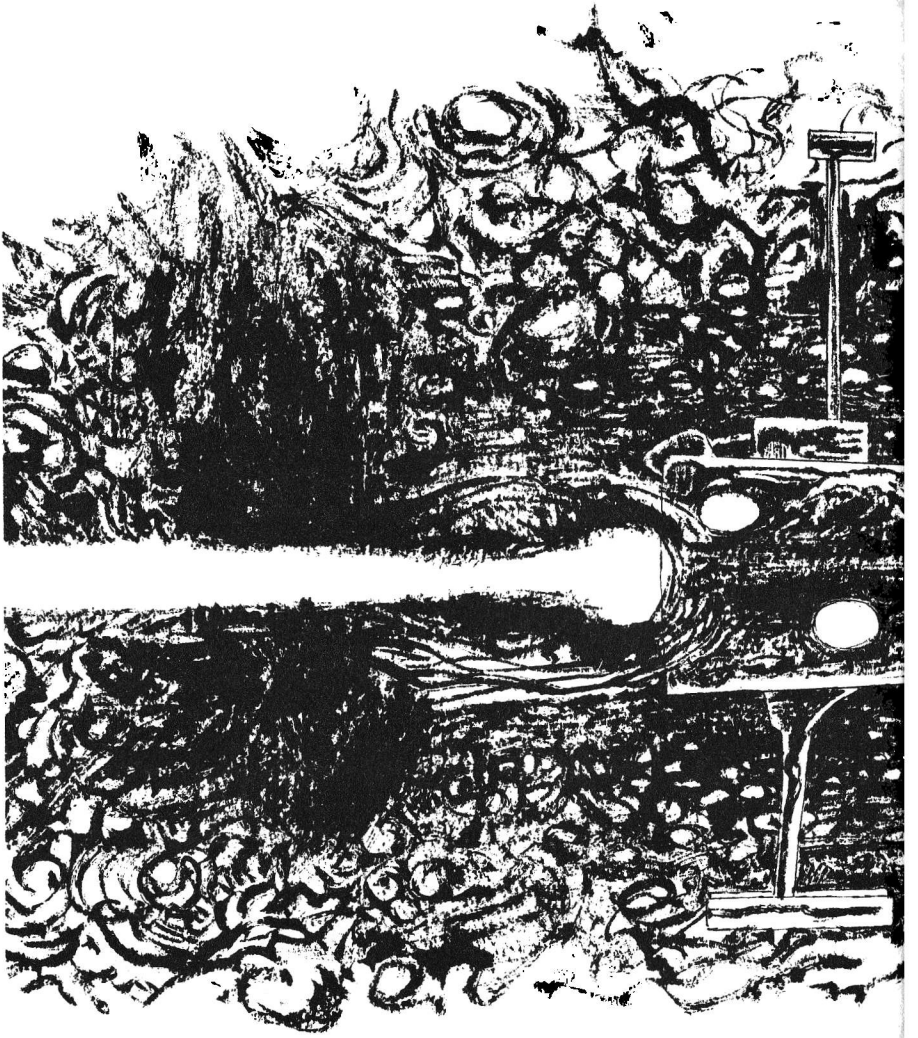
This time they went down, not up. Knefhausen was going to the basement chamber that had been successively Franklin Roosevelt's swimming pool, the White House press lounge, a TV studio for taping jolly little two-shots of the President with congressmen and senators for the folks back home to see and, now, the heavily armored bunker in which anyone trapped in the White House in the event of a successful attack from the city outside could hold out for several weeks, during which time the Fourth Armored would surely be able to retake the grounds from its bases in Maryland. It was not a comfortable room, but it was a safe one. Besides being armored against attack, it was as thoroughly soundproof, spyproof and leakproof as any chamber in the world, not excepting the Under-Kremlin, or the Colorado NORAD base.

Knefhausen was admitted and seated, while the President and a couple of others were in whispered conversation at one end of the room, and the several dozen other people present craned their necks to stare at Knefhausen.

After a moment the President raised his head. "All right," he said. He drank from a crystal goblet of water, looking wizened and weary, and disappointed at the way a boyhood dream had turned out: the presidency wasn't what it had seemed to be, from Muncie, Indiana. "We all know why we're here. The government of the United States has given out information which was untrue. It did so knowingly and wittingly, and we've been caught at it. Now we want you to know the background, and so Dr. Knefhausen is going to explain the Alpha-Aleph project. Go ahead, Knefhausen."

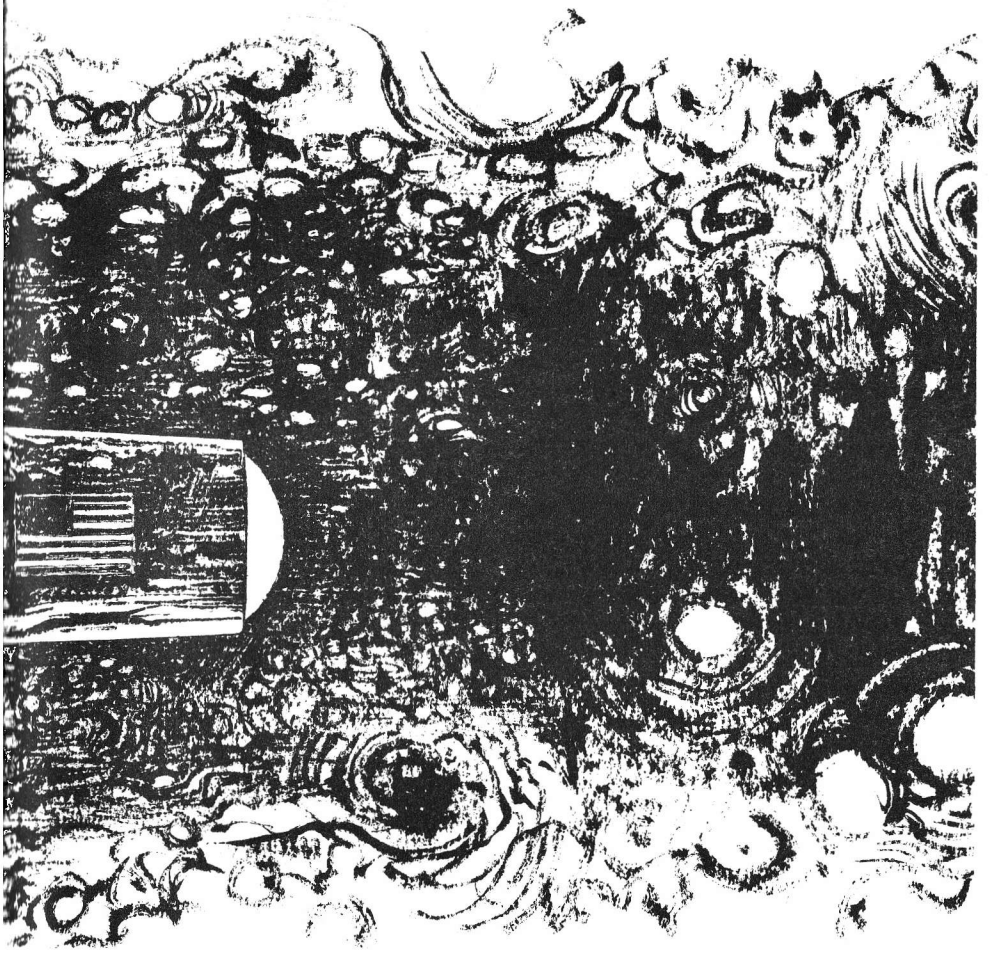
Knefhausen stood up and walked unhurryingly to the little lectern set up for him, off to one side of the President. He opened his papers on the lectern, studied them thoughtfully for a moment with his lips pursed and said:

"As the President has said, the Alpha-Aleph project is a camouflage. A few of you learned this some months ago, and then you referred to it with other words. 'Fraud.' 'Fake.' Words like that. But if I may say it in French, it is not any of those words, it is a legitimate *ruse de guerre*. Not the *guerre* against our political enemies, or even against the dumb kids in the streets with their Molotov



cocktails and bricks. I do not mean those wars, I mean the war against ignorance. For you see, there were certain signs—certain *things*—we had to know for the sake of science and progress. Alpha-Aleph was designed to find them out for us.

"I will tell you the worst parts first," he said. "Number one, there is no such planet as Alpha-Aleph. The Russians were right. Number two, we knew this all along. Even the photographs we produced were fakes, and in the long run the rest of



the world will find this out and they will know of our *ruse de guerre.* I can only hope that they will not find out too soon, for if we are lucky and keep the secret for a while, then I hope we will be able to produce good results to justify what we have done. Number three, when the *Constitution* reaches Alpha Centauri there will be no place for them to land, no way to leave their spacecraft, no sources of raw materials which they might be able to use to make fuel to return—nothing but the

star and empty space. This fact has certain consequences.

The *Constitution* was designed with enough hydrogen fuel capacity for a one-way flight, plus maneuvering reserve. There will not be enough for them to come back, and the source they had hoped to tap, namely the planet Alpha-Aleph does not exist, so they will not come back. Consequently they will die there. Those are the bad things to which I must admit."

There was a sighing murmur from the audience. The President was frowning absently to himself. Knefhausen waited patiently for the medicine to be swallowed, then went on.

"You ask, then, why have we done this thing? Condemning eight young people to their death? The answer is simple: Knowledge. To put it in other words, we must have the basic scientific knowledge to protect the free world. You are all familiar, I si . . . I believe, with the known fact that basic scientific advances have been very few these past ten years and more. Much R&D. Much technology. Much applications. But in the years since Einstein, or better since Weizsäcker, very little basic.

"But without the new basic knowledge, the new technology must soon stop developing. It will run out of steam, you see.

"Now I must tell you a story. It is a true scientific story, not a joke; I know you do not want jokes from me at this time. There was a man named de Bono, a Maltese, who wished to investigate the process of creative thinking. There is not very much known about this process, but he had an idea how he could find something out. So he prepared for an experiment a room that was stripped of all furniture, with two doors, one across from the other. You go in one door, cross the room and then you walk out the other. He put at the door that was the entrance some material—two flat boards, some ropes. And he got as his subjects some young children. Now he said to the children: 'This is a game we will play. You must go through this room and out the other door, that is all. If you do that, you win. But there is one rule. You must not touch the floor with your feet, or your knees, or with any part of your body, or your clothing. We had here a boy,' he said, 'who was very athletic and walked across on his hands, but he was disqualified. You must not do that. Now go, and whoever does it fastest will win some chocolates.'

"So he took away all of the children but the first one and, one by one, they tried. There were ten or fifteen of them, and each of them did the same thing. Some it took longer to figure it out, some figured it out right away, but it always was the same trick: they sat down on the floor, they took the boards and the ropes, and they tied one board to each foot and they walked across the

room like on skis. The fastest one thought of the trick right away and was across in a few seconds. The slowest took many minutes. But it was the same trick for all of them, and that was the first part of the experiment.

"Now this Maltese man, de Bono, performed the second part of the experiment. It was exactly like the first, with one difference. He did not give them two boards. He gave them only one board.

"And in the second part every child worked out the same trick, too, but it was, of course, a different trick. They tied the rope to the end of the single board and then they stood on it, and jumped up, tugging the rope to pull the board forward, hopping and tugging, moving a little bit at a time, and every one of them succeeded. But in the first experiment the average time to cross was maybe forty-five seconds. And in the second experiment the average time was maybe twenty seconds. With one board they did their job faster than with two.

"Perhaps now some of you see the point. Why did not any of the children in the first group think of this faster method of going across the room? It is simple. They looked at what they were given to use for materials and, they are like all of us, they wanted to use everything. But they did not need everything. They could do better with less, in a different way."

Knefhausen paused and looked around the room, savoring the moment. He had them now, he knew. It was just as it had been with the President himself, three years before. They were beginning to see the necessity of what had been done, and the pale, upturned faces were no longer as hostile, only perplexed and a little afraid.

He went on:

"So that is what Project Alpha-Aleph is about, gentlemen and ladies. We have selected eight of the most intelligent human beings we could find, healthy, young, very adventurous. Very creative. We played on them a nasty trick, to be sure. But we gave them an opportunity no one has ever had. The opportunity to *think*. To think for *ten years*. To think about basic questions. Out there they do not have the extra board to distract them. If they want to know something they cannot run to the library and look it up, and find that somebody has said that what they were thinking could not work. They must think it out for themselves.

"So in order to make this possible we have practiced a deception on them and it will cost them their lives. All right, that is tragic, yes. But if we take their lives we give them in exchange immortality.

"How do we do this? Trickery again, gentlemen and ladies. I do not say to them, 'Here, you must discover new basic approaches to science and tell them to us.' I camouflage the purpose, so that they will

not be distracted even by that. We have told them that this is recreational, to help them pass the time. This, too, is a *ruse de guerre.* The 'recreation' is not to help them make the trip, it is the whole purpose of the trip.

"So we start them out with the basic tools of science. With numbers: That is, with magnitudes and quantification, with all that scientific observations are about. With grammar: This is not what you learned when you were thirteen years old. It is a technical term; it means with the calculus of statement and the basic rules of communication—that is so they can learn to think clearly by communicating fully and without fuzzy ambiguity. We give them very little else, only the opportunity to mix these two basic ingredients and come up with new forms of knowledge.

"What will come of these things? That is a fair question. Unfortunately there is no answer—not yet. If we knew the answer in advance, we would not have to perform the experiment. So we do not know what will be the end result of this, but already they have accomplished very much. Old questions that have puzzled the wisest of scientists for hundreds of years they have solved already. I will give you one example. You will say, yes, but what does it *mean?* I will answer, I do not know, I only know that it is so hard a question that no one else has ever been able to answer it. It is a proof of a thing which is called Goldbach's Conjecture. Only a conjecture; you could call it a guess. A guess by an eminent mathematician many, many years ago, that every even number can be written as the sum of two prime numbers. This is one of those simple problems in mathematics that everyone can understand and no one can solve. You can say, 'Certainly, sixteen is the sum of eleven and five, both of which are prime numbers, and thirty is the sum of twenty-three and seven, which also are both prime, and I can give you such numbers for any even number you care to name.' Yes, you can; but can you prove that for *every* even number it will *always* be possible to do this? No. You cannot. No one has been able to, but our friends on the *Constitution* have done it, and this was in the first few months. They have yet almost ten years. I cannot say what they will do in that time, but it is foolish to imagine that it will be anything less than very much indeed. A new relativity, a new universal gravitation—I don't know, I am only saying words. But much."

He paused again. No one was making a sound. Even the President was no longer staring straight ahead without expression, but was looking at him.

"It is not yet too late to spoil the experiment, and so it is necessary for us to keep the secret a bit longer. But there you have it, gentlemen and ladies. That is the truth about Alpha-Aleph." He dreaded what would

come next, postponed it for a second by consulting his papers, shrugged, faced them and said: "Now, are there any questions?"

Oh, yes, there were questions. *Herr Omnes* was stunned a little, took a moment to overcome the spell of the simple and beautiful truths he had heard, but first one piped up, then another, then two or three shouting at once. There were questions, to be sure. Questions beyond answering. Questions he did not have time to hear, much less answer, before the next question was on him. Questions to which he did not know the answers. Questions, worst of all, to which the answers were like pepper in the eyes, enraging, blinding the people to sense. But he had to face them, and he tried to answer them. Even when they shouted so that outside the thick double doors the Marine guards looked at each other uneasily, and wondered what made the dull rumble that penetrated the very good soundproofing of the room. "What I want to know, who put you up to this?" "Mr. Chairman, nobody; it is as I have said." "But see now, Knefhausen, do you mean to tell us you're murderin' these good people for the sake of some Goldbach's theory?" "No, Senator, not for Goldbach's Conjecture, but for what great advances in science will mean in the struggle to keep the free world free." "You're confessing you've dragged the United States into a palpable fraud?" "A legitimate ruse of war, Mr. Secretary, because there was no other way." "The photographs, Knefhausen?" "Faked, General, as I have told you. I accept full responsibility." And on and on, the words "murder" and "fraud" and even "treason" coming faster and faster.

Until at last the President stood up and raised his hand. Order was a long time coming, but at last they quieted down.

"Whether we like it or not, we're in it," he said simply. "There is nothing else to say. You have come to me, many of you, with rumors and asked for the truth. Now you have the truth, and it is classified Top Secret and must not be divulged. You all know what this means. I will only add that I personally propose to see that any breach of this security is investigated with all the resources of the government, and punished with the full penalty of the law. I declare this a matter of national emergency, and remind you that the penalty includes the death sentence when appropriate—and I say that in this case it is appropriate." He looked very much older than his years, and he moved his lips as though something tasted bad in his mouth. He allowed no further discussion, and dismissed the meeting.

Half an hour later, in his private office, it was just Knefhausen and the President.

"All right," said the President, "it's

all hit the fan. The next thing is the world will know it. I can postpone that a few weeks, maybe even months. I can't prevent it."

"I am grateful to you, Mr. President, for—"

"Shut up, Knefhausen. I don't want any speeches. There is one thing I want from you, and that is an explanation: What the hell is this about mixing up narcotics and free love and so on?"

"Ah," said Knefhausen, "you refer to the most recent communication from the *Constitution.* Yes. I have already dispatched, Mr. President, a strongly worded order. Because of the communications lag it will not be received for some months, but I assure you the matter will be corrected."

The President said bitterly, "I don't want any assurances, either. Do you watch television? I don't mean 'I Love Lucy' and ball games, I mean news. Do you know what sort of shape this country is in? The bonus marches in 1932, the race riots in 1967—they were nothing. Time was when we could call out the National Guard to put down disorder. Last week I had to call out the Army to use against three companies of the Guard. One more scandal and we're finished, Knefhausen, and this is a big one."

"The purposes are beyond reproach—"

"Your purposes may be. Mine may be, or I try to tell myself it is for the good of science I did this, and not so I will be in the history books as the president who contributed a major breakthrough. But what are the purposes of your friends on the *Constitution?* I agreed to eight martyrs, Knefhausen. I didn't agree to forty billion dollars out of the nation's pockets to give your eight young friends ten years of gangbangs and dope."

"Mr. President, I assure you this is only a temporary phase. I have instructed them to straighten out."

"And if they don't, what are you going to do about it?" The President, who never smoked, stripped a cigar, bit off the end and lit it. He said, "It's too late for me to say I shouldn't have let you talk me into this. So all I will say is you have to show results from this flimflam before the lid blows off, or I won't be President any more, and I doubt that you will be alive."

CONSTITUTION FOUR

This is Shef again and it's, oh, let me see, about Day 250. 300? No, I don't think so. Look, I'm sorry about the ship date, but I honestly don't think much in those terms any more. I've been thinking about other things. Also I'm a little upset. When I tossed the ruble the hexagram was K'an, which is danger, over Li, the Sun. That's a bad mood in which to be communicating with you. We aren't vengeful types, but the fact is that some of us were pretty sore when we found out what you'd done. I don't *think* you need to worry, but I

wish I'd got a much better hexagram.

Let me tell you the good parts first. Our velocity is pushing point four oh C now. The scenery is beginning to get interesting. For several weeks the stars fore and aft have been drifting out of sight as the ones in front get up into the ultraviolet and the ones behind sink into the infrared. You'd think that as the spectrum shifts the other parts of the EMF bands would come into the visible range. I guess they do, but stars peak in certain frequencies, and most of them seem to do it in the visible frequencies, so the effect is that they disappear. The first thing was that there was a sort of round black spot ahead of us where we couldn't see anything at all, not Alpha Centauri, not Beta Centauri, not even the bright Circini stars. Then we lost the Sun behind us, and a little later we saw the blackout spread to a growing circle of stars there. Then the circles began to widen.

Of course, we know that the stars are really there. We can detect them with phase-shift equipment, just as we can transmit and receive your messages by shifting the frequencies. But we just can't see them any more. The ones in direct line of flight, where we have a vector velocity of .34c or .37c—depending on whether they are in front of us or behind us—simply aren't radiating in the visible band any more. The ones farther out to the side have been displaced visually because of the relativistic effects of our speed. But what it looks like is that we're running the hell out of Nothing, in the direction of Nothing, and it is frankly a little scary.

Even the stars off to one side are showing relativistic color shifts. It's almost like a rainbow, one of those full-circle rainbows that you see on the clouds beneath you from an airplane sometimes. Only this circle is all around us. Nearest the black hole in front the stars have frequency-shifted to a dull reddish color. They go through orange and yellow and a sort of leaf green to the band nearest the black hole in back, which are bright blue shading to purple. Jim Barstow has been practicing his farsight on them, and he can relate them to the actual sky map. But I can't. He sees something in the black hole in front of us that I can't see. He says he thinks it's a bright radio source, probably Centaurus A, and he claims it is radiating strongly in the whole visible band now. He means strongly for him, with his eyes. I'm not sure I can see it at all. There *may* be a sort of very faint, diffuse glow there, like the *gegenschein,* but I'm not sure. Neither is anyone else.

But the starbow itself is beautiful. It's worth the trip. Flo has been learning oil painting so she can make a picture of it to send you for your wall, although when she found out what you'd been up to she got so sore she was thinking of boobytrapping it with a fusion bomb or something. (But she's over that now. I think.)

So we're not so mad at you any more, although there was a time when if I'd been communicating with you at exactly that moment I would have said some bad things.

I just played this back, and it sounds pretty jumbled and confused. I'm sorry about that. It's hard for me to do this. I don't mean hard like intellectually difficult—the way chess problems and tensor analysis used to be—but hard like shoveling sand with a teaspoon. I'm just not used to constricting my thoughts in this straitjacket any more. I tried to get one of the others to communicate this time, but there were no takers. I did get a lot of free advice. Dot says I shouldn't waste my time remembering how we used to talk. She wanted to write an eidetic account in simplified notation for you, which she estimated a crash program could translate for you in reasonable time, a decade or two, and would give you an absolutely full account of everything. I objected that that involved practical difficulties. Not in preparing the account . . . shucks, we can all do that now. I don't forget anything, except irrelevant things like the standard-reckoning day that I don't want to remember in the first place, and neither does anyone else. But the length of transmission would be too much. We don't have the power to transmit the necessary number of groups, especially since the accident. Dot said we could Gödelize it. I said you were too dumb to de-Gödelize it. She said it would be very good practice for you.

Well, she's right about that, and it's time you all learned how to communicate in a sensible way, so if the power holds out I'll include Dot's eidetic account at the end—in Gödelized form. Lots of luck. I won't honestly be surprised if you miss a digit or something and it all turns into "Rebecca of Sunnybrook Farm" or some missing books of apocrypha or, more likely of course, gibberish. Ski says it won't do you any good in any case, because Henle was right. I pass that on without comment.

Sex. You always want to hear about sex. It's great. Now that we don't have to fool with the pills any more we've been having some marvelous times. Flo and Jim Barstow began making it as part of a multiplexed communications system that you have to see to believe. Sometimes when they're going to do it we all knock off and just sit around and watch them, cracking jokes and singing and helping with the auxiliary computations. When we had that little bit of minor surgery the other day—now we've got the bones seasoning—Ann and Ski decided to ball instead of using anesthesia, and they said it was better than acupuncture. It didn't block the sensation. They were aware of their little toes being lopped off, but they didn't perceive it as pain. So then Jim, when it was his turn, tried going through the amputation without anything at all in the expectation that he and Flo would go to bed together a little later, and

that worked well too. He was all set up about it; claimed it showed a reverse causalty that his theories predicted but that had not been demonstrated before. Said at last he was over the cause-preceding-the-effect hangup. It's like the Red Queen and the White Queen, and quite puzzling until you get the hang of it. (I'm not sure I've got the hang of it yet.) Suppose he hadn't balled Flo? Would his toe have hurt retroactively? I'm a little mixed up on this, Dot says because I simply don't understand phenomenology in general, and I think I'll have to take Ann's advice and work my way through Carnap, although the linguistics are so poor that it's hard to stay with it. Come to think of it, I don't have to. It's all in the Gödelized cidetic statement, after all. So I'll transmit the statement to you, and while I'm doing it that will be a sort of review for me and maybe I'll get my head right on causality.

Listen, let me give you a tip. The statement will also include Ski's trick of containing plasma for up to 500K milliseconds, so when you figure it out you'll know how to build those fusion power reactors you were talking about when we left. That's the carrot before your nose, so get busy on de-Gödelizing. The plasma dodge works fine, although, of course, we were sorry about what happened when we junked those dumb Rube Goldberg bombs you had going off and replaced them with a nice steady plasma flow. The explosion killed Will Becklund outright, and it looked hairy for all of us.

Well, anyway. I have to cut this short because the power's running a little low and I don't want to chance messing up the statement. It follows herewith:

$1973^{354} + 331^{852} + 17^{2008} + 5^{47} + 3^{9606} + 2^{88}$ take away 78.

Lots of luck, fellows!

WASHINGTON FOUR

Knefhausen lifted his head from the litter of papers on his desk. He rubbed his eyes, sighing. He had given up smoking the same time as the President, but, like the President, he was thinking of taking it up again. It could kill you, yes. But it was a tension-reducer, and he needed that. And what was wrong with something killing you. There were worse things than being killed, he thought dismally.

Looking at it any way you could, he thought objectively, the past two or three years had been hard on him. They had started so well and had gone so bad. Not as bad as those distant memories of childhood when everybody was so poor and Berlin was so cold and what warm clothes he had came from the *Winterhilfe.* By no means as hard as the end of the war. Nothing like as bad as those first years in South America and then in the Middle East, when even the lucky and famous ones, the Von Brauns and the Ehrickes, were having trouble getting what was due them and a young calf like Knefhau-

sen had to peel potatoes and run elevators to live. But harder and worse than a man at the summit of his career had any reason to expect.

The Alpha-Aleph project, fundamentally, was sound! He ground his teeth, thinking about it. It would work no, by God, it *was* working, and it would make the world a different place. Future generations would see.

But the future generations were not here yet, and in the present things were going badly.

Reminded, he picked up the phone and buzzed his secretary. "Have you got through to the President yet?" he demanded.

"I'm sorry, Dr. Knefhausen. I've tried every ten minutes, just as you said."

"Ah," he grunted. "No, wait. Let me see. What calls are there?"

Rustle of paper. "The news services, of course, asking about the rumors again. Jack Anderson's office. The man from CBS."

"No, no. I will not talk to the press. Anyone else."

"Senator Copley called, asking when you were going to answer the list of questions his committee sent you."

"I will give him an answer. I will give him the answer Götz von Berlichingen gave to the Bishop of Bamberg."

"I'm sorry, Dr. Knefhausen, I didn't quite catch—"

"No matter. Anything else?"

"Just a long-distance call, from a Mr. Hauptmann. I have his number."

"Hauptmann?" The name was puzzlingly familiar. After a moment Knefhausen placed it: to be sure, the photo technician who had cooperated in the faked pictures from Briareus XII. Well, he had his orders to stay out of sight and shut up. "No, that's not important. None of them are, and I do not wish to be disturbed with such nonsense. Continue as you were, Mrs. Ambrose. If the President is reached you are to put me on at once, but no other calls."

He hung up and turned to his desk.

He looked sadly and fondly at the papers. He had them all out: the reports from the *Constitution*, his own drafts of interpretation and comment, and more than a hundred footnoted items compiled by his staff, to help untangle the meanings and implications of those ah, sometimes so cryptic reports from space:

"*Henle.* Apparently refers to Paul Henle (note appended); probably the citation intended is his statement, 'There are certain symbolisms in which certain things cannot be said.' Conjecture that English language is one of those symbolisms."

"*Orange sherbet sundae.* A classified experimental study was made of the material in Document Ref. No. CON-130, Para. 4. Chemical analysis and experimental testing have indicated that the recommended mixture of pharmaceuticals and other ingredients produce a hallucinogen-

related substance of considerable strength and not wholly known qualities. One hundred subjects ingested the product or a placebo in a double-blind controlled test. Subjects receiving the actual substance report reactions significantly different from the placebo. Effects reported include feelings of immense competence and deepened understanding. However, data is entirely subjective. Attempts were made to verify claims by standard I.Q., manipulative and other tests, but the subjects did not cooperate well and several have since absented themselves without leave from the testing establishment."

"*Gödelized language.* A system of encoding any message of any kind as a single very large number. The message is first written out in clear language and then encoded as bases and exponents. Each letter of the message is represented in order by the natural order of primes—that is, the first letter is represented by the base 2, the second by the base 3, the third by the base 5, then 7, 11, 13, 17, et cetera. The identity of the letter occupying that position in the message is given by the exponent: simply, the exponent 1 meaning that the letter in that position is an A, the letter 2 meaning that it is a B, 3 a C, et cetera. The message, as a whole, is then rendered as the product of all the bases and exponents. *Example.* The word "cab" can thus be represented as $2^3 \times 3^1 \times 5^2$, or 600. (=8x3x25.) The name 'Abe' would be represented by the number 56,250, or $2^1 \times 3^2 \times 5^5$. (=2x9x3125.) A sentence like 'John lives' would be represented by the product of the following terms: $2^{10} \times 3^{15} \times 5^8 \times 7^{14} \times 11^0 \times 13^{12} \times 17^9 \times 19^{22} \times 23^5 \times 29^{19} \times 31^{27}$—in which the exponent '0' has been reserved for a space and the exponent '27' has been arbitrarily assigned to indicate a full stop. As can be seen, the Gödelized form for even a short message involves a very large number, although such numbers may be transmitted quite compactly in the form of a sum of bases and exponents. The example transmitted by the *Constitution*is estimated to equal the contents of a standard unabridged dictionary."

"*Farsight.* The subject James Madison Barstow is known to have suffered from some nearsightedness in his early school years, apparently brought on by excessive reading, which he attempted to cure through eye exercises similar to the 'Bates method'—note appended. His vision at time of testing for Alpha-Aleph project was optimal. Interviews with former associates indicate his continuing interest in increasing visual acuity. *Alternate explanation.*There is some indication that he was also interested in paranormal phenomena such as clairvoyance or prevision, and it is possible, though at present deemed unlikely, that his use of the term refers to 'looking ahead' in time."

And so on, and on.

Knefhausen gazed at the litter of papers lovingly and hopelessly, and

passed his hand over his forehead. The kids! They were so marvelous . . . but so unruly . . . and so hard to understand. How unruly of them to have concealed their true accomplishments. The secret of hydrogen fusion! That alone would justify, more than justify, the entire project. But where was it? Locked in that number-jumber gibberish. Knefhausen was not without appreciation of the elegance of the method. He, too, was capable of taking seriously a device of such luminous simplicity. Once the number was written out you had only to start by dividing it by two as many times as possible, and the number of times would give you the first letter. Then divide by the next prime, three, and that number of times would give you the second letter. But the practical difficulties! You could not get even the first letter until you had the whole number, and IBM had refused even to bid on constructing a bank of computers to write that number out unless the development time was stretched to twenty-five years. *Twenty-five years.* And meanwhile in that number was hidden probably the secret of hydrogen fusion, possibly many greater secrets, most certainly the key to Knefhausen's own well being over the next few weeks. . .

His phone rang.

He grabbed it and shouted into it at once: "Yes, Mr. President!"

He had been too quick. It was only his secretary. Her voice was shaking but determined.

"It's not the President, Dr. Knefhausen, but Senator Copley is on the wire and he says it is urgent. He says—"

"No!" shouted Knefhausen and banged down the phone. He regretted it even as he was doing it. Copley was very high, chairman of the Armed Forces Committee; he was not a man Knefhausen wished to have as an enemy, and he had been very careful to make him a friend over years of patient fence-building. But he could not speak to him, or to anyone, while the President was not answering his calls. Copley's rank was high, but he was not in the direct hierarchical line over Knefhausen.When the top of that line refused to talk to him Knefnausen was cut off from the world.

He attempted to calm himself by examining the situation objectively. The pressures on the President just now: they were enormous. There was the continuing trouble in the cities, all the cities. There were the political conventions coming up. There was the need to get elected for a third term, and the need to get the law amended to make that possible. And yes, Knefhausen admitted to himself, the worst pressure of all was the rumors that were floating around about the *Constitution.* He had warned the President. It was unfortunate the President had not listened. He had said that a secret known to two people is compromised and a secret known to more than two is no secret. But the

President had insisted on the disclosure to that ever-widening circle of high officials—sworn, of course, to secrecy, but what good was that? In spite of everything, there had been leaks. Fewer than one might have feared. More than one could stand.

He touched the reports from *Constitution* caressingly. Those beautiful kids, they could still make everything right, so wonderful. . .

Because it was he who had made them wonderful, he confessed to himself. He had invented the idea. He had selected them. He had done things which he did not quite even yet reconcile himself to to make sure that it was they and not some others who were on the crew. He had, above all, made doubly sure by insuring their loyalty in every way possible. Training. Discipline. Ties of affection and friendship. More reliable ties: loading their food supplies, their entertainment tapes, their programmed activities with every sort of advertising inducement, M/R compulsion, psychological reinforcement he could invent or find, so that whatever else they did they did not fail to report faithfully back to Earth. Whatever else happened, there was that. The data might be hard to entangle, but would be there. They could not help themselves; his commandments were stronger than God's; like Martin Luther they must say *Ich kann nicht anders,* and come Pope or Inquisition they must stand by it. They would learn, and tell what they learned, and thus the investment would be repaid. . .

The telephone!

He was talking before he had it even to his mouth. "Yes, yes! This is Dr. Knefhausen, yes!" he gabbled. Surely it must be the President now—

It was not.

"Knefhausen!" shouted the man on the other end. "Now, listen, I'll tell you what I told that bitch pig girl of yours, if I don't talk to you on the phone *right now* I'll have Fourth Armored in there to arrest you and bring you to me in twenty minutes. So listen!"

Knefhausen recognized both voice and style. He drew a deep breath and forced himself to be calm. "Very well, Senator Copley," he said, "what is it?"

"The game is blown, boy! That's what it is. That boy of yours in Huntsville, what's his name, the photo technician—"

"Hauptmann?"

"That's him! Would you like to know where he is, you dumb Kraut bastard?"

"Why, I suppose . . . I should think in Huntsville—"

"Wrong, boy! Your Kraut bastard friend claimed he didn't feel good and took some accrued sick time. Intelligence kept an eye on him up to a point, didn't stop him, wanted to see what he'd do. Well, they saw. They saw him leaving Orly Airport an hour ago in an Aeroflot plane. Put your brain to work on that one, Knefhausen! He's defected. Now

start figuring out what you're going to do about it, and it better be good?"

Knefhausen said something, he did not know what, and hung up the phone, he did not remember when. He stared glassily into space for a time.

Then he flicked the switch for his secretary and said, not listening to her stammering apologies, "That long-distance call that came from Hauptmann before, Mrs. Ambrose. You didn't say where it was from."

"It was an overseas call, Dr. Knefhausen. From Paris. You didn't give me a chance to—"

"Yes, yes. I understand. Thank you. Never mind." He hung up and sat back. He felt almost relieved. If Hauptmann had gone to Russia it could only be to tell him that the picture was faked and not only was there no planet for the astronauts to land on but it was not a mistake, even, actually a total fraud. So now it was all out of his hands. History would judge him now. The die was cast. The Rubicon was crossed.

So many literary allusions, he thought deprecatingly. Actually it was not the judgment of history that was immediately important but the judgment of certain real people now alive and likely to respond badly. And they would judge him not so much by what might be or what should have been, as by what was. He shivered in the cold of that judgment, and reached for the telephone to try once more to call the President. But he was quite sure the President would not answer, then or ever again.

CONSTITUTION FIVE

Old reliable P.O.'d Shef here. Look, we got your message. I don't want to discuss it. You've got a nerve. You're in a bad mood, aren't you? If you can't say anything nice, don't say anything at all. We do the best we can, and that's not bad, and if we don't do exactly what you want us to maybe it's because we know quite a lot more than you did when you fired us off at that blob of moonshine you call Alpha-Aleph. Well, thanks a lot for nothing.

On the other hand, thanks a little for what you did do, which at least worked out to get us where we are, and I don't mean spatially. So I'm not going to yell at you. I just don't want to talk to you at all. I'll let the others talk for themselves.

Dot Letski speaking. This is important. Pass it on. I have three things to tell you that I do not want you to forget. *One: Most problems have grammatical solutions.* The problem of transporting people from Earth to another planet does not get solved by putting pieces of steel together one at a time at random, and happening to find out you've built the *Constitution* by accident. It gets solved by constructing a model—=equation (=grammar)—which describes the necessary circumstances under which the transportation occurs. Once you have the grammatical

model, you just put the metal around it and it goes like gangbusters.

When you have understood this you will be ready for: *Two: There is no such thing as causality.* What a waste of time it has been, trying to assign "causes" to "events"! You say things like, "Striking a match causes it to burn." True statement? No, false statement. You find yourself in a whole waffle about whether the "act" of "striking" is "necessary" and/or "sufficient" and you get lost in words. Pragmatically useful grammars are without tenses. In a decent grammar–which this English-language one, of course, is not, but I'll do the best I can–you can make a statement like "There exists a conjunction of forms of matter –specified–which combine with the release of energy at a certain temperature– which may be the temperature associated with heat of friction." Where's the causality? "Cause" and "effect" are in the same timeless statement. So, *Three: There are no such things as empirical laws.* Ski came to understand that he was able to contain the plasma in our jet indefinitely, not by pushing particles around in brute-force magnetic squeezes, but by encouraging them to want to stay together. There are other ways of saying what he does– = "creates an environment in which centripetal exceed centrifugal forces"–, but the way I said it is better because it tells something about your characters. Bullies, all of you. Why can't you be nice to things if you want them to be nice to you? Be sure to pass this on to T'in Fa at Tientsin, Professor Morris at All Soul's and whoever holds the Carnap chair at UCLA.

Flo's turn. My mother would have loved my garden. I have drumsticks and daffodils growing side by side in the sludgy sand. They do so please us, and we them! I will probably transmit a full horticultural handbook at a future date, but meanwhile it is shameful to eat a radish. Carrots, on the other hand, enjoy it.

A statement of William Becklund, deceased. I emerged into the world, learned, grew, ate, worked, moved and died. Alternatively, I emerged from the hydrogen flare, shrank, disgorged and reentered the womb one misses so. You may approach it from either end, it makes no difference at all which way you look at it.

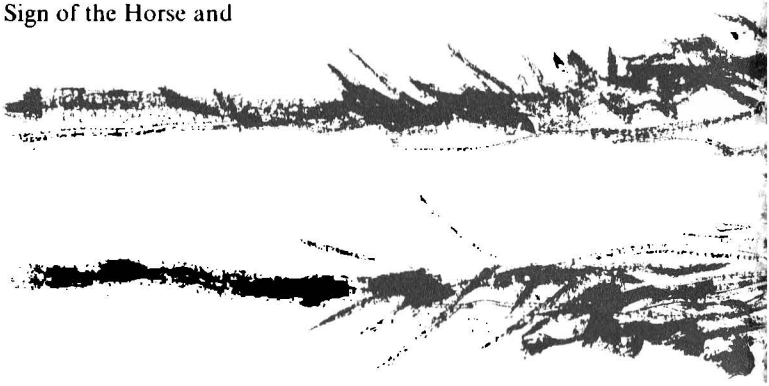
Observational datum, Letski. At time t, a Dirac number incommensurable with GMT, the following phenomenon is observed:

The radio source Centaurus A is identified as a positionally stable single collective object rather than two intersecting gas clouds and is observed to contract radially toward a center. Analysis and observation reveal it to be a Black Hole of which the fine detail is not detectable as yet. One infers all galaxies develop such central vortices, with implications of interest to astronomers and eschatologists. I, Seymour Letski,

propose to take a closer look but the others prefer to continue programmed flight first. Harvard-Smithsonian notification service, please copy.

"Starbow," a preliminary study for a rendering into English of a poem by James Barstow:

Gaggle of goslings but pick of our race
We waddle through relativistic space.
Dilated, discounted, despondent we scan:
But vacant the Sign of the Horse and the Man.

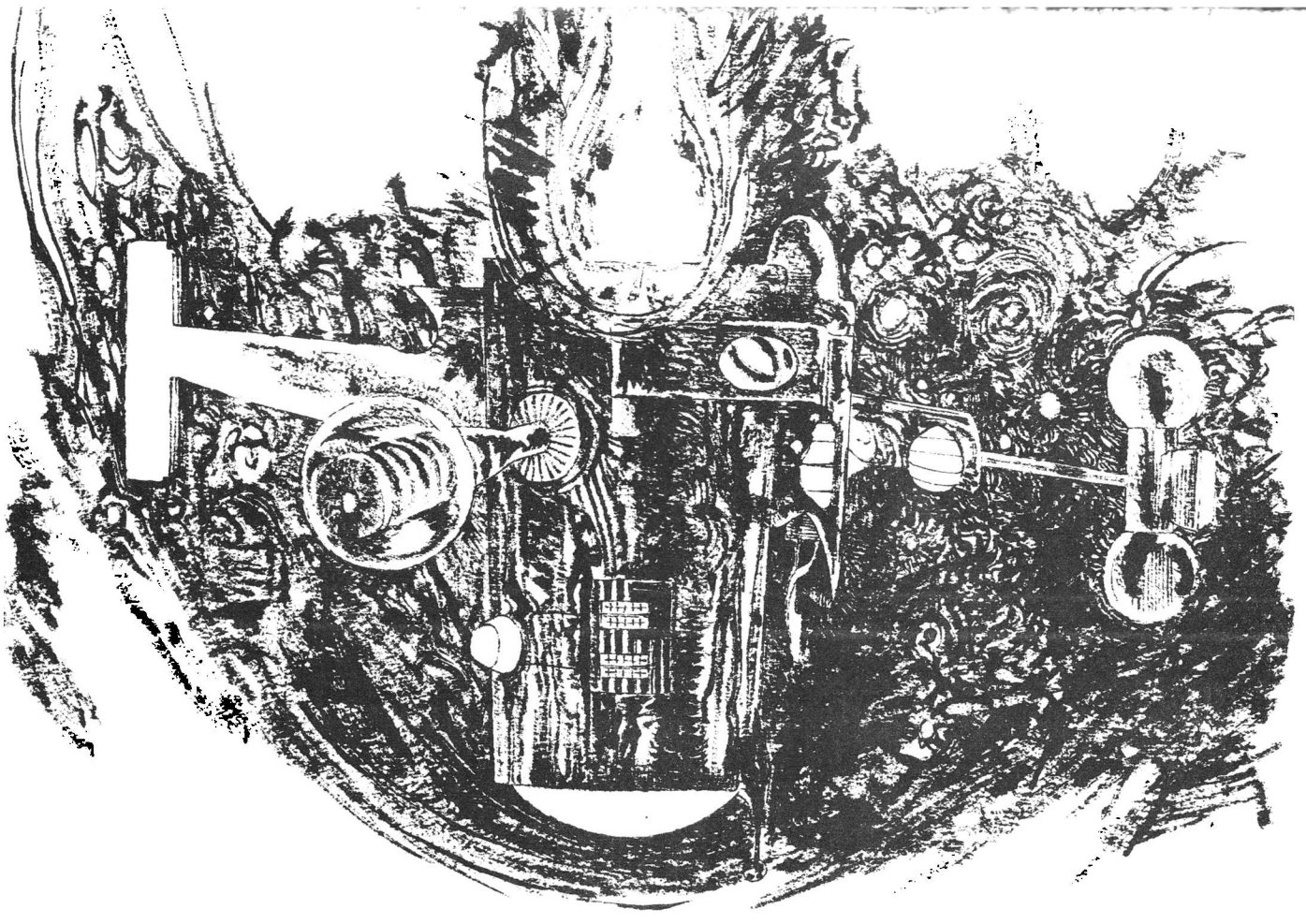


Vacant the Sign of the Man and the Horse,
And now we conjecture the goal of our course.
Tricked, trapped and cozened, we ruefully run
After the child of the bachelor sun.
The trick is revealed and the trap is confessed
And we are the butts of the dim-witted jest.
O Gander who made us, O Goose who laid us,
How lewdly and twistedly you betrayed us!
We owe you a debt. We won't forget.
With fortune and firmness we'll pay you yet.
Give us some luck and we'll timely send
Your pot of gold from the starbow's end.

Ann Becklund:

I think it was Stanley Weinbaum who said that from three facts a truly superior mind should be able to deduce the whole universe. (Ski thinks it is possible with a finite number, but considerably larger than that). We are so very far from being truly superior minds by those standards, or even by our own. Yet we have a much larger number of facts to work with than three, or even three thousand, and so we have deduced a good deal.

This is not as valuable to you as



you might have hoped, dear old bastardly Kneffie and all you bastardly others, because one of the things that we have deduced is that we can't tell you everything, because you wouldn't understand. We could help you along, some of you, if you were here, and in time you would be able to do what we do easily enough, but not by remote control.

But all is not lost, folks! Cheer up! You don't deduce like we deduce, but on the other hand you have so very much more to work from. Try. Get smart. You can do it if you want to. Set your person at rest, compose your mind before you speak, make your relations firm before you ask for something. Try not to be loathsome about it. Don't be like the fellow in the Changes. "He brings increase to no one. Indeed, someone even strikes him."

We've all grown our toes back now, even Will, although it was particularly difficult for him since he had been killed, and we've inscribed the bones and used them with very good effect in generating the hexagrams. I hope you see the point of what we did. We could have gone on with tossing coins or throwing the yarrow stalks, or at least with the closest Flo could breed to yarrow stalks. We didn't want to do that because it's not the optimum way.

The person who doesn't keep his heart constantly steady might say, "Well, what's the difference?" That's a poor sort of question to ask. It implies a deterministic answer. A better question is, "Does it make a difference?", and the answer to that is, "Yes, probably, because in order to do something right you must do it right." That is the law of identity, in any language.

Another question you might ask is, "Well, what source of knowledge are you actually tapping when you consult the hexagrams?" That's a better kind of question in that it doesn't *force* a wrong answer, but the answer is, again, indeterminate. You might view the *I Ching* as a sort of Rorschach bundle of squiggles that has no innate meaning but is useful because your own mind interprets it and puts sense into it. Feel free! You might think of it as a sort of memory bank of encoded lore. Why not? You might skip it entirely and come to knowledge in some other tao, any tao you like. ("The superior man understands the transitory in the light of the eternity of the end.") That's fine, too!

But whatever way you do it, you should *do* it that way. We needed inscribed bones to generate hexagrams, because that was the right way, and so it was no particular sacrifice to lop off a toe each for the purpose. It's working out nicely, except for one thing. The big hangup now is that the translations are so degraded, Chinese to German, German to English and error seeping in at every step, but we're working on that now.

Perhaps I will tell you more at another time. Not now. Not very

soon. Eve will tell you about that.

Eve Barstow, the Dummy, comes last and, I'm afraid, least.

When I was a little girl I used to play chess, badly, with very good players, and that's the story of my life. I'm a chronic over-achiever. I can't stand people who aren't smarter and better than I am, but the result is that I'm the runt of the litter every time. They are all very nice to me here, even Jim, but they know what the score is and so do I.

So I keep busy and applaud what I can't do. It isn't a bad life. I have everything I need, except pride.

Let me tell you what a typical day is like here between Sol and Centaurus. We wake up—if we have been sleeping, which some of us still do—and eat—if we are still eating, as all but Ski and, of course, Will Becklund do. The food is delicious and Florence has induced it to grow cooked and seasoned where that is desirable, so it's no trouble to go over and pick yourself a nice poached egg, or clutch of French fries. (I really prefer brioche in the mornings, but for sentimental reasons she can't manage it.) Sometimes we ball a little or sing old campfire songs. Ski comes down for that, but not for long, and then he goes back to looking at the universe. The starbow is magnificent and appalling. It is now a band about 40° across, completely surrounding us with colored light. One can always look in the other frequencies and see ghost stars before us and behind us, but in the birthright bands the view to the front and rear is now dead black and the only light is that beautiful banded ring of powdery stars.

Sometimes we write plays or have a little music. Shef had deduced four lost Bach piano concerti, very reminiscent of Corelli and Vivaldi, with everything going at once in the tuttis, and we've all adapted them for performance. I did mine on the Moog, but Ann and Shef synthesized whole orchestras. Shef's is particularly cute. You can tell that the flautist has early emphysema and two people in the violin section have been drinking, and he's got Toscanini conducting like a *risorgimento* metronome. Flo's oldest daughter made up words and now she sings a sort of nursery rhyme adaptation of some Buxtehude chorales; oh, I didn't tell you about the kids. We have eleven of them now. Ann, Dot and I have one apiece, and Florence has eight. (But they're going to let me have quadruplets next week.) They let me take care of them pretty much for the first few weeks, while they're little, and they're *so* darling.

So mostly I spend my time taking care of the kids and working out tensor equations that Ski kindly gives me to do for him, and, I must confess it, feeling a little lonely. I *would* like to watch a TV quiz show over a cup of coffee with a friend! They let me do over the interior of our mobile home now and then. The other day I redid it in Pittsburgh suburban as a

joke. Would you believe French windows in interstellar space? We never open them, of course, but they look real pretty with the chintz curtains and lace tiebacks. And we've added several new rooms for the children and their pets. (Flo grew them the cutest little bunnies in the hydroponics plot).

Well, I've enjoyed this chance to gossip, so will sign off now. There is one thing I have to mention. The others have decided we don't want to get any more messages from you. They don't like the way you try to work on our subconsciouses and all—not that you succeed, of course, but you can see that it's still a little annoying—, and so in future the dial will be set at six-six-oh, all right, but the switch will be in the "off" position. It wasn't my idea, but I was glad to go along. I *would* like some slightly less demanding company from time to time, although not, of course, yours.

WASHINGTON FIVE

Once upon a time the building that was now known as DoD Temp Restraining Quarters 7—you might as well call it with the right word, "jail", Knefhausen thought—had been a luxury hotel in the Hilton chain. The maximum security cells were in the underground levels, in what had been meeting rooms. There were no doors or windows to the outside. If you did get out of your own cell you had a flight of stairs to get up before you were at ground level, and then the guards to break through to get to the open. And then, even if there happened not to be an active siege going on at the moment, you took your chances with the roaming addicts and activists outside.

Knefhausen did not concern himself with these matters. He did not think of escape, or at least didn't after the first few panicky moments, when he realized he was under arrest. He stopped demanding to see the President after the first few days. There was no point in appealing to the White House for help when it was the White House that had put him here. He was still sure that if only he could talk to the President privately for a few moments he could clear everything up. But as a realist he had faced the fact that the President would never talk to him privately again.

So he counted his blessings.

First, it was comfortable here. The bed was good, the rooms were warm. The food still came from the banquet kitchens of the hotel, and it was remarkably good for jailhouse fare.

Second, the kids were still in space and still doing some things, great things, even if they did not report what. His vindication was still a prospect.

Third, the jailers let him have newspapers and writing materials, although they would not bring him his books, or give him a television set.

He missed the books, but nothing

else. He didn't need TV to tell him what was going on outside. He didn't even need the newspapers, ragged, thin and censored as they were. He could hear for himself. Every day there was the rattle of small-arms fire, mostly far-off and sporadic, but once or twice sustained and heavy and almost overhead, Brownings against AK-47s, it sounded like, and now and then the slap and smash of grenade launchers. Sometimes he heard sirens hooting through the streets, punctuated by clanging bells, and wondered that there was still a civilian fire department left to bother. (Or was it still civilian?) Sometimes he heard the grinding of heavy motors that had to be tanks. The newspapers did little to fill in the details, but Knefhausen was good at reading between the lines. The Administration was holed up somewhere—Key Biscayne, or Camp David, or Southern California, no one was saying where. The cities were all in red revolt. *Herr Omnes* had taken over.

For these disasters Knefhausen felt unjustly blamed. He composed endless letters to the President, pointing out that the serious troubles of the Administration had nothing to do with Alpha-Aleph; the cities had been in revolt for most of a generation, the dollar had become a laughingstock since the Indochinese wars. Some he destroyed, some he could get no one to take from him, a few he managed to dispatch—and got no answers.

Once or twice a week a man from the Justice Department came to ask him the same thousand pointless questions once again. They were trying to build up a dossier to prove it was all his fault, Knefhausen suspected. Well, let them. He would defend himself when the time came. Or history would defend him. The record was clear. With respect to moral issues, perhaps, not so clear, he conceded. No matter. One could not speak of moral questions in an area so vital to the search for knowledge as this. The dispatches from the *Constitution* had already produced so much—although, admittedly, some of the most significant parts were hard to understand. The Gödel message had not been unscrambled, and the hints of its contents remained only hints.

Sometimes he dozed and dreamed of projecting himself to the *Constitution.* It had been a year since the last message. He tried to imagine what they had been doing. They would be well past the midpoint now, decelerating. The starbow would be broadening and diffusing every day. The circles of blackness before and behind them would be shrinking. Soon they would see Alpha Centauri as no man had ever seen it. To be sure, they would then see that there was no planet called Aleph circling the primary, but they had guessed that somehow long since. Brave, wonderful kids! Even so they had gone on. This foolishness with drugs and sex, what of it? One

opposed such goings-on in the common run of humanity, but it had always been so that those who excelled and stood out from the herd could make their own rules. As a child he had learned that the plump, proud air leader sniffed cocaine, that the great warriors took their sexual pleasure sometimes with each other. And intelligent man did not concern himself with such questions, which was one more indication that the man from the Justice Department, with his constant hinting and prying into Knefhausen's own background, was not really very intelligent.

The good thing about the man from the Justice Department was that one could sometimes deduce things from his questions, and rarely, oh, very rarely, he would sometimes answer a question himself. "Has there been a message from the *Constitution?*" "No, of course not, Dr. Knefhausen. Now, tell me again, who suggested this fraudulent scheme to you in the first place?"

Those were the highlights of his days, but mostly the days just passed unmarked.

He did not even scratch them off on the wall of his cell, like the prisoner in the Chateau d'If. It would have been a pity to mar the hardwood paneling. Also he had other clocks and calendars. There was the ticking of the arriving meals, the turning of the seasons as the man from the Justice Department paid his visits. Each of these was like a holiday—a holy day, not joyous but solemn. First there would be a visit from the captain of the guards with two armed soldiers standing in the door. They would search his person and his cell on the chance that he had been able to smuggle in a . . . a what? A nuclear bomb, maybe. Or a pound of pepper to throw in the Justice man's eyes. They would find nothing, because there was nothing to find. And then they would go away and for a long time there would be nothing. Not even a meal, even if a meal time happened to be due. Nothing at all, until an hour or three hours later the Justice man would come in with his own guard at the door, equally vigilant inside and out, and his engineer manning the tape recorders, and his questions.

And then there was the day when the man from the Justice Department came and he was not alone. With him was the President's secretary, Murray Amos.

How treacherous is the human heart! When it has given up hope how little it takes to make it hope again!

"Murray!" cried Knefhausen, almost weeping, "it's so good to see you again! The President, is he well? What can I do for you? Have there been developments?"

Murray Amos paused in the doorway. He looked at Dieter von Knefhausen and said bitterly, "Oh, yes, there have been developments. Plenty of them. The Fourth Armored has just changed sides, so we

are evacuating Washington. And the President wants you out of here at once."

"No, no! I mean . . . oh, yes, it is good that the President is concerned about my welfare, although it is bad about the Fourth Armored. But what I mean, Murray, is this: Has there been a message from the *Constitution?*"

Amos and the Justice Department man looked at each other. "Tell me, Dr. Knefhausen," said Amos silkily, "how did you manage to find that out?"

"Find it out? How could I find it out? No, I only asked because I hoped. There has been a message, yes? In spite of what they said? They have spoken again?"

"As a matter of fact, there has been," said Amos thoughtfully. The Justice Department man whispered piercingly in his ear, but Amos shook his head. "Don't worry, we'll be coming in a second. The convoy won't go without us . . . Yes, Knefhausen, the message came through to Goldstone two hours ago. They have it at the decoding room now."

"Good, very good!" cried Knefhausen. "You will see, they will justify all. But what do they say? Have you good scientific men to interpret it? Can you understand the contents?"

"Not exactly," said Amos, "because there's one little problem the code room hadn't expected and wasn't prepared for. The message wasn't coded. It came in clear, but the language was Chinese."

CONSTITUTION SIX
Ref.: CONSIX T51/11055/*7
CLASSIFIED MOST SECRET
Subject: Transmission from U.S. Starship *Constitution.*

The following message was received and processed by the decrypt section according to standing directives. Because of its special nature, an investigation was carried out to determine its provenance. Radio-direction data received from Farside Base indicate its origin along a line of sight consistent with the present predicted location of the *Constitution.* Strength of signal was high but within appropriate limits, and degradation of frequency separation was consistent with relativistic shifts and scattering due to impact with particle and gas clouds.

Although available data do not prove beyond doubt that this transmission originated with the starship, no contra-indications were found.

On examination, the text proved to be a phonetic transcription of what appears to be a dialect of Middle Kingdom Mandarin. Only a partial translation has been completed. (See note appended to text.) The translation presented unusual difficulties for two reasons: One, the difficulty of finding a translator of sufficient skill who could be granted appropriate security status; two, because—conjecturally—the language used may not correspond exactly to

any dialect but may be an artifact of the *Constitution's* personnel. (See PARA EIGHT.)

This text is PROVISIONAL AND NOT AUTHENTICATED and is furnished only as a first attempt to translate the contents of the message into English. Efforts are being continued to translate the full message, and to produce a less corrupt text for the section herewith. Later versions and emendations will be forwarded when available.

TEXT FOLLOWS:

PARA ONE. The one who speak for all—*Lt-Col Sheffield H Jackman*—rests. With righteous action comes surcease from care. I—*identity not certain, but probably Mrs. Annette Marin Becklund, less probably one of the other three female personnel aboard, or one of their descendants*—come in his place, moved by charity and love.

PARA TWO. It is not enough to study or to do deeds which make the people frown and bow their heads. It is not enough to comprehend the nature of the sky or the sea. Only through the understanding of all can one approach wisdom, and only through wisdom can one act rightly.

PARA THREE. These are the precepts as it is given us to see them:

PARA FOUR. The one who imposes his will by force lacks justice. Let him be thrust from a cliff.

PARA FIVE. The one who causes another to lust for a trifle of carved wood or a sweetmeat lacks courtesy. Let him be restrained from the carrying out of wrong practices.

PARA SIX. The one who ties a knot and says, "I do not care who must untie it," lacks foresight. Let him wash the ulcers of the poor and carry nightsoil for all until he learns to see the day to come as brother to the day that is.

PARA SEVEN. We who are in this here should not impose our wills on you who are in that here by force. Understanding comes late. We regret the incident of next week, for it was done in haste and in error. The one who speaks for all acted without thinking. We who are in this here were sorry for it afterward.

PARA EIGHT. You may wonder—*literally: ask thoughtless questions of the hexagrams*—why we are communicating in this language. The reason is in part recreational, in part heuristic—*literally: because on the staff hand one becomes able to strike a blow more ably when blows are struck repeatedly*—but the nature of the process is such that you must go through it before you can be told what it is. Our steps have trodden this path. In order to reconstruct the Chinese of the *I Ching* it was first necessary to reconstruct the German of the

translation from which the English was made. Error lurks at every turn. [*Literally: false apparitions shout at one each time the path winds.*] Many flaws mark our carving. Observe it in silence for hours and days until the flaws become part of the work.

PARA NINE. It is said that you have eight days before the heavier particles arrive. The dead and broken will be few. It will be better if all airborne nuclear reactors are grounded until the incident is over.

PARA TEN. When you have completed rebuilding send us a message, directed to the planet Alpha-Aleph. Our home should be prepared by then. We will send a ferry to help colonists across the stream when we are ready:

The above text comprises the first 852 groups of the transmission. The remainder of the text, comprising approximately 7,500 groups, has not been satisfactorily translated. In the opinion of a consultant from the Oriental Languages Department at Johns Hopkins it may be a poem.

/s/Durward S. RICHTER

Durward S. RICHTER
Major General, USMC
Chief Cryptographer
Commanding

Distribution: X X X
BY HAND ONLY

WASHINGTON SIX

The President of the United States—Washington—opened the storm window of his study and leaned out to yell at his Chief Science Adviser. "Harry, get the lead out! We're waiting for you!"

Harry looked up and waved, then continued doggedly plowing through the dripping jungle that was the North Lawn. Between the overgrown weeds and the rain and the mud it was slow going, but the President had little sympathy. He slammed down the window and said, "That man, he just goes out of his way to aggravate me. How long am I supposed to wait for him so I can decide if we have to move the capital or not?"

The Vice President looked up from her knitting. "Jimbo, honey, why do you fuss yourself like that? Why don't we just move and get it over with?"

"Well, it looks so lousy." He threw himself into a chair despondently. "I was really looking forward to the Tenth Anniversary parade," he complained. "Ten years, that's really worth bragging about! I don't want to hold it out in the sticks, I want it right down Constitution Avenue, just like the old days, with the people cheering and the reporters and the cameras all over and everything. Then let that son of a bitch in Omaha say I'm not the real President."

His wife said placidly, "Don't fuss yourself about him, honey. You

know what I've been thinking, though? The parade might look a little skimpy on Constitution Avenue anyway. It would be real nice on a kind of littler street."

"Oh, what do you know? Anyway, where would we go? If Washington's under water, what makes you think Bethesda would be any better?"

His Secretary of State put down his solitaire cards and looked interested. "Doesn't have to be Bethesda," he said. "I got some real nice land up near Dulles we could use. It's high there."

"Why, sure. Lots of nice land over to Virginia," the Vice President confirmed. "Remember when we went out on that picnic after your Second Inaugural? That was at Fairfax Station. There were hills all around. Just beautiful."

The President slammed his fist on the coffee table and yelled, "I'm not the President of Fairfax Station, I'm the President of the U. S. of A.! What's the capital of the U. S. of A.? Washington! My God, don't you see how those jokers in Houston and Omaha and Salt Lake and all would laugh if they heard I had to move out of my own capital?"

He broke off, because his Chief Science Adviser was coming in the door, shaking himself, dripping mud as he got out of his oilskin slicker. "Well?" demanded the President. "What did they say?"

Harry sat down. "It's terrible out there. Anybody got a dry cigarette?"

The President threw him a pack. Harry dried his fingers on his shirt front before he drew one out. "Well," he said, "I went to every boat captain I could find. They all said the same. Ships they talked to, places they'd been. All the same. Tides rising all up and down the coast."

He looked around for a match. The President's wife handed him a gold cigarette lighter with the Great Seal of the United States on it, which, after some effort, he managed to ignite. "It don't look good, Jimmy. Right now it's low tide and that's all right, but it's coming in. And tomorrow it'll come in a little higher. And there will be storms—not just rain like this. I mean, you got to figure on a tropical depression coming up from the Bahamas now and then."

"We're not in the tropics," said the Secretary of State suspiciously.

"It doesn't mean that," said the Science Adviser, who had once given the weather reports over the local ABC television station, when there was such a thing as a television network. "It means storms. Hurricanes. But they're not the worst things, it's the tide. If the ice is melting, then they're going to keep getting higher regardless."

The President drummed his fingers on the coffee table. Suddenly he shouted, "I don't *want* to move my capital!"

No one answered. His temper outbursts were famous. The Vice President became absorbed in her knit-

ting, the Secretary of State picked up his cards and began to shuffle, the Science Adviser picked up his slicker and carefully hung it on the back of a door.

The President said, "You got to figure it this way. If we move out, then all those local yokels that claim to be the President of the United States are going to be just that much better off, and the eventual reunification of our country is going to be just that much more delayed." He moved his lips for a moment, then burst out, "I don't ask anything for myself! I never have. I only want to play the part I have to play in what's good for all of us, and that means keeping up my position as the *real* President, according to the U. S. of A. Constitution as amended. And that means I got to stay right here in the real White House, no matter what."

His wife said hesitantly, "Honey, how about this? The other Presidents had like a summer White House—Camp David and like that. Nobody fussed about it. Why couldn't you do the same as they did? There's the nicest old farmhouse out near Fairfax Station that we could fix up to be real pretty."

The President looked at her with surprise. "Now, that's good thinking," he declared. "Only we can't move permanently, and we have to keep this place garrisoned so nobody else will take it away from us, and we have to come back here once in a while. How about that, Harry?

His Science Adviser said thoughtfully, "We could rent some boats, I guess. Depends. I don't know how high the water might get."

"No 'guess'! No 'depends'! That's a national priority. We have to do it that way to keep that bastard in Omaha paying attention to the real President."

"Well, Jimbo, honey," said the Vice President after a moment, emboldened by his recent praise, "you have to admit they don't pay a lot of attention to us right now. When was the last time they paid their taxes?"

The President looked at her foxily over his glasses. "Talking about that," he said, "I might have a little surprise for them anyway. What you might call a secret weapon."

"I hope it does better than we did in the last war," said his wife, "because if you remember, when we started to put down the uprising in Frederick, Maryland, we got the pee kicked out of us."

The President stood up, indicating the Cabinet meeting was over.

"Never mind," he said sunnily. "You go on out again, Harry, and see if you can find any good maps in the Library of Congress where they got the fires put out. Find us a nice high place within, um, twenty miles if you can. Then we'll get the Army to condemn us a Summer White House like Mae says, and maybe I can sleep in a bed that isn't moldy for a change."

His wife looked worried, "What are you going to do, Jim?"

He chuckled. "I'm going to check out my secret weapon."

He shooed them out of his study and, when they were gone, went to the kitchen and got himself a bottle of Fresca from the six-pack in the open refrigerator. It was warm, of course. The Marine guard company was still trying to get the gas generator back in operation, but they were having little success. The President didn't mind. They were his personal Praetorians and, if they lacked a little as appliance repairmen, they had proved their worth when the chips were down. The President was always aware that during the Troubles he had been no more than any other Congressman—appointed to fill a vacancy, at that—and his rapid rise to Speaker of the House and Heir Apparent, finally to the Presidency itself, was due not only to his political skills and knowhow but also to the fact that he was the only remotely legitimate heir to the Presidency who also happened to have a brother-in-law commanding the Marine garrison in Washington.

The President was, in fact, quite satisfied with the way the world was going. If he envied Presidents of the past—missiles, fleets of nuclear bombers, billions of dollars to play with—he certainly saw nothing, when he looked at the world around him, to compare with his own stature in the real world he lived in.

He finished the soda, opened his study door a crack and peered out. No one was nearby. He slipped out and down the back stairs. In what had once been the public parts of the White House you could see the extent of the damage more clearly. After the riots and the trashings and the burnings and the coups the will to repair and fix up had gradually dwindled away. The President didn't mind. He didn't even notice the charred walls and the fallen plaster. He was listening to the sound of a distant gasoline pump chugging away, and smiling to himself as he approached the underground level where his secret weapon was locked up.

The secret weapon, whose name was Dieter von Knefhausen, was trying to complete the total defense of every act of his life that he called his memoirs.

He was less satisfied with the world than the President. He could have wished for many changes. Better health, for one thing; he was well aware that his essential hypertension, his bronchitis and his gout were fighting the last stages of a total war to see which would have the honor of destroying their mutual battleground, which was himself. He did not much mind his lack of freedom, but he did mind the senseless destruction of so many of his papers.

The original typescript of his autobiography was long lost, but he had wheedled the President—the pretender, that is, who called himself the President—into sending someone

to find what could be found of them. A few tattered and incomplete carbon copies had turned up. He had restored some of the gaps as best his memory and available data permitted, telling again the story of how he had planned Project Alpha-Aleph and meticulously itemizing the details of how he had lied, forged and falsified to bring it about.

He was as honest as he could be. He spared himself nothing. He admitted his complicity in the "accidental" death of Ann Barstow's first husband in a car smash, thus leaving her free to marry the man he had chosen to go with the crew to Alpha Centauri. He had confessed he had known the secret would not last out the duration of the trip, thus betraying the trust of the President who made it possible. He put it all in, all he could remember, and boasted of his success.

For it was clear to him that his success was already proved. What could be surer evidence of it than what had happened ten years ago? The "incident of next week" was as dramatic and complete as anyone could wish. If its details were still indecipherable, largely because of the demolition of the existing technology structure it had brought about, its main features were obvious. The shower of heavy particles—baryon? perhaps even quarks?—had drenched the Earth. The source had been traced to a point in the heavens identical with that plotted for the *Constitution*.

Also there were the messages received; taken together, there was no doubt that the astronauts had developed knowledge so far in advance of anything on Earth that, from two light-years out, they could impose their will on the human race. They had done it. In one downpour of particles, the entire military-industrial complex of the planet was put out of action.

How? How? Ah, thought Knefhausen, with envy and pride, that was the question. One could not know. All that was known was that every nuclear device—bomb, power plant, hospital radiation source or stockpile—had simultaneously soaked up the stream of particles and at that moment ceased to exist as a source of nuclear energy. It was not rapid and catastrophic, like a bomb. It was slow and long-lasting. The uranium and the plutonium simply melted, in the long, continuous reaction that was still bubbling away in the seething lava lakes where the silo had stood and the nuclear power plants had generated electricity. Little radiation was released, but a good deal of heat.

Knefhausen had long since stopped regretting what could not be helped, but wistfully he still wished he had the opportunity to measure the total heat flux properly. Not less than 10^{16} watt-years, he was sure, just to judge by the effects on the Earth's atmosphere, the storms, the gradual raising of temperature all over, above all by the rumors about the

upward trend of sea level that bespoke the melting of the polar ice caps. There was no longer even a good weather net, but the fragmentary information he was able to piece together suggested a world increase of four, maybe as many as six or seven degrees Celsius already, and the reactions still seething away in Czechoslovakia, the Congo, Colorado and a hundred lesser infernos.

Rumors about the sea level?

Not rumors, no, he corrected himself, lifting his head and staring at the snake of hard rubber hose that began under the duckboards at the far end of the room and ended outside the barred window, where the gasoline pump did its best to keep the water level inside his cell below the boards. Judging by the inflow, the grounds of the White House must be nearly awash.

The door opened. The President of the United States (Washington) walked in, patting the shoulder of the thin, scared, hungry-looking kid who was guarding the door.

"How's it going, Knefhausen?" the President began sunnily. "You ready to listen to a little reason yet?"

"I'll do whatever you say, Mr. President, but as I have told you there are certain limits. Also I am not a young man, and my health—"

"Screw your health and your limits," shouted the President. "Don't start up with me, Knefhausen!"

"I am sorry, Mr. President," whispered Knefhausen.

"Don't be sorry! I judge by results. You know what it takes to keep that pump going just so you won't drown? Gas is rationed, Knefhausen! Takes a high national priority to get it! I don't know how long I'll be able to justify this continuous drain on our resources if you don't cooperate."

Sadly, but stubbornly, Knefhausen said: "As far as I am able, Mr. President, I cooperate."

"Yeah. Sure." But the President was in an unusually good mood today, Knefhausen observed, with the prisoner's paranoid attention to detail, and in a moment he said: "Listen, let's not get up tight about this. I'm making you an offer. Say the word and I'll fire that dumb son of a bitch Harry Stokes and make you my Chief Science Adviser. How would that be? Right up at the top again. An apartment of your own. Electric lights! Servants—you can pick 'em out yourself, and there're some nice-looking little girls in the pool. The best food you ever dreamed of. A chance to perform a real service for the U. S. of A., helping to reunify this great country to become once again the great power it should and must be!"

"Mr. President," Knefhausen said, "naturally, I wish to help in any way I can, but we have been over all this before. I'll do anything you like, but I don't know how to make the bombs work again. You saw what happened, Mr. President. They're gone."

"I didn't say bombs, did I? Look, Kneffie, I'm a reasonable man. How about this: You promise to use your best scientific efforts *in any way you can.* You say you can't make bombs; all right. But there will be other things."

"What other things, Mr. President?"

"Don't push me, Knefhausen. Anything at all. Anything where you can perform a service for your country. You give me that promise and you're out of here today. Or would you rather I just turned off the pump?"

Knefhausen shook his head, not in negation but in despair. "You do not know what you are asking. What can a scientist do for you today? Ten years ago, yes—even five years ago. We could have worked something out maybe, I could have done something. But now the preconditions do not exist. When all the nuclear plants went out— When the factories that depended on them ran out of power— When the fertilizer plants couldn't fix nitrogen and the insecticide plants couldn't deliver— When the people began to die of hunger and the pestilences started—"

"I know all that, Knefhausen. Yes, or no?"

The scientist hesitated, looking thoughtfully at his adversary. A gleam of the old shrewdness appeared in his eyes.

"Mr. President," he said slowly. "You know something. Something has happened."

"Right," crowed the President. "You're smart. Now tell me, what is it I know?"

Knefhausen shook his head. After seven decades of vigorous life, and another decade of slowly dying, it was hard to hope again. This terrible little man, this upstart, this lump—he was not without a certain animal cunning, and he seemed very sure. "Please, Mr. President. Tell me."

The President put a finger to his lips, and then an ear to the door. When he was convinced no one could be listening, he came closer to Knefhausen and said softly:

"You know that I have trade representatives all over, Knefhausen. Some in Houston, some in Salt Lake, some even in Montreal. They are not always there just for trade. Sometimes they find things out, and tell me. Would you like to know what my man in Anaheim has just told me?"

Knefhausen did not answer, but his watery old eyes were imploring.

"A message," whispered the President.

"From the *Constitution?*" cried Knefhausen. "But, no, it is not possible! Farside is gone, Goldstone is destroyed, the orbiting satellites are running down—"

"It wasn't a radio message," said the President. "It came from Mount Palomar. Not the big telescope, because that got ripped off, too, but what they call a Schmidt. Whatever that is. It still works. And they still have some old fogies who look

through it now and then, for old times' sake. And they got a message, in laser light. Plain Morse code. From what they said was Alpha Centauri. From your little friends, Knefhausen."

He took a piece of paper from his pocket and held it up.

Knefhausen was racked by a fit of coughing, but he managed to croak: "Give it to me!"

The President held it away. "A deal, Knefhausen?"

"Yes, yes! Anything you say, but give me the message!"

"Why, certainly," smiled the President, and passed over the much-creased sheet of paper. It said:

PLEASE BE ADVISED. WE HAVE CREATED THE PLANET ALPHA-ALEPH. IT IS BEAUTIFUL AND GRAND. WE WILL SEND OUR FERRIES TO BRING SUITABLE PERSONS AND OTHERS TO STOCK IT AND TO COMPLETE CERTAIN OTHER BUSINESS. OUR SPECIAL REGARDS TO DR. DIETER VON KNEFHAUSEN, WHOM WE WANT TO TALK TO VERY MUCH. EXPECT US WITHIN THREE WEEKS OF THIS MESSAGE.

Knefhausen read it over twice, stared at the President and read it again. "I . . . I am very glad," he said inadequately.

The President snatched it back, folded it and put it in his pocket, as though the message itself was the key to power. "So you see," he said, "It's simple. You help me, I help you."

"Yes. Yes, of course," said Knefhausen, staring past him.

"They're your friends. They'll do what you say. All those things you told me that they can do—"

"Yes, the particles, the ability to reproduce, the ability, God save us, to build a planet—" Knefhausen might have gone on cataloguing the skills of the spacemen indefinitely, but the President was impatient:

"So it's only a matter of days now, and they'll be here. You can imagine what they'll have! Guns, tools, everything—and all you have to do is get them to join me in restoring the United States of America to its proper place. I'll make it worth their while, Knefhausen! And yours, too. They—"

The President stopped, observing the scientist carefully. Then he cried "Knefhausen!" and leaped forward to catch him.

He was too late. The scientist had fallen limply to the duckboards. The guard, when ordered, ran for the White House doctor, who limped as rapidly to the scene as his bad legs and brain soaked with beer would let him, but he was too late, too. Everything was too late for Knefhausen, whose old heart had failed him . . . as it proved a few days later—when the great golden ships from Alpha-Aleph landed and disgorged their bright, terrible crewmen to clean up the Earth—just in time. ■

Ever seen square gears?
Or elliptical gears?
They mesh just fine—and
for some purposes,
a weirdo gear in a complex
machine works wonders!

HOWARD L. MYERS

The others looked up when old Radge Morimet stomped into the chamber of the Primgranese High Board of Trade. He stood, turning his head slowly to look at each of the Board members while the emo-monitor sensor implanted in his chin gave him quick reads of their attitudes.

He read relaxed concentration in them—the kind of attitude that's great, he thought caustically, for a kid trying to work a fairly simple puzzle toy. Here and there he encountered flashes of annoyance, presumably with himself because of his late arrival and the less-that-totally-sane emo-reading they were getting from him.

Morimet was well aware that he was rattling their sensors with the slam-slamming signal-cry of *vengeance*—of a mind busy with schemes of mayhem to inflict on an enemy. He had the prestige of his age and his record of service to protect that chronic attitude. Had he been a lesser figure than he was, he would have been pressured long ago into the care of a psych-releaser to get his vengeance-fixation lifted.

Personally, he considered it a useful attitude to have in the conduct of a war. He wished some of his colleagues on the High Board shared it.

He sat, and his chair positioned him comfortably at his place along the rim of the Board table. "Please go on from where you were," he said.

"We were in the process of reviewing," said Domler, the chairman.

Morimet grunted.

Domler said, "To sum up, twenty-three years ago the Lontasta Federation apparently discovered a non-human, telepathic intelligence, about which we still have only limited information. The telepath is referred to as 'Monte', which may be suggestive as to its size. The Lontastans shifted their capital from Nexal to what is presumed to be the world on which the creature was discovered, and which has been named Orrbaune. Again, we have an indication in this that the creature Monte is too massive to travel by warp.

"We have not," Domler continued, "been able to obtain direct verification of this information. Our infiltrators have not been able to penetrate to the new capital planet. They are detected by telepathic means as soon as they enter the Orrbaune system.

"We have learned, however, that the telepath is serving the Lontastan capital as a communication system, on a level far surpassing anything previously achieved. This balanced our previous advantage in personal coordination, obtained when we equipped our people with implanted emo-monitors, and enabled the Lontastans to compete with us on even terms.

"Then last year the Lontastans finally perfected an implantable emo-monitor of their own. They now have a decisive advantage over us, and we have in prospect nothing of

sufficient magnitude to restore the balance.

"The econo-war, ladies and gentlemen, is in grave jeopardy."

This was not news to any of the members. The emotional atmosphere in the chamber darkened slightly toward depression, however, at Domler's reminder. Morimet's vengeance pattern slam-slammed even harder.

"Comments on my summary?" queried Domler.

Several members eyed Morimet expectantly. He frowned. "Not from me," he growled. "If somebody will come forward with something *new* to discuss, all of us might have comments to make. We've already hashed and rehashed the status of the war to the point of no return. The question is: What are we going to do about it?"

He glared around fiercely.

"Every possibility is being explored," replied Grayme, a touch of tartness in her tone and a flicker of anger flashing at Morimet. "For example, our exploratory teams are now examining an average of thirty-nine stars per standard day on the mere chance that the Monte-type lifeform may have evolved on more than one planet, and we can find a Monte of our own."

Farsit, adjutant of Armed Resort, said slowly, "Also, this Board might seriously consider, in this crisis, the use of overt force. Assuming Monte is a massive living creature, we could produce a high-megaton missile with a prime-field guidance system we are confident could home on this creature. I'm aware that such action would violate the traditions of centuries, but if no other course presents itself—"

"Well, we do have promising preliminary findings for more conventional approaches," Domler broke in hurriedly. "It is theoretically possible, for instance, to jam telepathic communications. Effective hardware is still decades away, but—"

Morimet was glowering. "I said something *new!*" he snapped. "We're going down the drain *today,* not twenty years from now, or not in whatever century we happen to stumble across a Monte of our own! As for bombing that telepath, if it worked at all it would put the econo-war on an unsustainable primitive level. Such absurd crudities as that was what put organized rivalry in such bad odor back in Earth-Only times! We fight Lontastan commerce, not Lontastan landscapes and populations! Besides, they could play the missile game, too, if they were pushed into it!"

"Your desire for a new solution to our problem," replied Domler, showing an exasperation-read, "is one all of us share. Unfortunately, none of us has such a solution to offer . . . that is, Raider Morimet, unless *you* have something in mind."

Morimet stared down at the table. "What we need, at a minimum, is a

counter to the speed with which the Lontastan Council of Commerce, aided by telepathic communication, can reach command decisions. Presumably, of course, Monte also improves communication at lower government levels, and perhaps in corporation offices as well. But it is the Cof C that makes the important econo-war decisions for the Federation, just as this High Board does for the Commonality of Primgran. With telepathic communion, their CofC doesn't spend years, or even hours, verbally comparing information and opinions among the members, or quibbling over semantics. They *communicate,* perhaps not instantly, but a hell of a lot faster than we do!

"And we," Morimet paused, sweeping the chamber with a disdain-read, "we have *us.* With our emo-monitors, we're not as bad as an ancient stockholders' meeting or national congress, in that we can't practice concealment and deceit on each other. But we can consume endless amounts of time, as we're doing right now, while the Lontastans are *moving!*

"In short, good colleagues, our problem is in this chamber. What do we do about it?"

The members stirred uncomfortably.

"We can throw your criticism in your face, Radge," replied Grayme. "What's new about that? We know the limitations that apply to this or any human governing body. As for the absence of concealment and deceit, I wonder if the absence is total here. That yammering vengeance-pattern of yours could conceal a multitude of unrecognizable intents."

Morimet grinned wolfishly. "Maybe it does. For example, my intent in bringing up the shortcomings of this High Board was not to enjoy the sound of my own voice. It was to propose that we do something about us."

"Do what?" asked Domler.

"Grayme just mentioned the 'limitations that apply to this or any human governing body'," Morimet responded. "She was in error. There is one purely human governing body to which the limitations wouldn't apply. I refer, of course, to an individual man or woman."

Everyone tried to reply at once. Morimet's emo-monitor hit him with a confusing flood of anger, disgust, and alarm. Then Farsit made himself heard.

"You object to bombing as a primitivism," he barked, "and then propose one-man rule!"

Morimet did not reply.

Gazing at him coolly, Grayme said, "Let's keep in mind the purposes of our econo-war. Man as an individual requires a demanding challenge at the group-activity level in order to maintain a cohesive, well-culled social structure that is motivated toward progress. Our war pro-

vides that, both for ourselves and for the Lontastans.

"A key requirement is group activity at all levels . . . that is, *teamwork.* What would the individual citizen ask himself when he learned the Commonality was being led not by a team . . . by this Board . . . but by an *individual?* Would he not be tempted to conclude that, if one person was better than a group for governing the Commonality, then he could govern himself on the basis of his strictly personal desires and goals without giving priority to the goals of his society?

"Don't forget, Radge, that man is by nature selfish, that self-interest is his strongest drive. That's a necessity for individual survival. Concern for the well-being of the society of which he is a member is also present, but it is less urgent and often must be aroused by the blandishments of others. His morale, as a team member, must be encouraged by reasoned explanation and pep talks.

"Certainly that morale would be dampened," she concluded, "if he saw the highest echelon of his team giving away to what the ancients called a 'personality cult'. It would be an invitation to him to pamper his own personality. Thus, we cannot allow the slightest taint of such a cult to enter this chamber."

Morimet glanced around to see if anyone else wanted to get some licks in before he replied.

Then he said, "such a taint is already present here. I refer, of course, to myself. Any average citizen with an eccentricity such as mine would have been dragged to a psych-releaser long ago, but I, it seems, am a specially respected person. However, that's a rather quibbling point.

"I don't propose that this Board abdicate, but merely streamline itself. I say that decisions which require speed in the making—mainly those involving strategic and tactical matters—be left entirely to one person."

"Meaning practically every issue of importance that comes before this Board," growled Domler. "You're proposing more than a mere manager."

Morimet continued, "The Board would constantly review the actions of this top man, the one we can call the Executive, but would have no authority to interfere with those actions. The Board's chief authority would be the power to dismiss the Executive when, and if, it found him unsatisfactory. Thus, the Board would remain supreme, essentially, and the Executive would be its tool."

The chamber was silent for a moment after he finished. Farsit fidgeted and said, "The concept of delegation of authority is an old one—"

"I don't claim originality in this," said Morimet. "It *is* an old idea, and a workable one."

"For the sake of discussion," said Farsit, "how would this Executive be selected?"

"From our own membership," replied Morimet. "It would be a

simple matter to ask the secretary to review the deliberations of this Board over the past five years and identify the member whose stands have proven correct more often than any other member's. That would be our man, or our woman as the case may be."

Another silence followed.

Suddenly Grayme snapped, "We're getting way off base here! The whole idea is unacceptable in principle! What good can be served by going into its details?"

Morimet looked at her. "I'm inclined to agree, concerning the principle," he said, "but more than a principle is at stake here. The war itself is threatened! That's a matter of urgent practical concern. We have to act!"

"Very well, on a *practical* level," retorted Grayme, "the conduct of the war requires continuity! It has lasted for over four centuries, and may be needed at least that long in the future. But your suggestion would produce a break in continuity at the end of an Executive's life! That's another weakness of the 'personality cult'. When the personality is gone, collapse tends to follow. At best, this would be sporadic, cyclical leadership . . ."

"I grant that," Morimet replied testily. "Maintaining continuity will be a problem for future Boards. But the immediate need is to maintain the war *in our time.* Without it each citizen would, as you remarked yourself, make a cult out of his own personality. The deadly somnolence we've witnessed in the warless Halstayne Independency would overtake us all. What do you want for your grandchildren, Grayme, a slightly compromised econo-war, as I propose, or no war at all?"

She blinked, registering shock.

Farsit spoke up. "Chairman, I ask that the secretary be queried as Morimet suggested, with the understanding that this request won't commit me to his proposal."

Domler nodded and pressed a button to put the computer secretary in the Board table into action. A moment later slips of paper were fed out of slots in front of each member's seat.

Grayme read hers and laughed dryly. "Were you counting on this, Radge?"

Morimet wadded his slip angrily and threw it on the table. "I decline to accept the position," he said flatly.

Domler remarked, "Maybe we *should* drag you to a psych-releaser! This was your proposal, yet when you are chosen by criteria you yourself specified—"

"It's my *age,* damn it!" Morimet bawled in annoyance that for an instant broke through his vengeance pattern. "When I said maintain the war in our time, I meant more than the next ten or fifteen years! We need a younger person for the Executive!"

Farsit nodded slowly. He glanced at his slip of paper again. "The nu-

merical scores of the rest of us are closely clustered, well below your own, Morimet. I'm in second place, but by too slight a margin to mean much. If your age rules you out, and I agree that it should, then our choice of a candidate is not obvious to me."

"Well, I don't insist that the Executive be one of us," said Morimet. "I'm willing to go along with whatever modifications of my proposal you consider realistic." He hesitated, then added, "In fact, I know of a young man, a recent infiltration casualty, who might make an excellent candidate, although his motivation is rather shot at this moment."

"Who's that?"

"His name is Glan Combrit."

"Oh, yes,"nodded Farsit, "Combrit. A brilliant record. He was one of your junior execs when you were an active corporate raider, wasn't he?"

"He was more than that," said Morimet. "He wound up running the whole Exchange end of my operation. Since then he's had a varied and highly successful career, most recently as an industrial espionage agent on several Lontastan planets. And it wasn't a slip on his part that has him out of action now. Even after the Lontastans got wise to him, it's to his credit that he managed to elude their goon squads and get home with a reasonably whole skin. He *knows* the econo-war, and he's a gifted strategist who can play it by the book or come up with creative solutions of his own. He's in recuperation on Earth right now. I visited him there a couple of weeks ago."

"I protest this discussion, Chairman!" Grayme complained loudly. "It is premature! Nothing has been decided!"

"Sustained," said Domler. "The discussion unjustifiably presumes a favorable decision on Morimet's proposal."

Morimet rose from his chair, his vengeance pattern slam-slamming harder than usual. "You have my proposal," he snorted, "and my arguments in its favor. I'm going home, and let you haggle over it as long-windedly as you like! Maybe you can do that better without my emo present to distract you!"

He whirled and stalked from the chamber. Once alone, he permitted himself a small grin.

Outside the building, Morimet glanced up with an old man's caution for obstacles in his path. The sky was blue and empty. He activated his transport implants and soared upward, on semi-inert mode and propelled by repulsor field.

His home, on the other side of the planet, could have been reached most quickly by lifting totally out of the atmosphere, making three right-angle minimal warps, and then descending. But he was in no hurry. He had nothing to do at home but wait word of the Board's decision, and he suspected the decision was hours away.

Besides, he was skittish about warping in the vicinity of a planet. There was too much gas, even ten thousand miles above the atmosphere proper, for warping to be totally safe. That was how he had got stuck in his vengeance fixation. Warp did not take a man out of prime-field space, only out of matter-energy-time space. And every particle of gas carried its share of prime field—and a man's mind was itself a patterned, durable prime-field matrix. A man who warped through a too dense wisp of gas could have his mind knocked right out of his body . . . knocked out at a velocity several times the speed of light.

The trauma of such an experience wasn't mild. The disassociation of mind and body was not bad in itself; in fact, that was a rather useless trick most any sane adult could do at will for amusement. And whether knocked out in warp or wittingly sent wandering, the mind matrix snapped back into place, as if from the end of a taut rubber band, as soon as it was permitted to do so.

The damaging factor about warp knock-out was the sheer speed with which it happened, the sudden recognition by both mind and body of the presence of relative motion of a magnitude both found innately "abnormal". And worse, this superlight motion was *separating* them.

In more respects than one, the experience was more traumatic than death itself. It was, in fact, one of the few types of trauma that a sane adult could not break without the help of a psych-releaser.

Thus it had happened several years ago that Radge Morimet, indulging himself in a moment of vengeful anger after a minor econo-war setback, had warped toward his headquarters planet . . . and had cut it too close. He had come out of warp in the stratosphere—that is, his body had—while his mind matrix had been knocked away by the outermost fringes of the ionosphere. The ionosphere was no mere wisp of gas; its prime field was *solid.* It had stopped his mind matrix cold.

Reassociation took place in far less than a second, but not before the mind matrix was fixed by shock in the vengeance pattern it was holding at the instant of knock-out.

But, as Morimet had quickly realized, a touch of unsanity had its usefulness, to a man in a position to get away with it. It wasn't pleasant or comfortable, either to himself or to others, but for purposes of fighting a war his particular fixation had advantages over sweet reasonableness. It kept his mind on his job, for one thing. Probably it accounted in large part for his "rightness" score being higher than those of the other Board members.

He took his time going home, riding his repulsor field through the upper stratosphere. It was nearly an hour later before he dropped down on his estate. The local time was

about 4:00 a.m., and his house, lawns, gardens and forest were dark and dewy damp.

Still, he lingered outside. There was no one in the house, his wife having "gone visiting" more or less permanently after he acquired his fixation–which was understandable. After all, what kind of companionship could a woman have with a man whose emo pattern blocked communication?

Morimet blinked on his infrared vision and puttered about in his wife's flower garden until the call came from the Board.

"Morimet?" Domler's voice sounded in his right ear.

"Yes?"

"We've decided in favor of your proposal. It was unanimous except for one abstention."

Morimet grinned. "Grayme?" he asked.

"That's correct," the woman replied for herself.

Domler continued, "We've also studied the profiles of the young man you mentioned, Glan Combrit. He appears to be a suitable candidate, except for the motivation factor you mentioned. Possibly that lack can be remedied by an endoctrination course, which Grayme could conduct . . ."

Morimet straightened up from the flower he had been admiring and walked toward the house. He chortled. "Glan's been around too much to be more than mildly affected by a pep talk. Don't his profiles show that?"

"They suggest it," Domler replied. "However, we've agreed that a mild improvement in his motivation will be sufficient. An Executive who was too hard-driving would tend to aggravate the 'personality cult' problem and–"

"I disagree," Morimet interrupted. "High motivation is essential in that job. Consider my own example. I'm no brighter than many of the Board members, so why did I have the highest rightness score?" Nobody replied, so he hammered his point: "Why have you tolerated my eccentricity? Didn't you do so out of tacit recognition that it was making me exceptionally useful to the Commonality?"

Another silence. Then Grayme snapped angrily, "Radge Morimet, if you are suggesting what I think you are . . .!"

"I'm suggesting that now's the time to do things that just aren't done!" he retorted sharply. "We have a war to keep going, damn it! But if it will make you feel better, Grayme, I'm not suggesting that a fixation be installed in Glan Combrit without his knowledge and willing consent."

"To *intentionally* render a man *unsane!*" she yelped.

"Oh, don't get so appalled!" he chided. "You happily supervise the indoctrination programs that direct the thinking, to a degree, of billions of individuals. I'm proposing to di-

rect the thinking, to a somewhat greater degree, of just one man!"

Farsit's voice sounded in his ear: "What would be the content of the fixation?"

"Oh, something to the effect that Combrit desired most urgently to be on the winning side in the war."

"The *winning* side?" protested Domler. "But we don't want to win the war! That would be almost as bad as losing it!"

"Of course," Morimet agreed. "But the Executive should be *trying* to win. We can safely trust the Lontastans and their Monte creature to see that he doesn't succeed. And bear in mind that this wouldn't be a hate-the-enemy fixation, such as mine, that would put Combrit out of emo-communication. It would simply focus his drives along channels which are desirable in his job."

After a pause, Domler said lamely, "This will require some discussion."

"Call me back," said Morimet shortly, flexing his ear to break the connection. He went into the house and prepared himself a supper.

Five days later he was sitting on a patio on top of a forested Asian hill, gazing out over the Sol-brightened Pacific while sipping a drink and chatting with Glan Combrit.

"I imagine that the decisive point for the Board," he told the younger man, "was that score the secretary came up with. If my stand had been correct so often in the past, they're betting it is this time."

Combrit said slowly, "I accept the position, of course—and the condition attached."

"Good!" approved Morimet, seizing Combrit's hand for a firm shake. "I assured the Board you would. But there's one thing, Glan, I want you to face with your eyes open."

"What's that?"

"You're not going to be a happy man. I'm speaking as one who knows. A fixation is no fun to live with in the best of circumstances. And yours will, of necessity, cause you many frustrations, since it will demand winning. Even if you're effective beyond my wildest dreams, the most we can hope for is to bring the war back to even terms."

Combrit nodded. "O.K. I'll know to expect that. It is something I won't like, but I can live with it. After all, back in the days when this planet we're on was all man had, the entire race was loaded with neuroses beyond count, and they managed to survive it."

"Yeah, but they didn't know anything better!" grumped Morimet. "Well, if your life-support is all in order, let's get off our duffs and warp for the capital. The sooner you're on the job, the sooner we'll stop losing this war!"

Combrit stood up. "Right. But don't expect too much. That creature Monte is more than a communications network. If we succeed in putting real pressure on the Lontastans, they might well respond by assigning duties to Monte similar to

those you're giving me. And let's face it . . . my brain must compare to Monte's the same way an implant computer compares to that desk job in the Board chamber!"

"Well, we'll see," replied Morimet, pleased that Combrit had recognized that key point in the situation without prompting.

Within weeks after assuming the duties of Executive, Combrit began stemming the tide of Lontastan victory. This was most immediately evident in Trade Credit Flow statistics, which had been running in high negative figures for the Primgran Commonality for two decades. Before the end of a standard year, Combrit's fast and effective trade moves had brought the TCF down to within a trillion dollars of parity.

And in one memorable trading day on the Open World of Exchange, the Primgranese General Stock average soared twenty-nine percent—and on low-volume turnover. Obviously, this unprecedented gain was not due to a flood of raid-buying by Lontastan adherents, but to a sudden decline in selling decisions by Primgranese holders. On that same day the more vulnerable Primgranese Frontals ran up a forty percent gain, also on low volume.

The formerly depressed Primgranese stocks were now safely priced and no longer inviting to potential raid-buying.

Then, having brought the econo-war back to even terms, Combrit began swinging it in the Commonality's favor.

He was jubilant, as were all members of the High Board of Trade, except Morimet. The old man took praise for the success of his proposal more grumpily than gracefully. It was evident to him, as well as to some of his associates, that his fixation was getting him down.

"Get rid of it, Radge," Grayme urged him after one of the in-person Board sessions. "Perhaps it served a useful function for a while, but we have Combrit now. Living in unsanity is too far beyond the call of duty! Let go of it!"

Morimet grimaced unhappily. "Not yet," he replied. "Perhaps soon . . . but . . . well, not yet." He turned and hurried away.

Combrit had heard the exchange, and walked up to the woman. "I think he means to hang on until he sees what the Lontastans will try to do to counter our successes," he told her.

"That's needless!" she complained. "You've demonstrated that you can handle any response of the enemy with more effectiveness than Radge possibly could!"

"He obviously doesn't see it that way," Combrit replied.

Grayme shrugged. "Who knows how that man sees *anything?* That constant slam-slam-slam shuts him off from everybody!"

Combrit nodded. "I'm glad my own fixation involves nothing like that. Fact is, I'm quite comfortable

with it. But for him, that trauma must be like a painful wound on an otherwise healthy and alert body . . . not bad enough to dull the alertness and thus deaden the pain for him. It has to be a torture to live with, simply because it stands alone and can't be ignored."

"I'm glad your fixation has worked out so well," Grayme said. "I opposed it, and I'm glad I've been proven wrong."

Then within days the situation changed again.

In a stunningly brilliant series of market maneuvers, Lontastan raiders seized majority control of Midgard Starstream, a pivotal holding corporation on the Primgranese Frontal list that had territorial as well as industrial significance. It had been firmly in Primgranese hands for more than a century and a half.

Combrit's report to the High Board concluded grimly:

"The Lontastan Council of Commerce, presumably with reluctance similar to this Board's in establishing the position of Executive, appears to have responded in kind. I assume from the efficiency of the Midgard Starstream raid that the creature Monte was selected the Lontastan 'Executive'. For sheer mass of brainpower, Monte obviously outclasses any human, or any presently conceivable artificial mental construct.

"Two positive factors should apply, however. First, the Lontastan Federation may employ Monte with restraint, disliking—as would we—relinquishment of a human conflict to nonhuman control. Second, Monte lacks man's heritage of combativeness. This, plus the special preparation I was given for my present duties, should leave us with a definite motivational edge."

Domler messaged Morimet: "Damn it, Radge, a lot of good motivation is going to do us when that Monte monster can outscheme a dozen Combrits! They can murder us!"

Morimet snorted. "Don't bet on it! One positive factor both you and Combrit seem to be missing is that we hold the creative initiative."

"*What* creative initiative?"

"They're copying us, we're not copying them. We establish an Executive, then they imitate our action. Before that, we came up with emomonitor implants, and they followed suit as soon as they could develop the gadget for themselves. One edge that gives us—among several—is that it makes the Lontastans tend to hold back, to guard themselves against whatever unexpected initiative we may hit them with next."

"All right, I'm not saying the econo-war's lost," Domler said, "but I am saying that adoption of your Executive scheme hasn't gained us a thing, at best, and for the moment at any rate it's proving costly."

"So it is," Morimet replied agreeably, "but let's wait and see how it goes for a while."

"Morimet, are you withholding information from the Board?" the Chairman asked suspiciously.

"Nothing is being withheld," growled Morimet. "As for certain opinions and expectations I might entertain, based on data known to all of you, those are my business until I care to express them!"

Domler broke off communication brusquely.

The war continued to go discouragingly for the Primgran Commonality. There were no further coups of the scope of the Midgard Starstream seizure, but almost every action wound up favorably for Lontasta. When the enemy did not achieve a small victory, at least victory was denied the industrialists of Primgran.

At last Morimet paid a visit to Combrit's office, Executive Control. He stood in the middle of the room, staring about critically at the sumcom consoles, the Executive's three immediate assistants, and at Combrit himself. Judging from the man's strained appearance, and by the presence of a cot in a corner of the room, Combrit had been living in his office day and night.

"You're pushing yourself too hard, Glan," he said.

Combrit laughed wryly. "Monte's doing the pushing, Radge, not me! What a brain that creature's got! And evidently he never sleeps. I have to stay on my toes constantly, and . . . and"—he slumped his shoulders—"well . . . we're still losing."

Morimet had observed Combrit's emotions closely while he spoke. Frustration was heavy. Events were running counter to the demand of Combrit's fixation. And there was a definite flicker of admiration when he mentioned Monte!

"O.K.," Morimet replied. "The solution is to *not let* him keep pushing you! You're not glued to this office, Glan! Your assistants know standard economic strategics and tactics and can hold the fort. Get away from these clattering consoles a while, where you can *think!*"

Combrit frowned. "I'd better stick around . . . never know when something urgent will come up."

"But what are communications for!" snapped Morimet. "You can stay in touch wherever you go! Look, Glan, I've lived with a fixation a hell of a lot longer than you have, and I've learned some tricks about dealing with one. And I say get out of here! Warp to Earth for a few days, or even a week! Appease that urge to be on the winning side by hauling a few game fish out of the ocean. Or conquer a couple of mountains by climbing them on foot with all your life-support systems off."

Combrit showed annoyance. "You don't really think such stunts would distract me for a single minute from the hard and plain fact that *I'm not on the winning side,* do you?"

"Well, maybe not. But I have a suggestion to deal with that. Get

your fixation deintensified while you're taking your break. A psych-releaser can do that for you. Then it can be reestablished when you return—"

Thoroughly goaded, Combrit flushed and shouted, "I don't *want* it deintensified! I want to *win!*" He whirled away, and quickly calmed down. When he faced Morimet again he was registering surprised concern. "That was quite an outburst, wasn't it?" he chuckled sorely. "Which proves you're right, and I have let this job get me on a thin edge. I'll take a few days off and go to Earth."

"Fine!" Morimet approved. "I think you'll find you'll feel better, and some quiet thinking might produce some useful answers for you as well."

The next day at his home Morimet was informed that the Executive had warped for Earth for a few days of relaxation. "About time," he grunted.

He settled down to wait. The trip from the capital planet to Earth took fifty-three hours—long enough for him to do a lot of floor-pacing if he allowed himself to become impatient, but also long enough for Combrit to think through his position and discover the answer to his problem.

But would Combrit do it?

Morimet messaged his wife. "I might go to a psych-releaser in a day or two," he told her.

"You might? I hope you do, Radge," she replied. "Let me know."

"I will."

He managed to hold off fifty-five hours before attempting to message Combrit. There was no response. He messaged Earth Arrivals Control.

"I'm trying to contact Executive Glan Combrit," he said to the officer in charge. "He must have passed through Arrivals two hours ago. Do you know where he is?"

"Executive Combrit hasn't arrived here, Director Morimet," the officer replied with a touch of alarm. "I'll see what I can learn and call you back."

Morimet grinned. "Thank you."

Then he messaged a psych-releaser and made an appointment.

Four days passed before it was known for a fact that Glan Combrit had defected to the enemy, and was even then in Lontastan territory.

The Board met in emergency session, and Morimet arrived late again. The others noticed, but were too preoccupied to comment upon, the absence of his fixation.

Without preamble, Domler said, "Morimet, this Board isn't trying to shift responsibility for what's happened, but the fact is that you were the key figure in this disaster from the beginning. You proposed establishment of an Executive, you named the man for the job, you suggested and later structured the fixation installed in him."

"And he's feeling *pleased* with himself!" observed Grayme, staring

at Morimet. "You didn't plan for this, *too*, did you?"

Morimet nodded. "This was the final act of my scheme," he admitted comfortably. "I'll resign from the Board but I'd like to be sure a new Executive is properly prepared and on the job."

"A *new* one?" muttered Domler. "After what happened to the old one?"

"The next time," said Morimet, "the fixation must be worded differently. The Executive must be locked to the purpose of producing victory for Primgran, specifically, not simply to be on 'the winning side' as Combrit's fixation was phrased."

"Then it was the wording of Combrit's fixation," said Farsit, "wording you selected, that drove him into the enemy camp."

"Yes. He saw no hope for being on the winning side with us," said Morimet, "but with the Lontastans, and most of all with Monte, he expected his fixation could be satisfied."

The other members gazed at him, emoting stunned incomprehension.

Grayme demanded at last in a cold voice, "Morimet, was your vengeance desire directed at us rather than the Lontastan Federation?"

He chuckled. "Of course not! I wanted to injure the enemy, and that's what I've done."

"By giving them our key man?" exploded Domler.

"Right," Morimet nodded, "our key man, and one they will be slow to learn is worse than useless to them, provided what's said in this chamber today isn't allowed to go further."

He leaned back in his chair and smiled at the others. "How well would a football team play with two quarterbacks calling signals at once?" he asked.

"Oh, I see," said Farsit, puckering his brow. "Or I see what you tried to do. I don't think it'll work that way."

"You don't? Consider these points: First, the Lontastans have grown accustomed to copying our initiatives, to taking our ideas and using them against us. They know that Combrit is *good*, almost as good as their creature Monte, as he demonstrated by holding them to limited victories. Second, they have the same misgivings we would have about looking to a nonhuman for leadership in a purely human fight. They would prefer to limit Monte's role to that of a super-communication system.

"However, they would be as reluctant as you were about rendering a man unsane by installing a fixation in him. Since they had Monte, they could avoid that while not only following our lead but going us one better. They had misgivings about elevating Monte, and they still have them even though Monte has proven himself a winner.

"But now they also have Combrit, already handily fixated for them, with a motivation that will make him

loyal to what he considers the winning side. Don't think they won't use him, friends! They will!

"On the other hand, they won't retract all the authority they've given Monte. He's proven too successful for them to do that. They will try to make an Executive team out of the two of them, which is a very promising-sounding idea, you'll agree."

"Damn right, I agree!" growled Domler. "Entirely *too* promising! It'll probably work! Monte's supermentality and Combrit's motivation and fighting heritage—"

"Very promising-sounding," Morimet repeated with self-satisfaction, "and very much in keeping with the concept of maintaining teamwork at all levels." He hesitated and peered expectantly at the others.

Grayme caught on first. "*A committee!*" she exclaimed. "Monte and Combrit will be a *committee!*"

"Right!" approved Morimet. "It only takes two to make a committee, at which point the long gab-sessions begin! Even with one member of the committee a telepath, it will take time to reach a meeting of minds and make a decision. Monte and Combrit will have the same problems directing the conduct of the Lontastan effort that our Board had before we picked an Executive."

"But how long will it last?" asked Farsit. "Won't they catch on?"

"Maybe, but I doubt it. They *prefer* teamwork, for one thing, just as we do, and won't want to catch on. Also, the idea of one man in charge was copied from us, and it is much easier to neglect, or forget, the basic philosophy behind a borrowed idea than one you work out yourself. The Lontastans won't be as dedicated to the single Executive principle as I hope this Board will remain."

"But when Combrit discovers he isn't on the winning side after all—" Grayme began.

"He'll rationalize his way through that problem," said Morimet. "Read the wording of his fixation, Grayme, with careful attention to tenses. He's on the winning side *now,* and he knows it. What happens from now on can be explained away to his satisfaction."

"Well!" exclaimed Domler. "If all this works out as you expect, Morimet, woe to the Lontastans!"

Morimet smiled and pulled a sheaf of paper from his belt pouch. "That's why I mentioned retiring from the Board. I've got my licks in, and you shouldn't need me any more."

"Radge," asked Grayme softly, "why did you hide behind that vengeance pattern all these years? Did you think we would refuse to go along with you if we knew all the details of your scheme?"

"Partly that. But mostly," Morimet hesitated, his pattern showing a flick of resolved self-distaste. "Mostly, though, it was because I needed a touch of unsanity to go through with it. Combrit was a friend of mine."

He straightened and tossed his papers on the table. "Here are my recommendations concerning the new Executive, and my resignation. My wife's at home rearranging the whole flower garden. I'd better get back there and either stop her if I can, or help her if I can't."

"But look here," broke in Domler, "your scheme is no lasting answer, even if it works for a time. At the best, it can't outlast Combrit!"

Morimet shrugged. "I know, but it gives us war in our time, and that's the best any generation can expect to do. What happens later will be another generation's problem."

He turned and walked jauntily out of the chamber. ■

Next month we begin a new serial by an old master, Harry Harrison: it's called "A Transatlantic Tunnel, Hurrah!"

The time is the near future. The British Empire, guardian of world peace and order, is attempting to build a railroad tunnel across the Atlantic Ocean floor. The chief engineer of the vast project is Augustin Washington, a descendant of the infamous George Washington, leader of the North American Colonies' abortive rebellion some two hundred years ago. Our hero has four principal aims in life: win the hand of the woman he loves; complete the Transatlantic Tunnel; clear the name of his revolutionary ancestor; and win independence for the American colonies . . . not necessarily in that order.

From the opening scenes aboard a plush Victorian railroad train, with its gold-plated nuclear-powered engine, to the wild adventures in the sky aboard England's mammoth coal-powered flying boat, Harry Harrison provides fast-moving adventure, lively humor, and a sharp eye for historical detail—even though the history doesn't belong in our particular time-track.

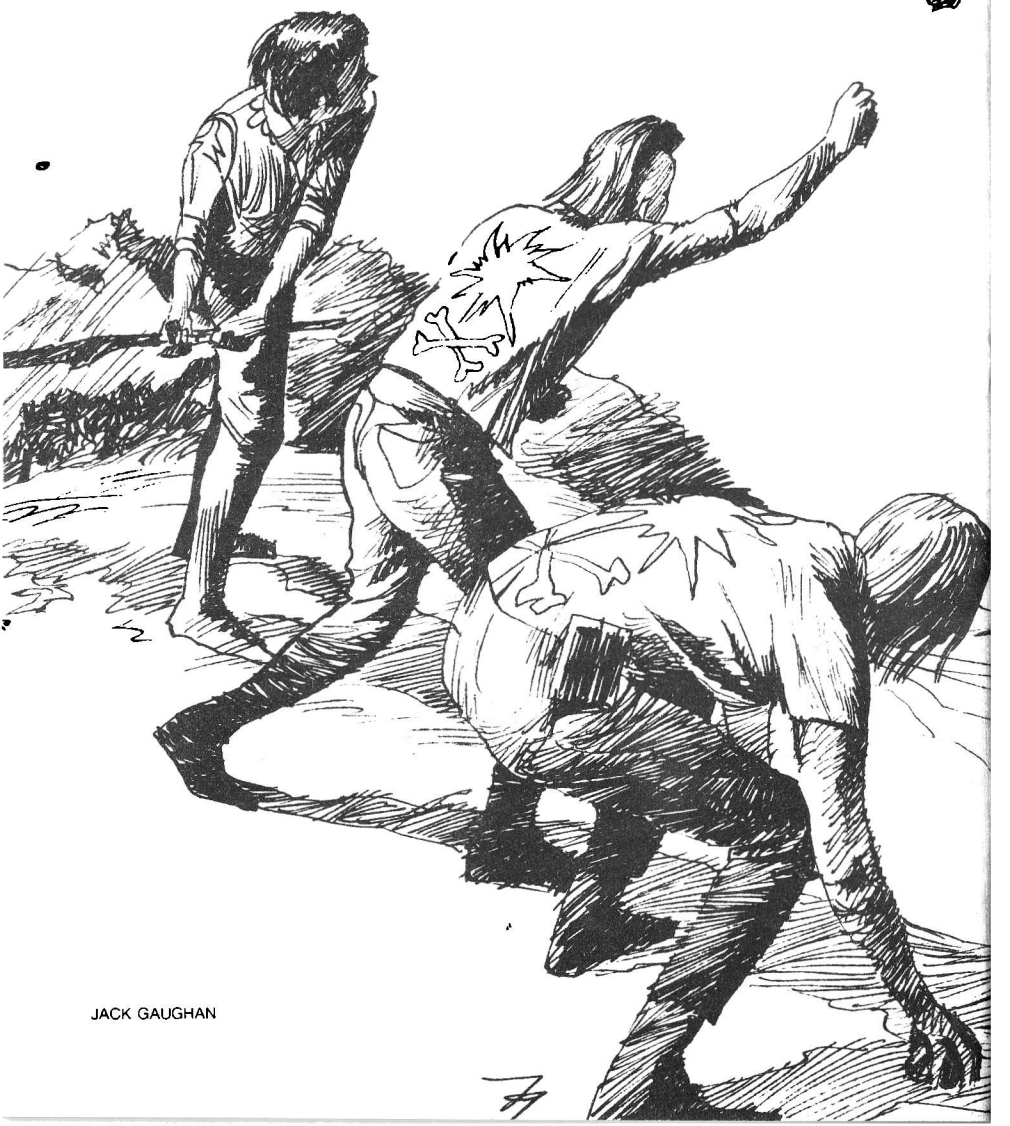
Part 2 of Joseph Green's factual article on NASA's Skylab program will also be in next month. Skylab, of course, is the first practical step toward using our hard-earned space capabilities to Do Something for mankind here on Earth. Because, before you can carry out elaborate programs aboard manned space stations, you have to learn just what men can do in orbit—and what they can't.

Also coming up are stories by Laurence M. Jannifer, Stanley Schmidt, and others. Plus the Reference Library by P. Schuyler Miller, and as many Brass Tacks letters as space permits.

cloak of anarchy

The concept "complete individual freedom" means, to every individual, "what *I* mean by right and proper freedom." But since individuals don't agree . .

LARRY NIVEN



JACK GAUGHAN

Square in the middle of what used to be the San Diego Freeway, I leaned back against a huge, twisted oak. The old bark was rough and powdery against my bare back. There was dark green shade shot with tight parallel beams of white gold. Long grass tickled my legs.

Forty yards away across a wide strip of lawn was a clump of elms, and a small grandmotherly woman sitting on a green towel. She looked like she'd grown there. A stalk of grass protruded between her teeth. I felt we were kindred spirits, and once when I caught her eye I wiggled a forefinger at her, and she waved back.

In a minute now I'd have to be getting up. Jill was meeting me at the Wilshire exits in half an hour. But I'd started walking at the Sunset Boulevard ramps, and I was tired. A minute more . . .

It was a good place to watch the world rotate.

A good day for it, too. No clouds at all. On this hot blue summer afternoon, King's Free Park was as crowded as it ever gets.

Someone at police headquarters had expected that. Twice the usual number of copseyes floated overhead, waiting. Gold dots against blue, basketball-sized, twelve feet up. Each a television eye and a sonic stunner, each a hookup to police headquarters, they were there to enforce the law of the Park.

No violence.

No hand to be raised against another—and no other laws whatever. Life was often entertaining in a Free Park.

North toward Sunset, a man carried a white rectangular sign, blank on both sides. He was parading back and forth in front of a square-jawed youth on a plastic box, who was trying to lecture him on the subject of fusion power and the heat pollution problem. Even this far away I could hear the conviction and the dedication in his voice.

South, a handful of yelling marksmen were throwing rocks at a copseye, directed by a gesticulating man with wild black hair. The golden basketball was dodging the rocks, but barely. Some cop was baiting them. I wondered where they had got the rocks. Rocks were scarce in King's Free Park.

The black-haired man looked familiar. I watched him and his horde chasing the copseye . . . then forgot them when a girl walked out of a clump of elms.

She was lovely. Long, perfect legs, deep red hair worn longer than shoulder length, the face of an arrogant angel, and a body so perfect that it seemed unreal, like an adolescent's daydream. Her walk showed training; possibly she was a model, or dancer. Her only garment was a cloak of glowing blue velvet.

It was fifteen yards long, that cloak. It trailed back from two big gold disks that were stuck somehow to the skin of her shoulders. It trailed back and back, floating at a height of

five feet all the way, twisting and turning to trace her path through the trees. She seemed like the illustration in a book of fairy tales, bearing in mind that the original fairy tales were not intended for children.

Neither was she. You could hear neck vertebrae popping all over the Park. Even the rock-throwers had stopped to watch.

She could sense the attention, or hear it in a whisper of sighs. It was what she was here for. She strolled along with a condescending angel's smile on her angel's face, not overdoing the walk, but letting it flow. She turned, regardless of whether there were obstacles to avoid, so that fifteen yards of flowing cloak could follow the curve.

I smiled, watching her go. She was lovely from the back, with dimples.

The man who stepped up to her a little farther on was the same one who had led the rock-throwers. Wild black hair and beard, hollow cheeks and deep-set eyes, a diffident smile and a diffident walk . . . Ron Cole. Of course.

I didn't hear what he said to the girl in the cloak, but I saw the result. He flinched, then turned abruptly and walked away with his eyes on his feet.

I got up and moved to intercept him. "Don't take it personal," I said.

He looked up, startled. His voice, when it came, was bitter. "How should I take it?"

"She'd have turned any man off the same way. She's to look at, not to touch."

"You know her?"

"Never saw her before in my life."

"Then—?"

"Her cloak. Now you *must* have noticed her cloak."

The tail end of her cloak was just passing us, its folds rippling an improbable deep, rich blue. Ronald Cole smiled as if it hurt his face. "Yah."

"All right. Now suppose you made a pass, and suppose the lady liked your looks and took you up on it. What would she do next? Bearing in mind that she can't stop walking even for a second."

He thought it over first, then asked, "Why not?"

"If she stops walking, she loses the whole effect. Her cloak just hangs there like some kind of tail. It's supposed to wave. If she lies down, it's even worse. A cloak floating at five feet, then swooping into a clump of bushes and bobbing frantically—" Ron laughed helplessly in falsetto. I said, "See? Her audience would get the giggles. That's not what she's after."

He sobered. "But if she really wanted to, she wouldn't *care* about . . . oh. Right. She must have spent a fortune to get that effect."

"Sure. She wouldn't ruin it for Jacques Casanova himself." I thought unfriendly thoughts toward the girl in the cloak. There are polite ways to turn down a pass. Ronald Cole was easy to hurt.

I asked, "Where did you get the rocks?"

"Rocks? Oh, we found a place where the center divider shows through. We knocked off some chunks of concrete." Ron looked down the length of the Park just as a kid bounced a missile off a golden ball. "They got one! Come on!"

The fastest commercial shipping that ever sailed was the clipper ship; yet the world stopped building them after just twenty-five years. Steam had come. Steam was faster, safer, more dependable and cheaper.

The freeways served America for almost fifty years. Then modern transportation systems cleaned the air and made traffic jams archaic and left the nation with an embarrassing problem. What to do with ten thousand miles of unsightly abandoned freeways?

King's Free Park had been part of the San Diego Freeway, the section between Sunset and the Santa Monica interchange. Decades ago the concrete had been covered with topsoil. The borders had been landscaped from the start. Now the Park was as thoroughly covered with green as the much older Griffith Free Park.

Within King's Free Park was an orderly approximation of anarchy. People were searched at the entrances. There were no weapons inside. The copseyes, floating overhead and out of reach, were the next best thing to no law at all.

There was only one law to enforce. All acts of attempted violence carried the same penalty for attacker and victim. Let anyone raise his hands against his neighbor, and one of the golden basketballs would stun them both. They would wake separately, with copseyes watching. It was usually enough.

Naturally people threw rocks at copseyes. It was a Free Park, wasn't it?

"They got one! Come on!" Ron tugged at my arm. The felled copseye was hidden, surrounded by those who had destroyed it. "I hope they don't kick it apart. I told them I need it intact, but that might not stop them."

"It's a Free Park. And they bagged it."

"With my missiles!"

"Who are they?"

"I don't know. They were playing baseball when I found them. I told them I needed a copseye. They said they'd get me one."

I remembered Ron quite well now. Ronald Cole was an artist and an inventor. It would have been two sources of income for another man, but Ron was different. He invented new art forms. With solder and wire and diffraction gratings and several makes of plastics kit, and an incredible collection of serendipitous junk, Ron Cole made things the like of which had never been seen on Earth.

The market for new art forms has

always been low, but now and then he did make a sale. It was enough to keep him in raw materials, especially since many of his raw materials came from basements and attics. Rarely there came a *big* sale, and then, briefly, he would be rich.

There was this about him: he knew who I was, but he hadn't remembered my name. Ron Cole had better things to think about than what name belonged with whom. A name was only a tag and a conversational gambit. "Russel! How are you?" A signal. Ron had developed a substitute.

Into a momentary gap in the conversation he would say, "Look at this," and hold out—miracles.

Once it had been a clear plastic sphere, golf-ball size, balanced on a polished silver concavity. When the ball rolled around on the curved mirror, the reflections were *fantastic.*

Once it had been a twisting sea serpent engraved on a Michelob beer bottle, the lovely vase-shaped bottle of the early 1960s that was too big for standard refrigerators.

And once it had been two strips of dull silvery metal, unexpectedly heavy. "What's this?"

I'd held them in the palm of my hand. They were heavier than lead. Platinum? But nobody carries that much platinum around. Joking, I'd asked, "U-235?"

"Are they warm?" he'd asked apprehensively. I'd fought off an urge to throw them as far as I could and dive behind a couch.

But they *had* been platinum. I never did learn why Ron was carrying them about. Something that didn't pan out.

Within a semicircle of spectators, the felled copseye lay on the grass. It was intact, possibly because two cheerful, conspicuously large men were standing over it, waving everyone back.

"Good," said Ron. He knelt above the golden sphere, turned it with his long artist's fingers. To me he said, "Help me get it open."

"What for? What are you after?"

"I'll tell you in a minute. Help me get— Never mind." The hemispherical cover came off. For the first time ever, I looked into a copseye.

It was impressively simple. I picked out the stunner by its parabolic reflector, the cameras, and a toroidal coil that had to be part of the floater device. No power source. I guessed that the shell itself was a power beam antenna. With the cover cracked there would be no way for a damn fool to electrocute himself.

Ron knelt and studied the strange guts of the copseye. From his pocket he took something made of glass and metal. He suddenly remembered my existence and held it out to me, saying, "Look at this."

I took it, expecting a surprise, and I got it. It was an old hunting watch, a big wind-up watch on a chain, with a protective case. They were in common use a couple of hundred years ago. I looked at the face, said, "Fif-

teen minutes slow. You didn't repair the whole works, did you?"

"Oh, no." He clicked the back open for me.

The works looked modern. I guessed, "Battery and tuning fork?"

"That's what the guard thought. Of course that's what I made it from. But the hands don't move; I set them just before they searched me."

"Aah. What does it do?"

"If I work it right, I think it'll knock down every copseye in King's Free Park."

For a minute or so I was laughing too hard to speak. Ron watched me with his head on one side, clearly wondering if I thought he was joking.

I managed to say, "That ought to cause all *kinds* of excitement."

Ron nodded vigorously. "Of course it all depends on whether they use the kind of circuits I think they use. Look for yourself; the copseyes aren't supposed to be foolproof. They're supposed to be cheap. If one gets knocked down, the taxes don't go up much. The other way is to make them expensive and foolproof, and frustrate a lot of people. People aren't supposed to be frustrated in a Free Park."

"So?"

"Well, there's a cheap way to make the circuitry for the power system. If they did it that way, I can blow the whole thing. We'll see." Ron pulled thin copper wire from the cuffs of his shirt.

"How long will this take?"

"Oh, half an hour—maybe more."

That decided me. "I've got to be going. I'm meeting Jill Hayes at the Wilshire exits. You've met her, a big blond girl, my height—"

But he wasn't listening. "O.K., see you," he muttered. He began placing the copper wire inside the copseye, with tweezers. I left.

Crowds tend to draw crowds. A few minutes after leaving Ron, I joined a semicircle of the curious to see what they were watching.

A balding, lantern-jawed individual was putting something together—an archaic machine, with blades and a small gasoline motor. The T-shaped wooden handle was brand new and unpainted. The metal parts were dull with the look of ancient rust recently removed.

The crowd speculated in half-whispers. What was it? Not part of a car; not an outboard motor, though it had blades; too small for a motor scooter, too big for a motor skateboard—

"Lawn mower," said the white-haired lady next to me. She was one of those small, birdlike people who shrivel and grow weightless as they age, and live forever. Her words meant nothing to me. I was about to ask, when—

The lantern-jawed man finished his work, and twisted something, and the motor started with a roar. Black smoke puffed out. In triumph he gripped the handles. Outside, it was a prison offense to build a working

internal combustion machine. Here—

With the fire of dedication burning in his eyes, he wheeled his infernal machine across the grass. He left a path as flat as a rug. It was a Free Park, wasn't it?

The smell hit everyone at once: black dirt in the air, a stink of half-burned hydrocarbons attacking nose and eyes. I gasped and coughed. I'd never smelled anything like it.

The crowd roared and converged.

He squawked when they picked up his machine. Someone found a switch and stopped it. Two men confiscated the tool kit and went to work with screwdriver and hammer. The owner objected. He picked up a heavy pair of pliers and tried to commit murder.

A copseye zapped him and the man with the hammer, and they both hit the lawn without bouncing. The rest of them pulled the lawn mower apart and bent and broke the pieces.

"I'm half sorry they did that," said the old woman. "Sometimes I miss the sound of lawn mowers. My dad used to mow the lawn on Sunday mornings."

I said, "It's a Free Park."

"Then why can't he build anything he pleases?"

"He can. He did. Anything he's free to build, we're free to kick apart." And my mind finished, *Like Ron's rigged copseye.*

Ron was good with tools. It would not surprise me a bit if he knew enough about copseyes to knock out the whole system.

Maybe someone ought to stop him.

But knocking down copseyes wasn't illegal. It happened all the time. It was part of the freedom of the Park. If Ron could knock them all down at once, well—

Maybe someone ought to stop him.

I passed a flock of high school girls, all chittering like birds, all about sixteen. It might have been their first trip inside a Free Park. I looked back because they were so cute, and caught them staring in awe and wonder at the dragon on my back.

A few years and they'd be too blasé to notice. It had taken Jill almost half an hour to apply it this morning: a glorious red-and-gold dragon breathing flames across my shoulder, flames that seemed to glow by their own light. Lower down were a princess and a knight in golden armor, the princess tied to a stake, the knight fleeing for his life. I smiled back at the girls, and two of them waved.

Short blond hair and golden skin, the tallest girl in sight, wearing not even a nudist's shoulder pouch: Jill Hayes stood squarely in front of the Wilshire entrance, visibly wondering where I was. It was five minutes after three.

There was this about living with a physical culture nut. Jill insisted on getting me into shape. The daily ex-

ercises were part of that, and so was this business of walking half the length of King's Free Park.

I'd balked at doing it briskly, though. Who walks briskly in a Free Park? There's too much to see. She'd given me an hour; I'd held out for three. It was a compromise, like the paper slacks I was wearing despite Jill's nudist beliefs.

Sooner or later she'd find someone with muscles, or I'd relapse into laziness, and we'd split. Meanwhile . . . we got along. It seemed only sensible to let her finish my training.

She spotted me, yelled, "Russel! Here!" in a voice that must have reached both ends of the Park.

In answer I lifted my arm, semaphore-style, slowly over my head and back down.

And every copseye in King's Free Park fell out of the sky, dead.

Jill looked about her at all the startled faces and all the golden bubbles resting in bushes and on the grass. She approached me somewhat uncertainly. She asked, "Did you do that?"

I said, "Yah. If I wave my arms again, they'll all go back up."

"I think you'd better do it," she said primly. Jill had a fine poker face. I waved my arm grandly over my head and down, but, of course, the copseyes stayed where they had fallen.

Jill said, "I wonder what happened to them?"

"It was Ron Cole. You remember him. He's the one who engraved some old Michelob beer bottles for Steuben—"

"Oh, yes. But *how?*"

We went off to ask him.

A brawny college man howled and charged past us at a dead run. We saw him kick a copseye like a soccer ball. The golden cover split, but the man howled again and hopped up and down hugging his foot.

We passed dented golden shells and broken resonators and bent parabolic reflectors. One woman looked flushed and proud; she was wearing several of the copper toroids as bracelets. A kid was collecting the cameras. Maybe he thought he could sell them outside.

I never saw an intact copseye after the first minute.

They weren't all busy kicking copseyes apart. Jill stared at the conservatively dressed group carrying POPULATION BY COPULATION signs, and wanted to know if they were serious. Their grim-faced leader handed us pamphlets that spoke of the evil and the blasphemy of Man's attempts to alter himself through gene tampering and extra-uterine growth experiments. If it was a put-on, it was a good one.

We passed seven little men, each three to four feet high, traveling with a single tall, pretty brunette. They wore medieval garb. We both stared; but I was the one who noticed the makeup and the use of UnTan. African pigmies, probably part of a UN-

sponsored tourist group; and the girl must be their guide.

Ron Cole was not where I had left him.

"He must have decided that discretion is the better part of cowardice. May be right, too," I surmised. "Nobody's ever knocked down *all* the copseyes before."

"It's not illegal, is it?"

"Not illegal, but excessive. They can bar him from the Park, at the very least."

Jill stretched in the sun. She was all golden, and *big*. She said, "I'm thirsty. Is there a fountain around?"

"Sure, unless someone's plugged it by now. It's a—"

"Free Park. Do you mean to tell me they don't even protect the *fountains?*"

"You make one exception, it's like a wedge. When someone ruins a fountain, they wait and fix it that night. That way . . . If I see someone trying to wreck a fountain, I'll generally throw a punch at him. A lot of us do. After a guy's lost enough of his holiday to the copseye stunners, he'll get the idea, sooner or later."

The fountain was a solid cube of concrete with four spigots and a hand-sized metal button. It was hard to jam, hard to hurt. Ron Cole stood near it, looking lost.

He seemed glad to see me, but still lost. I introduced him— "You remember Jill Hayes." He said, "Certainly. Hello, Jill." and, having put her name to its intended purpose, promptly forgot it.

Jill said, "We thought you'd made a break for it."

"I did."

"Oh?"

"You know how complicated the exits are. They have to be, to keep anyone from getting in through an exit with—like a shotgun." Ron ran both hands through his hair, without making it any more or less neat. "Well, all the exits have stopped working. They must be on the same circuits as the copseyes. I wasn't expecting that."

"Then we're locked in," I said. That was irritating. But underneath the irritation was a funny feeling in the pit of my stomach. "How long do you think—"

"No telling. They'll have to get new copseyes in somehow. And repair the beamed power system, and figure out how I bollixed it, and fix it so it doesn't happen again. I suppose someone must have kicked my rigged copseye to pieces by now, but the police don't know that."

"Oh, they'll just send in some cops," said Jill.

"Look around you."

There were pieces of copseyes in all directions. Not one remained whole. A cop would have to be out of his mind to enter a Free Park.

Not to mention the damage to the spirit of the Park.

"I wish I'd brought a bag lunch," said Ron.

I saw the cloak off to my right: a

ribbon of glowing blue velvet hovering at five feet, like a carpeted path in the air. I didn't yell, or point, or anything. For Ron it might be pushing the wrong buttons.

Ron didn't see it. "Actually I'm kind of glad this happened," he said animatedly. "I've always thought that anarchy ought to be a viable form of society."

Jill made polite sounds of encouragement.

"After all, anarchy is only the last word in free enterprise. What can a government do for people that people can't do for themselves? Protection from other countries? If all the other countries are anarchies, too, you don't need armies. Police, maybe; but what's wrong with privately owned police?"

"Fire departments used to work that way," Jill remembered. "They were hired by the insurance companies. They only protected houses that belonged to their own clients."

"Right! So you buy theft and murder insurance, and the insurance companies hire a police force. The client carries a credit card—"

"Suppose the robber steals the card, too?"

"He can't use it. He doesn't have the right retina prints."

"But if the client doesn't have the credit card, he can't sic the cops on the thief."

"Oh." A noticeable pause. "Well—"

Half-listening, for I had heard it all before, I looked for the end points of the cloak. I found empty space at one end and a lovely red-haired girl at the other. She was talking to two men as outré as herself.

One can get the impression that a Free Park is one gigantic costume party. It isn't. Not one person in ten wears anything but street clothes; but the costumes are what get noticed.

These guys were part bird.

Their eyebrows and eyelashes were tiny feathers, green on one, golden on the other. Larger feathers covered their heads, blue and green and gold, and ran in a crest down their spines. They were bare to the waist, showing physiques Jill would find acceptable.

Ron was lecturing. "What does a government do for *anyone* except the people who run the government? Once there were private post offices, and they were cheaper than what we've got now. Anything the government takes over gets more expensive, *immediately.* There's no reason why private enterprise can't do anything a government—"

Jill gasped. She said, "Ooh! How lovely."

Ron turned to look.

As if on cue, the girl in the cloak slapped one of the feathered men hard across the mouth. She tried to hit the other one, but he caught her wrist. Then all three froze.

I said, "See? Nobody wins. She doesn't even like standing still. She—" and I realized why they weren't moving.

In a Free Park it's easy for a girl to

turn down an offer. If the guy won't take No for an answer, he gets slapped. The stun beam gets him and the girl. When she wakes up, she walks away.

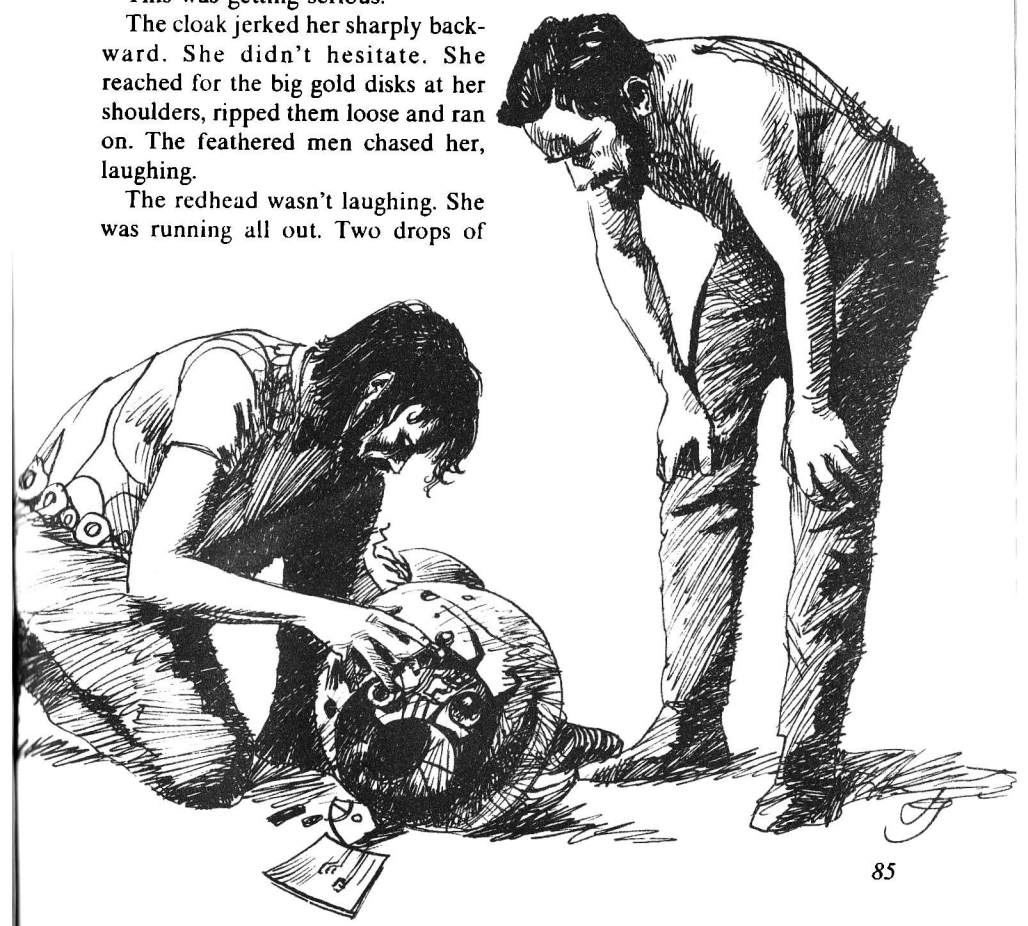
Simple.

The girl recovered first. She gasped and jerked her wrist loose and turned to run. One of the feathered men didn't bother to chase her; he simply took a double handful of the cloak.

This was getting serious.

The cloak jerked her sharply backward. She didn't hesitate. She reached for the big gold disks at her shoulders, ripped them loose and ran on. The feathered men chased her, laughing.

The redhead wasn't laughing. She was running all out. Two drops of



blood ran down her shoulders. I thought of trying to stop the feathered men, decided in favor of it—but they were already past.

The cloak hung like a carpeted path in the air, empty at both ends.

Jill hugged herself uneasily. "Ron, just how does one go about hiring your private police force?"

"Well, you can't expect it to form spontaneously—"

"Let's try the entrances. Maybe we can get out."

It was slow to build. Everyone knew what a copseye did. Nobody thought it through. Two feathered men chasing a lovely nude? A pretty sight; and why interfere? If she didn't want to be chased, she need only . . . what? And nothing else had changed. The costumes, the people with causes, the people looking for causes, the people-watchers, the pranksters—

Blank Sign had joined the POPULATION BY COPULATION faction. His grass-stained pink street tunic jarred strangely with their conservative suits, but he showed no sign of mockery; his face was as preternaturally solemn as theirs. Nonetheless they did not seem glad of his company.

It was crowded near the Wilshire entrance. I saw enough bewildered and frustrated faces to guess that it was closed. The little vestibule area was so packed that we didn't even try to find out what was wrong with the doors.

"I don't think we ought to stay here," Jill said uneasily.

I noticed the way she was hugging herself. "Are you cold?"

"No." She shivered. "But I wish I were dressed."

"How about a strip of that velvet cloak?"

"Good!"

We were too late. The cloak was gone.

It was a warm September day, near sunset. Clad only in paper slacks, I was not cold in the least. I said, "Take my slacks."

"No, hon, I'm the nudist." But Jill hugged herself with both arms.

"Here," said Ron, and handed her his sweater. She flashed him a grateful look, then, clearly embarrassed, she wrapped the sweater around her waist and knotted the sleeves.

Ron didn't get it at all. I asked him, "Do you know the difference between nude and naked?"

He shook his head.

"Nude is artistic. Naked is defenseless."

Nudity was popular in a Free Park. That night, nakedness was not. There must have been pieces of that cloak all over King's Free Park. I saw at least four that night: one worn as a kilt, two being used as crude sarongs, and one as a bandage.

On a normal day, the entrances to King's Free Park close at six. Those who want to stay, stay as long as they like. Usually there are not many,

because there are no lights to be broken in a Free Park; but light does seep in from the city beyond. The copseyes float about, guided by infrared, but most of them are not manned.

Tonight would be different.

It was after sunset, but still light. A small and ancient lady came stumping toward us with a look of murder on her lined face. At first I thought it was meant for us; but that wasn't it. She was so mad she couldn't see straight.

She saw my feet and looked up. "Oh, it's you. The one who helped break the lawn mower," she said—which was unjust. "A Free Park, is it? A Free Park! Two men just took away my dinner!"

I spread my hands. "I'm sorry. I really am. If you still had it, we could try to talk you into sharing it."

She lost some of her mad; which brought her embarrassingly close to tears. "Then we're all hungry together. I brought it in a plastic bag. Next time I'll use something that isn't transparent, by d-damn!" She noticed Jill and her improvised sweater-skirt, and added, "I'm sorry, dear, I gave my towel to a girl who needed it even more."

"Thank you anyway."

"Please, may I stay with you people until the copseyes start working again? I don't feel safe, somehow. I'm Glenda Hawthorne."

We introduced ourselves. Glenda Hawthorne shook our hands. By now it was quite dark. We couldn't see the city beyond the high green hedges, but the change was startling when the lights of Westwood and Santa Monica flashed on.

The police were taking their own good time getting us some copseyes.

We reached the grassy field sometimes used by the Society for Creative Anachronism for their tournaments. They fight on foot with weighted and padded weapons designed to behave like swords, broadaxes, morningstars, et cetera. The weapons are bugged so that they won't fall into the wrong hands. The field is big and flat and bare of trees, sloping upward at the edges.

On one of the slopes, something moved.

I stopped. It didn't move again, but it showed clearly in light reflected down from the white clouds. I made out something man-shaped and faintly pink, and a pale rectangle nearby.

I spoke low. "Stay here."

Jill said, "Don't be silly. There's nothing for anyone to hide under. Come on."

The blank sign was bent and marked with shoe prints. The man who had been carrying it looked up at us with pain in his eyes. Drying blood ran from his nose. With effort he whispered, "I think they dislocated my shoulder."

"Let me look." Jill bent over him. She probed him a bit, then set herself and pulled hard and steadily on his arm. Blank Sign yelled in pain and despair.

"That'll do it." Jill sounded satisfied: "How does it feel?"

"It doesn't hurt as much." He smiled, almost.

"What happened?"

"They started pushing me and kicking me to make me go away. I was *doing* it, I was walking away. I *was*. Then someone snatched away my sign—" He stopped for a moment, then went off at a tangent. "I wasn't hurting anyone with my sign. I'm a Psych Major. I'm writing a thesis on what people read into a blank sign. Like the blank sheets in the Rorschach tests."

"What kind of reactions do you get?"

"Usually hostile. But nothing like *that.*" Blank Sign sounded bewildered. "Wouldn't you think a Free Park is the one place you'd find freedom of speech?"

Jill wiped at his face with a tissue from Glenda Hawthorne's purse. She said, "Especially when you're not saying anything. Hey, Ron, tell us more about your government by anarchy."

Ron cleared his throat. "I hope you're not judging it by *this*. King's Free Park hasn't been an anarchy for more than a couple of hours. It needs time to develop."

Glenda Hawthorne and Blank Sign must have wondered what the hell he was talking about. I wished him joy in explaining it to them, and wondered if he would explain who had knocked down the copseyes.

This field would be a good place to spend the night. It was open, with no cover and no shadows, no way for anyone to sneak up on us.

And I was learning to think like a true paranoid.

We lay on wet grass, sometimes dozing, sometimes talking. Two other groups no bigger than ours occupied the jousting field. They kept their distance, we kept ours. Now and then we heard voices, and knew that they were not asleep; not all at once, anyway.

Blank Sign dozed restlessly. His ribs were giving him trouble, though Jill said none of them were broken. Every so often he whimpered and tried to move and woke himself up. Then he had to hold himself still until he fell asleep again.

"Money," said Jill. "It takes a government to print money."

"But you could get IOUs printed. Standard denominations, printed for a fee and notarized. Backed by your good name."

Jill laughed softly. "Thought of everything, haven't you? You couldn't travel very far that way."

"Credit cards, then."

I had stopped believing in Ron's anarchy. I said, "Ron, remember the girl in the long blue cloak?"

A little gap of silence. "Yah?"

"Pretty, wasn't she? Fun to watch."

"Granted."

"If there weren't any laws to stop you from raping her, she'd be muffled to the ears in a long dress and

carrying a tear gas pen. What fun would that be? I *like* the nude look. Look how fast it disappeared after the copseyes fell."

"Mm-m," said Ron.

The night was turning cold. Far-away voices; occasional distant shouts, came like thin gray threads in a black tapestry of silence. Mrs. Hawthorne spoke into that silence.

"What was that boy really saying with his blank sign?"

"He wasn't saying anything," said Jill.

"Now, just a minute, dear. I think he was, even if he didn't know it." Mrs. Hawthorne talked slowly, using the words to shape her thoughts. "Once there was an organization to protest the forced contraception bill. I was one of them. We carried signs for hours at a time. We printed leaflets. We stopped people passing so that we could talk to them. We gave up our time, we went to considerable trouble and expense, because we wanted to get our ideas across.

"Now, if a man had joined us with a blank sign, he would have been *saying* something.

"His sign says that he has no opinion. If he joins us, he says that we have no opinion either. He's saying our opinions aren't worth anything."

I said, "Tell him when he wakes up. He can put it in his notebook."

"But his notebook is *wrong*. He wouldn't push his blank sign in among people he agreed with, would he?"

"Maybe not."

"I . . . suppose I don't like people with no opinions." Mrs. Hawthorne stood up. She had been sitting tailor-fashion for some hours. "Do you know if there's a pop machine nearby?"

There wasn't, of course. No private company would risk getting their machines smashed once or twice a day. But she had reminded the rest of us that we were thirsty. Eventually we all got up and trooped away in the direction of the fountain.

All but Blank Sign.

I'd *liked* that blank sign gag. How odd, how ominous, that so basic a right as freedom of speech could depend on so slight a thing as a floating copseye.

I was thirsty.

The park was bright by city light, crossed by sharp-edged shadows. In such light it seems that one can see much more than he really can. I could see into every shadow; but, though there were stirrings all around us, I could see nobody until he moved. We four, sitting under an oak with our backs to the tremendous trunk, must be invisible from any distance.

We talked little. The Park was quiet except for occasional laughter from the fountain.

I couldn't forget my thirst. I could feel others being thirsty around me. The fountain was right out there in the open, a solid block of concrete with five men around it.

They were dressed alike, in paper

shorts with big pockets. They looked alike: like first-string athletes. Maybe they belonged to the same order, or frat, or ROTC class.

They had taken over the fountain.

When someone came to get a drink, the tall ash-blond one would step forward with his arm held stiffly out, palm forward. He had a wide mouth and a grin that might otherwise have been infectious, and a deep, echoing voice. He would intone, "Go back. None may pass here but the immortal Cthulhu--" or something equally silly.

Trouble was, they weren't kidding. Or: they were kidding, but they wouldn't let anyone have a drink.

When we arrived, a girl dressed in a towel had been trying to talk some sense into them. It hadn't worked. It might even have boosted their egos: a lovely half-naked girl begging them for water. Eventually she'd given up and gone away.

In that light her hair might have been red. I hoped it was the girl in the cloak.

And a beefy man in a yellow business jumper had made the mistake of demanding his Rights. It was not a night for Rights. The blond kid had goaded him into screaming insults, a stream of unimaginative profanity, which ended when he tried to hit the blond kid. Then three of them had swarmed over him. The man had left crawling, moaning of police and lawsuits.

Why hadn't somebody done something?

I had watched it all from sitting position. I could list my own reasons. One: it was hard to face the fact that a copseye would not zap them both, any second now. Two: I didn't like the screaming fat man much. He talked dirty. Three: I'd been waiting for someone else to step in.

Mrs. Hawthorne said, "Ronald, what time is it?"

Ron may have been the only man in King's Free Park who knew the time. People generally left their valuables in lockers at the entrances. But years ago, when Ron was flush with money from the sale of the engraved beer bottles, he'd bought an implant-watch. He told time by one red mark and two red lines glowing beneath the skin of his wrist.

We had put the women between us, but I saw the motion as he glanced at his wrist. "Quarter of twelve."

"Don't you think they'll get bored and go away? It's been twenty minutes since anyone tried to get a drink." Mrs. Hawthorne said.

Jill shifted against me in the dark. "They can't be any more bored than we are. I think they'll get bored and stay anyway. Besides—" She stopped.

I said, "Besides that, we're thirsty *now.*"

"Right."

"Ron, have you seen any sign of those rock throwers you collected? Especially the one who knocked down the copseye."

"No."

I wasn't surprised. In this dark-

ness? "Do you remember his . . ." and I didn't even finish.

". . . Yes!" Ron said suddenly.

"You're kidding."

"No. His name was Bugeyes. You don't forget a name like that."

"I take it he had bulging eyes?"

"I didn't notice."

Well, it was worth a try. I stood and cupped my hands for a megaphone and shouted, *"Bugeyes!"*

One of the Water Monopoly shouted, "Let's keep the noise down out there!"

"Bugeyes!"

A chorus of remarks from the Water Monopoly. "Strange habits these peasants—" "Most of them are just thirsty. *This* character—"

From off to the side: "What do you want?"

"We want to talk to you! Stay where you are!" To Ron I said, "Come on." To Jill and Mrs. Hawthorne, "Stay here. Don't get involved."

We moved out into the open space between us and Bugeyes' voice.

Two of the five kids came immediately to intercept us. They must have been bored, all right, and looking for action.

We ran for it. We reached the shadows of the trees before those two reached us. They stopped, laughing like maniacs, and moved back to the fountain.

Ron and I, we lay on our bellies in the shadows of low bushes. Across too much shadowless grass, four men in paper shorts stood at parade rest at the four corners of the fountain. The fifth man watched for a victim.

A boy walked out between us into the moonlight. His eyes were shining, big, expressive eyes, maybe a bit too prominent. His hands were big, too—with knobby knuckles. One hand was full of acorns.

He pitched them rapidly, one at a time, overhand. First one, then another of the Water Monopoly twitched and looked in our direction. Bugeyes kept throwing.

Quite suddenly, two of them started toward us at a run. Bugeyes kept throwing until they were almost on him; then he threw his acorns in a handful and dived into the shadows.

The two of them ran between us. We let the first go by: the wide-mouthed blond spokesman, his expression low and murderous now. The other was short and broad-shouldered, an intimidating silhouette, seemingly all muscle. A tackle. I stood up in front of him, expecting him to stop in surprise; and he did, and I hit him in the mouth as hard as I could.

He stepped back in shock. Ron wrapped an arm around his throat.

He bucked. Instantly. Ron hung on. I did something I'd seen often enough on television: linked my fingers and brought both hands down on the back of his neck.

The blond spokesman should be back by now; and I turned, and he was. He was on me before I could get my hands up. We rolled on the

ground, me with my arms pinned to my sides, him unable to use his hands without letting go. It was lousy planning for both of us. He was squeezing the breath out of me. Ron hovered over us, waiting for a chance to hit him.

Suddenly there were others, a lot of others. Three of them pulled the blond kid off me, and a beefy, bloody man in a yellow business jumper stepped forward and crowned him with a rock.

The blond kid went limp.

The man squared off and threw a straight left hook with the rock in his hand. The blond kid's head snapped back, fell forward.

I yelled, "Hey!" Jumped forward, got hold of the arm that held the rock.

Someone hit me solidly in the side of the neck.

I dropped. It felt like all my strings had been cut. Someone was helping me to my feet—Ron—voices babbling in whispers, one shouting, "Get him—"

I couldn't see the blond kid. The other one, the tackle, was up and staggering away. Shadows came from between the trees to play pileup on him. The woods were alive, and it was just a *little* patch of woods. Full of angry, thirsty people.

Bugeyes reappeared, grinning widely. "Now what? Go somewhere else and try it again?"

"Oh, no. It's getting very viscious out tonight. Ron, we've got to stop them. They'll kill him!"

"It's a Free Park. Can you stand now?"

"Ron, they'll *kill* him!"

The rest of the Water Trust was charging to the rescue. One of them had a tree branch with the leaves stripped off. Behind them, shadows converged on the fountain.

We fled.

I had to stop after a dozen paces. My head was trying to explode. Ron looked back anxiously, but I waved him on. Behind me the man with the branch broke through the trees and ran toward me to do murder.

Behind him, all the noise suddenly stopped.

I braced myself for the blow.

And fainted.

He was lying across my legs, with the branch still in his hand. Jill and Ron were pulling at my shoulders. A pair of golden moons floated overhead.

I wriggled loose. I felt my head. It seemed intact.

Ron said, "The copseyes zapped him before he got to you."

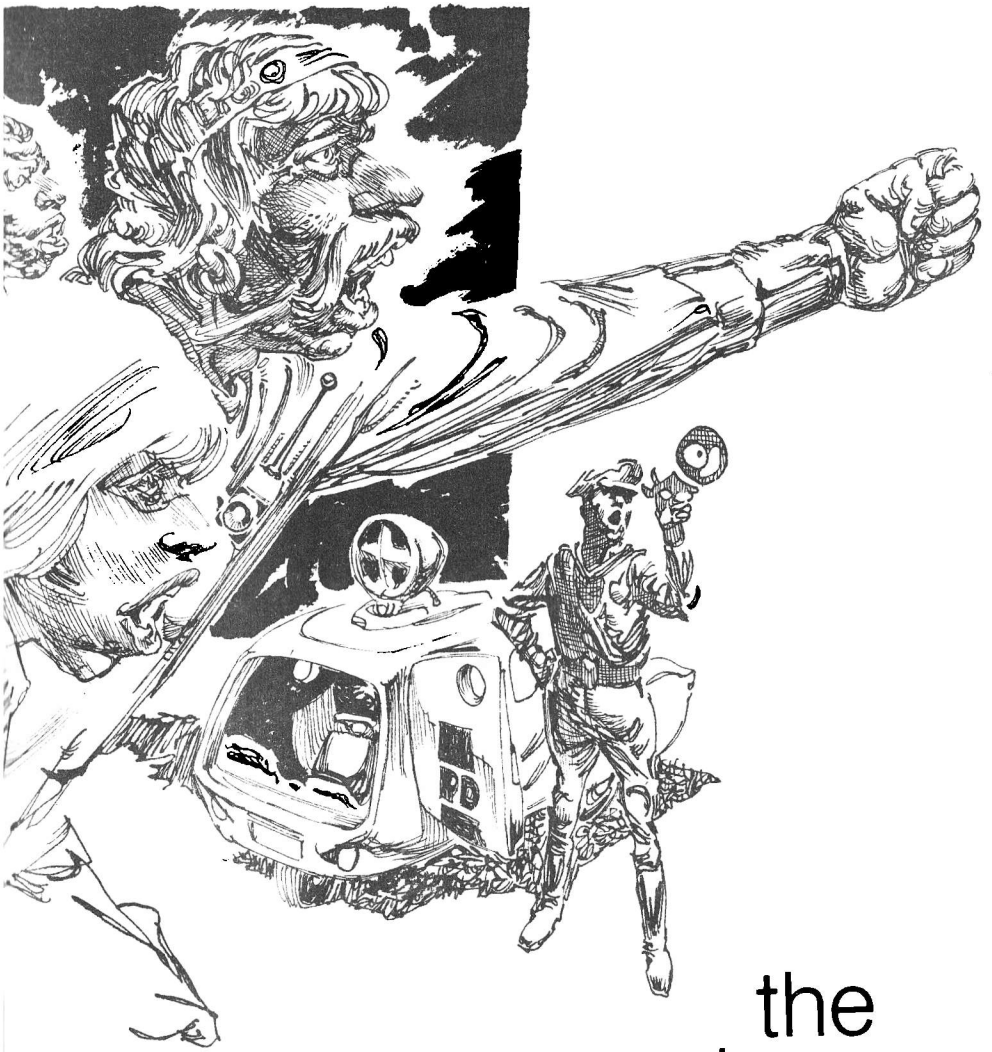
"What about the others? Did they kill them?"

"I don't know." Ron ran his hands through his hair. "I was wrong. Anarchy isn't stable. It comes apart too easily."

"Well, don't do anymore experiments, O.K.?"

People were beginning to stand up. They streamed toward the exits, gathering momentum, beneath the yellow gaze of the copseyes. ■

LEO SUMMERS



the long silence

Silence is golden, eh? Always? For everyone?

DONALD NOAKES

The police car traveled slowly along a street parallel to that carrying the marching demonstrators. Each time the car passed one of the connecting side streets the roar, no longer muffled by buildings, hit the car like a solid wave.

Superintendent Mack would not have been surprised to feel the car move sideways. He looked back at dark-skinned Inspector Khan and small, birdlike Professor Nantzen.

"Noisier than ever," he said. "If they stop it should be a good test for your box, Professor."

Nantzen leaned forward and patted the white metal box on the floor of the car.

"It will work. You will see. I hope they *do* stop."

"I don't," said Khan. "I'm not looking forward to it. The new law isn't popular. If they stop, it will be a deliberate challenge."

"It could be hairy," agreed Mack, "but I think it's a reasonable law. They can still march and demonstrate, but if they make any unauthorized halt and fail to disperse after warning, they face certain imprisonment. In any case, it *is* the law, and we have to carry it out as best we can."

He winced as they passed another side street.

"Damned if I know how they manage it, but they seem to get noisier each time. I've seen 'em all—teddy boys, rockers, flower people, hippies, greasers, skinheads, yippies, gabadoos, blinkers—but these lamies beat the lot. Love and music for Pete's sake—they're raving nutters!"

Khan nodded.

"It's a wonder they don't drive everyone mad. Towards the end of last week's demo I felt like screaming myself. It was probably as well that no one could hear what some of my men were yelling!"

Mack glanced out of the window.

"Any minute now. If they are going to try to stop anywhere, it will be outside the Dumbrian Embassy. Pull up just short of the next corner, Driver."

Professor Nantzen leaned forward and checked the connections and switches of his white box. The noise from their left rolled forward and increased.

"Purple One to Ivory. A group of lamies have stopped outside the Dumbrian Embassy. Trying to halt the march. Over."

Mack picked up the car microphone.

"Ivory to Purple One. Try to keep the main body moving."

He lowered the car window, listened to the roar, and wound up the window again.

"Are you using your loud hailers? Over."

"All loud hailers in operation but drowned by noise. We've got most of 'em moving past the Embassy. About a hundred halted. Mostly lamies. Suggest you try to move them before it gets too big. Over and out."

Mack grunted and replaced the microphone.

"Right, Driver. See how close you can get."

The noise hit them as they turned the corner. By the time that they reached the small square it was impossible to hear themselves speak, even with the car windows closed.

A line of police formed a semicircle in front of the Dumbrian Embassy. A mass of shouting demonstrators stood facing them. Almost all wore brightly colored lamie tunics with the chest pouch to hold a transistor radio. From the noise, Mack judged that all the radios must be turned to maximum volume.

Mack nodded to Khan, who left the car and raised his right arm. Police poured from the tenders which had halted behind the car.

Mack shook his head as Nantzen stretched out his hand to the box.

Khan lined up his men, then waved to Mack.

The superintendent picked up the microphone attached to the white box and nodded to Nantzen.

The professor turned two switches, and the din was cut off, cleanly and sharply.

In the square, lamie faces were still red as they yelled, but no ripple of sound emerged. Silence—until Mack spoke into the microphone and his voice boomed out from the loudspeakers on top of the car.

"You are committing an offense by halting here. You will disperse. Either rejoin your march to Hyde Park, or move off in any direction. Move now, or you will be arrested."

Inspector Khan and his group moved forward, a slow, solid wall of blue.

Lamies were banging their radios and mouthing soundlessly. A man at the rear of the crowd turned and ran, then another. Soon all but a small group of lamies had dispersed.

"Move on," ordered Mack. "This is the last warning before you are arrested."

Still the remaining lamies stood their ground. Suddenly, a transistor radio was hurled at the police, and then the defiant lamies charged.

Inspector Khan mopped his face as he re-entered the car.

"Damned if I know what's got into them. They fought like demons. So much for their nonviolence."

When they reached the police station, they found some lamies still struggling, some sitting on the floor screaming, while two sat slumped against a wall, mouths open slackly, staring silently into space.

Four hours later, Mack interrupted the two police surgeons, who were still in consultation.

"All that we can say definitely is that we cannot certify that any of the prisoners are fit to be questioned, or charged. As far as we can tell at this stage they are all mentally unbalanced. We have put ten under sedation. The remaining eight are calmer now, but we can get no response from them."

"Putting on an act, do you think?"

"It's a possibility—but if they are

it's going to be difficult to prove. We think it best that they be moved to a mental hospital. Let the experts decide. I'll make arrangements if you agree."

Mack frowned and rubbed his wiry gray hair.

"All right. Just give me time to have photos taken."

"Photos! What do you want photos for?"

"They had very little in their pockets, except their blasted transistors. We know the names of only two. However, from other bits and pieces, it seems likely that four came from the commune at Shepherds Bush and three from Chelsea. We shall have to look into their mental state before the demonstration. I don't like the situation one little bit."

Mack decided to go to Shepherds Bush himself and to send Khan to Chelsea.

Three lamies sat on the steps of the large house. Music from their transistors mingled with the sound of traffic and with more music from the commune. The lamies looked at Mack incuriously.

"Is anyone in charge here?" he asked.

He repeated the question, shouting to overcome the music.

They shook their heads. Then one said, "Jethro's pretty cute at arranging things. Take him to Jethro, man."

Mack winced as he entered the house. The noise from radios nearly deafened him. He smiled wryly at the slogans on the walls: "Love and Music"; "Music Means Harmony"; "Strike Chords not Blows"; "Tune in to Music and Peace".

His guide took him to a room in which a dozen lamies sat cross-legged on the floor, eyes half closed, swaying in time to the beat of music. The guide indicated a gaunt young man whose ginger hair and beard clashed horribly with his orange tunic and brick-red trousers.

Jethro smiled and patted the floor by his side. Mack sat down.

"I would like to talk to you," shouted Mack. "Turn off your radios, please."

Jethro shook his head, but he turned down the volume of his transistor.

Mack showed the first photograph to Jethro.

"Do you know this man?"

The lamie flicked his gaze at the photo and shook his head. He still swayed in time to the music.

After getting the same response to two other photos, both of lamies he felt certain came from this commune, Mack got up.

"Is there somewhere quieter where we can talk?"

A shrug.

"Come out to my car with me. It is important that I talk to you."

As they left the building, Jethro turned up the volume of the radio in the kangaroo pocket of his tunic.

Inside the car, Mack scowled at him.

"Turn it down, please. Don't you ever turn it off?"

Jethro turned down the volume and shook his head.

"Damn it, surely you must turn it off to go to sleep?"

"No–just very soft, man."

Mack started again with the photos.

"That's Jimmie," said Jethro. "He's a turn, man."

"A turn. What do you mean?"

"Comic. Great mimic."

"What is he like when he's not doing a turn?"

Jethro looked puzzled.

"Just ordinary, man."

He recognized more photos. The first he described as just ordinary, and nodded when Mack asked whether the next was ordinary too.

A suspicion entered Mack's mind. When Jethro indicated that he knew the next lamie, Mack said, "How about him? Is he odd?"

Jethro nodded happily.

Mack sighed and let him go.

The three lamies sitting on the steps confirmed Mack's suspicion. They cheerfully agreed with everything he said about the lamies they recognized. They were ordinary, mad, quiet, noisy, miserable, cheerful–anything to please their interrogator.

Back at New Scotland Yard, Inspector Khan massaged his forehead.

"I couldn't get any sense out of any of them. The noise was incredible. I wonder they're not *all* mad, but they certainly seem harmless."

The next morning, the headlines in the national press varied from, "Police Brutality–Twenty Lamies in Hospital," to "Police Impose Silence."

To Mack's relief the press made no mention of the suspected insanity of the arrested lamies.

At a conference at New Scotland Yard, Mack gave a factual report, concluding, "The arrested men and women are still in the hospital. Latest reports are that there is little change in their condition. Inspector Khan and I visited the lamie communes at Chelsea and Shepherds Bush. We could get no reliable evidence as to the mental state of the prisoners before their arrest. I was told that one of the men is a good mimic. Perhaps he could put on an act–but I doubt whether he could have taught the others. In any case, that presupposes that the lamies were prepared to be arrested–"

A messenger entered and gave the assistant commissioner a slip of paper. He frowned at the paper and then looked at Mack:

"Another test for Nantzen's box. Lamies estimated at five hundred in Hyde Park. Planning to walk in small groups and to concentrate for protest meeting outside the Yard. I should say that you have half an hour to make your preparations, Mack."

"I don't like it, sir. Suppose the box *does* damage their brains?"

Nantzen shook his head.

"Impossible. My device merely absorbs all sound waves except those on a very narrow band transmitted by the equipment. It didn't affect any of your men, did it?"

Mack agreed that this was so.

The assistant commissioner got up.

"If they drown the loud hailers, you'll have to use the professor's equipment. They must be warned and be given an opportunity to disperse before being arrested."

"I appreciate that, sir. I'm not at all happy about it. Could the radio station stop transmitting? We need only a couple of minutes."

"No time to convince them. You'd best get organized."

Mack was unusually tense as he sat in the car with Nantzen and Khan. He still mistrusted the effect of the professor's equipment. Something he had heard was important—but what?

By the time that he had made up his mind hundreds of lamies had assembled, blocking Broadway. Normal speech was impossible, and the loud hailers useless.

Mack wrote in his notebook, "When I raise microphone, switch on. *Immediately* I drop mike, *switch off.* There must be no delay. Understood?"

Nantzen read the message, shrugged and nodded.

Mack raised the microphone. Silence, sudden and complete.

"This is an illegal assembly. I must order you to disperse. The silence will end five seconds from now."

He watched the faces of the nearest lamies as he mentally counted off the seconds. The faces showed only surprise.

When he lowered the microphone, the transistors blared out again. The shouting crowd swayed.

Mack lifted the microphone. Again the incredible silence.

"Disperse, please. I have the power to keep you in silence. Think about this. Think carefully. If you do not disperse, I shall leave you in silence—to think. After I finish speaking there will be ten seconds silence. If you do not move off during this time, I shall impose silence again."

After five seconds he could see signs of panic. He tried to read the faces of the crowd.

At eight seconds the movement began, and as he lowered the microphone the last of the lamies were in flight. Transistors again blared.

Mack sighed with relief.

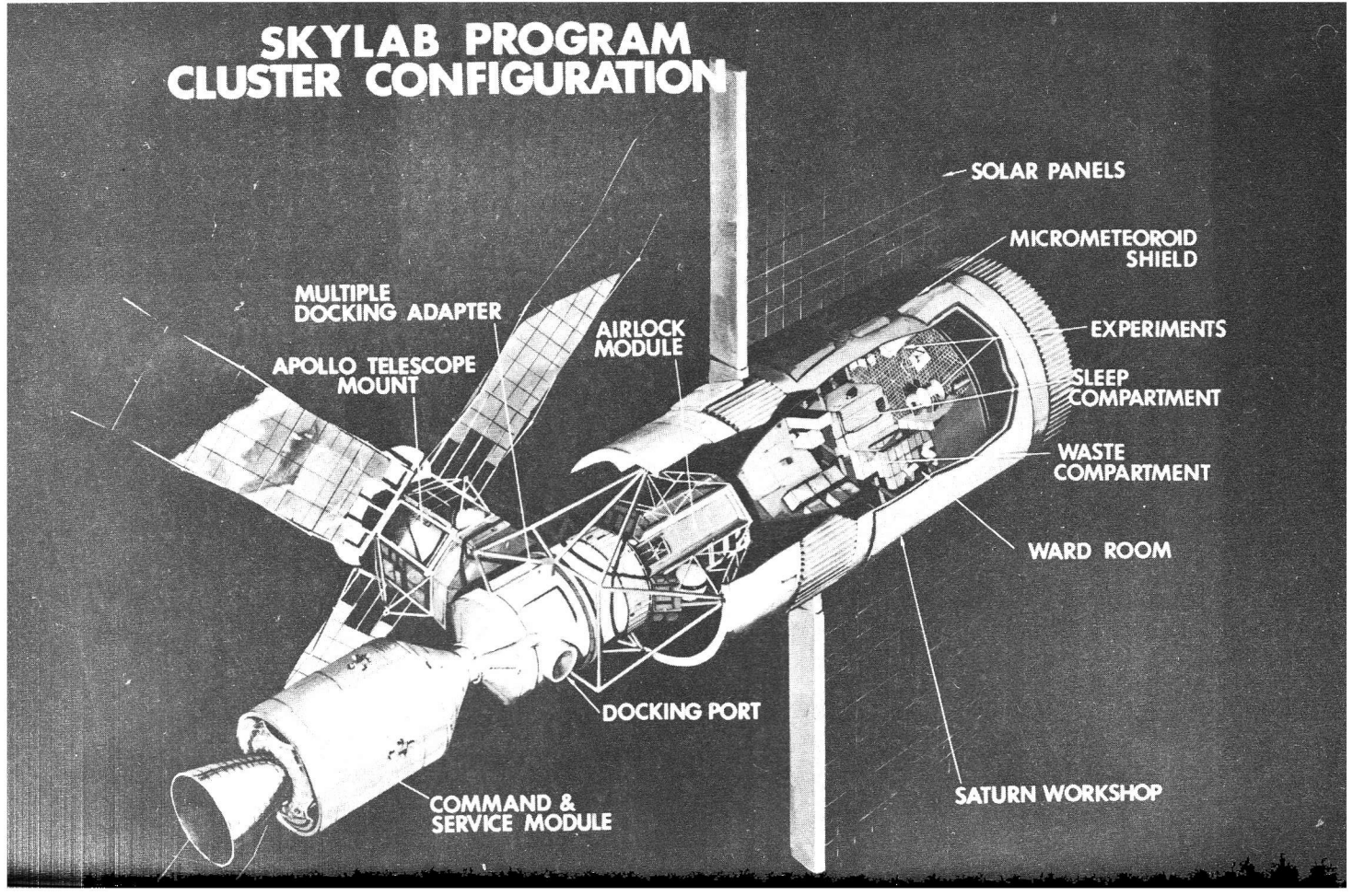
"Thank God it worked. I must see a psychiatrist before we use the box again."

Khan looked at him anxiously.

"You'd better come and have a drink, sir. I think that's what you need. It's been a strain—"

"Damn it, Khan, don't you understand—we were risking their sanity. We must find out exactly how long a silence can be imposed on lamies without danger. Without noise they have to think. If they are forced to think for too long, they go mad." ■


skylab
With the Salyut space station the Russians have once again beaten the United States to a "first" in space. The tragic deaths of the three cosmonauts overshadowed the technological success they achieved. But the United States program will, as usual, be bigger and better!
Joseph Green


SKYLAB PROGRAM
CLUSTER CONFIGURATION
SOLAR PANELS
MICROMETEOROID SHIELD
EXPERIMENTS
SLEEP COMPARTMENT
WASTE COMPARTMENT
WARD ROOM
SATURN WORKSHOP
AIRLOCK MODULE
MULTIPLE DOCKING ADAPTER
APOLLO TELESCOPE MOUNT
DOCKING PORT
COMMAND & SERVICE MODULE

[redacted]

Bonnie Astromonk died July 6, 1969.

Bonnie died from heart failure, a common death brought on by a unique condition—weightlessness. Bonnie was a 14-lb. macaque monkey, the primary passenger in the Biosatellite 3 capsule. The mission was terminated after eight and one half days of a planned three-week mission because telemetry indicated Bonnie was seriously ill, afflicted by such unusual troubles as loss of circadian rhythm, rapid changes from one to another of the four normal levels of sleep, and pendular eye movement—abnormal swinging from side to side. The monkey's balance system seemed out of order, he lost 20% of his body weight, his heart rate dropped rapidly, and his brain temperature fell 5°F. He lived only a few hours after his capsule reentered the atmosphere and was recovered.

Commander Andrian G. Nikolayev and Flight Engineer Vitali Sevastyanov did not die after establishing a record flight of eighteen days in space in June of 1970. But both men lost weight, had difficulty adjusting to gravity after returning to Earth, and encountered physiological problems with calcium balance, bone deterioration, and other slowly accumulating ills. Similar problems had appeared as early as 1965, in a less severe form, in the fourteen-day flight of Frank Borman and James Lovell in Gemini 7. Some scientists now speculate that the problems associated with weightlessness may be more subtle and less dramatic than anticipated, but still troublesome. Until these questions are resolved, flights to Mars that would require men to live under weightless conditions for many months would not be safe. Fortunately, the United States already has a program in work where the long-term effects of weightlessness will be thoroughly investigated. It is called Skylab, and the major item of hardware is the forerunner of the larger modular space stations planned for later in the decade.

Skylab began as the Apollo Applications Program, with the intent of

Figure 1. Complete Skylab, with most of upper floor in OWS hydrogen tank cut away to reveal Crew Quarters on bottom level. Note battery modules and tanks of breathable gases on exterior of AM, large radiator above radial docking port on MDA.

utilizing Apollo Program knowledge and equipment to obtain new scientific data, primarily by an intensive above-the-atmosphere study of the sun. The original aims have not changed, but new experiments and studies have been added until, with the name change to Skylab, the program is now equally a study of men living and working under weightless conditions.

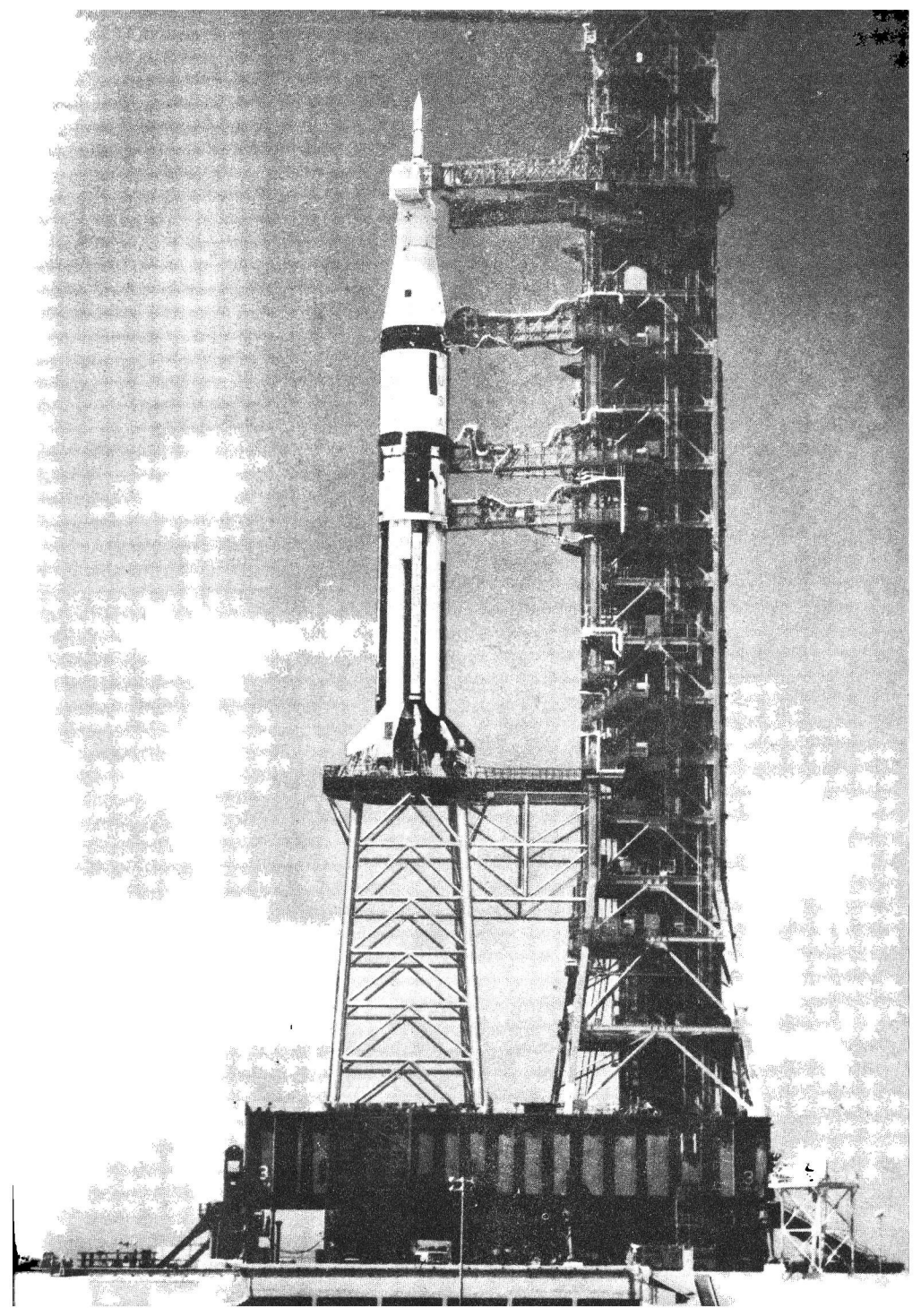
Skylab I will be launched from the Kennedy Space Center in the latter half of 1972, lifted by a giant Saturn V rocket. This vehicle will be 31-ft. shorter and approximately 175,000-lbs. lighter at liftoff than one carrying astronauts to the Moon, and it will be unmanned. After liftoff the Saturn will head down-range at an inclination from the equator of approximately fifty degrees, roughly parallel to the eastern U.S. coastline. When the first-stage engines cut off after the usual 2½ minute burn the vehicle will be moving somewhat faster than the normal 6,000-mph. The second stage will ignite and carry itself and the S-IVB third stage into a 235-nautical mile circular orbit. This feat is possible because of the overall reduction in weight. Normally the third stage must burn its single rocket to achieve orbit, but on this flight that is not possible; the S-IVB has no engine.

The inert third stage will bear little resemblance to an S-IVB on a Moon mission. Three new items of hardware have replaced the Command Service Module and Lunar Module. An Airlock Module (AM) extends outward from the top of the stage's hydrogen tank. It connects to a larger cylinder called the Multiple Docking Adapter (MDA). And ahead of the MDA, held in place and supported by a framework of aluminum tubing, will be the most complex astronomical tool ever launched into space, the Apollo Telescope Mount (ATM).

The Instrument Unit, the automatic pilot for Saturn vehicles, will have several hours of life left and many duties to perform. It will activate two new cold gas jet rocket clusters, called the Thrust Attitude Control System, near the base of the third stage. These will orient the vehicle to a solar-inertial attitude, where the Skylab's short axis will always face the sun. It will then deploy two large arrays of solar cell panels attached to the sides of the stage, and raise an aluminum micrometeoroid shield that extends the length of the hydrogen tank.

Its next task is to swing the ATM from its position ahead of the MDA, pivoting it on a hinge arrangement

Figure 2. Artist's composite of Saturn 1B on Saturn V Mobile Launcher sitting on Saturn V launch pad. The 128-ft. steel pedestal under the 1B is built over the normal flame exhaust passage in the Mobile Launcher deck. Note "White Room" at end of upper service arm, where astronauts are helped into spacecraft by special button-up crews.



on the tubing framework until it locks in place at a 90° angle, facing the sun. From tanks attached to the exterior of the AM the Instrument Unit will fill all three modules with a 5-psig atmosphere, composed of 3.7-psig oxygen and 1.3-psig nitrogen. It also performs many smaller tasks designed to prepare the interior for human habitation. The complete assembly in its working configuration is called the Saturn Workshop (SWS). The third stage alone is called the Orbiting Workshop (OWS). (See Figure 1 for orbital configuration; when the Apollo Spacecraft is docked to the MDA, as shown here, the complete unit is called the Cluster, or Skylab.) The laboratory is ready for the arrival of its crew.

Approximately twenty-four hours after the liftoff of the Saturn V a new type of launch will occur at the Kennedy Space Center. A Saturn 1B vehicle, Skylab II, with a manned Apollo Spacecraft as its payload, will lift off Pad B at the Saturn V facility, Launch Complex 39. In order to launch a 1B with Saturn V equipment some major modifications are necessary, and they are illustrated in Figure 2. A pedestal 128-ft. tall must be built on the base of the Mobile Launcher, in order for the upper service arms to provide access to the spaceship and vital portions of the vehicle. Many other modifications must be made in the ground propellants supply systems, electrical connections, hold-down arms, et cetera. But the end result is a capability to launch 1Bs on a Saturn V pad, making it possible to close down the Saturn 1B launch pads, 34 and 37, on Cape Kennedy.

The astronauts will rendezvous with the SWS and dock to the axial port of the MDA, completing the Skylab configuration. Ground Control will have thoroughly checked the condition of the SWS by telemetry. The three astronauts can remove the seal in the docking port and enter the MDA without wearing spacesuits. After a visual check of what will be their home for the next twenty-eight days, the astronauts will deactivate most of the systems on the Command Service Module (CSM), placing it in a semi-quiescent mode. After checking out and starting those support systems not under the control of the Instrument Unit, they will begin four weeks of intensive work. At the end of that time they will prepare the SWS for orbital storage, reenter their CSM, and return to Earth in the established Apollo manner, splashing down in the West Atlantic.

Assuming no unexpected complications develop with the first crew, Skylab Launches III and IV will return two crews of three astronauts each to the SWS, at approximately ninety-day intervals spaced from the first launch. All crews will operate the ATM and perform a variety of other experiments, though the first crew's primary mission will be the medical experiments, the second crew will concentrate on the ATM,

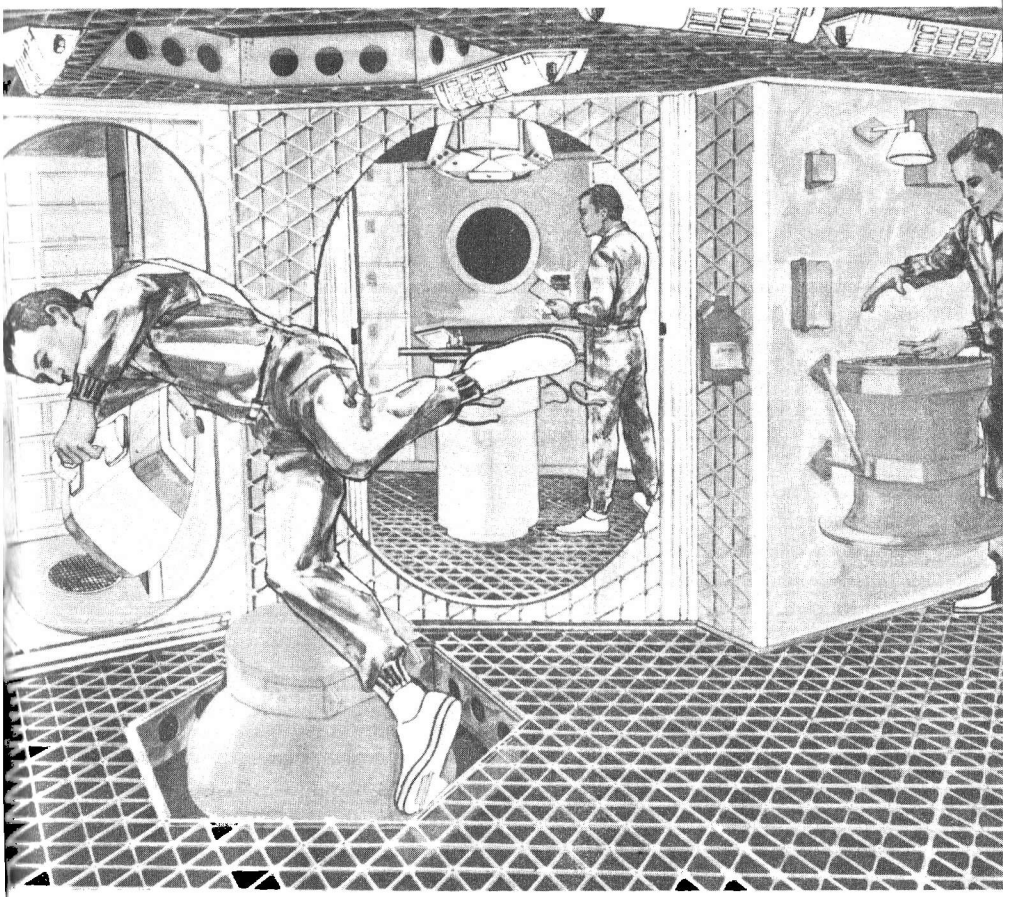


Figure 3. The astronauts at work. Man at left, above air lock to waste storage compartment in LOX tank below, carries air sampler. Center man is in wardroom preparing food—note window to space behind him. Man at right is working at table designed to hold objects down by gentle flow of air through table and out bottom.

and the third on the Earth Resources Experiment Package (EREP) in the MDA. Both latter crews are programmed for stays of fifty-six days, with splashdown planned for the central Pacific.

The total Skylab, including the docked CSM, contains approxi-

mately 13,000-cu. ft. of space, equivalent to that in a normal three-bedroom house. It has an overall length of 117-ft. and a total weight on Earth of 165,000-lbs. Despite its comparatively large size Skylab is not, by NASA definition, a true space station. According to NASA criteria a space station must be able to operate indefinitely, and Skylab has an operational life of eight or nine months and an expected orbital life of something over a year. In order to operate indefinitely a space station must be capable of accepting new supplies of water, oxygen, and other consumables. Skylab has all its consumables aboard at launch, and resupply would be difficult; there are no provisions for pumping more oxygen into the pressurized tanks, et cetera.

For descriptive purposes the Skylab can be broken down into its five major parts, the S-IVB stage modified into an Orbital Workshop, the Airlock Module, the Multiple Docking Adapter, the Apollo Telescope Mount, and the Command and Service Module. The astronauts will work within all parts except the ATM, which cannot be entered and must be operated by remote control from a panel in the MDA. Each module has a unique function to perform.

The Orbital Workshop is by far the largest habitation to date for human beings in orbit. The stage's liquid hydrogen tank will become a 10,000-cu. ft. space laboratory and living quarters, where the astronauts will spend most of their time. The crew quarters are anchored to an aluminum-grid floor that sits just above the LOX tank, with a second floor at normal ceiling height. (See Figure 3: At one time only the upper floor existed and the astronauts were to live and work "upside down" on the lower level, but this plan was discarded in favor of the more conventional two-floor approach. Note the delta-shaped plate on the bottom of the astronaut's shoe. It slips through any of the triangular holes in the grid, and a twist of the foot locks the man in place. He can hang from the ceiling as easily as stand on the floor, and with equal firmness.) A fire retardant liner of aluminum foil covers the inside surfaces. Solid partitions divide the crew quarters into three sleep compartments, a wardroom, a waste management compartment, and a work space.

The wardroom, where food is prepared and consumed, and the waste management compartment, where it is eliminated after the astronaut has extracted its energy, are sealed areas where odor and particle migration are controlled by fans and filters. A double-pane glass window 18-in. in diameter, with heaters to keep it from fogging, is located in the middle of the wardroom wall. Since in normal operation Skylab keeps the ATM side constantly to the sun the astronauts, when passing above the daylight side of the Earth, will have a dining room with an unex-

celled view. On the opposite side of the orbit they will be looking into space, with their window in shadow and no atmosphere to blur the stars . . . and that, too, will lend rare dining atmosphere.

The wardroom has about 100-sq. ft. of floor space, the waste management compartment about 30, and the sleep compartments about 70. The work area, where most experiments will be performed, has 180-sq. ft. The astronauts will have more than the usual comforts previously available to men in orbit. Most food will be frozen, ready to heat-an'-eat in an oven. The astronaut will sleep lying flat in a full-length bag in his private compartment; the bag has vents that can be opened for body heat dispersal. The temperature can range from 60° to 90°F, with fans providing constant air circulation. The sound of all the support systems operating to keep humans alive and Skylab functioning may create a noticeable drone, but it should be a sound to which the astronauts can easily adapt.

The Airlock Module is the nerve center of the Cluster that forms Skylab. As the name implies, it has an air lock to space in its longitudinal center—a modified Gemini hatch—and air-tight doors on each side that can be closed to isolate the area. Extravehicular Activity (EVA) will be conducted from here, not the hatch in the CSM. The AM is 16-ft. 8-in. long and 5-ft. in diameter for most of its length. One end connects to the Orbital Workshop hydrogen tank by a flexible bellows, and the Structural Transition Section on the other end swells to the 10-ft. diameter of the larger MDA, which makes it a solid connection. The Transition Section contains most Skylab controls and displays for the support systems, including distribution of the electrical power received from the solar arrays and batteries, and oxygen and nitrogen replacement gases from tanks on the exterior. It also has four small viewing ports located at 90° intervals.

The AM contains much of the equipment for the Skylab's basic communications system, including an antenna on the exterior that enables ground controllers to communicate directly with Skylab command systems. (Instrumentation is provided for both real-time and delayed transmission. When Skylab is not within range of a ground station data will be stored for later relay.) Modules on the exterior hold the main power batteries, which are used during emergencies, or when the vehicle is in Earth's shadow. A fixed shroud surrounds the tunnel section of the AM, extending from the top of the S-IVB stage almost to the Transition Section. The aluminum tubing framework which holds the AM, MDA, and ATM in place attaches to this shroud—see Figure 1.

The Multiple Docking Adapter is 17-ft. long and 10-ft. in diameter. It has an axial docking port for normal CSM attachment, and a radial port for an emergency dock. It contains

two windows, one above the radial port and another overlooking the ATM. A large radiator that can accept heat from the sun, or emit excess heat to space, is mounted on the exterior, and provides the basic means for Cluster temperature control.

The MDA contains the equipment for several experiments, and will be one of the primary work stations for the astronauts. The Control & Display Panel for the ATM is located here, and this is one of the most complex control systems Man has ever been asked to operate in space. Present plans call for the ATM to be operated between four hundred and five hundred accumulative hours during the three missions. The MDA also contains the Earth Resources Experiment Package (EREP), a group of four experiments designed to perform the most exhaustive analysis yet attempted on the feasibility of gathering surface information from space. This package will be discussed in some detail in Part II.

The Command Service Module is very similar to that proven on the Apollo Program. Some modifications to permit the CSM to remain semi-dormant while docked to the Cluster are incorporated, and a new set of batteries to provide power during the descent to Earth. (Fuel cells are not designed to provide power over such long periods of time.) Another tank containing fuel for the Reaction Control System has been added, providing the ability to deorbit with this system if a malfunction occurs in the main engine.

The Apollo Telescope Mount, although a complete module, is basically a group of experiments. Together these instruments will provide astronomers with the most information yet obtained on the sun in those areas of the electromagnetic spectrum normally blocked by Earth's atmosphere. Although the Skylab mission has been broadened the ATM is still the primary scientific payload.

Altogether, Skylab will be by far the largest and most complex vehicle in Earth orbit to date—unless the Russians launch a space station earlier, a distinct possibility. Every module is planned for the maximum utilization of space; the walls of most cylinders are almost covered with equipment. A large number of subsystems support Skylab. Ground Controllers will monitor all systems from liftoff through the life of the station.

NASA has compiled a prime candidate list of over fifty experiments for Skylab, of which six are on the ATM and four in the EREP group. The others are listed, with brief descriptions, in tables 1 through 3. Note that some experiments listed

Figure 4. Two typical workdays for the astronauts. Every waking moment is carefully planned, but the men have a period of leisure after the day is over. See text for a detailed run-through on Day 15.

GET 323:00

Day	Crew-men	HOURS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
15	1	EAT M172	M071	S/HK			M092 S	EAT	M071	M171 C O		ATM		M092 O	EAT	M071	ATM		PH	M071	SLEEP				
	2	EAT M172	M071	M171 C S			M092 O	EAT	M071	S/HK		T003	M093 O	M092 S	EAT	M071	PH		ATM	T003	M071	SLEEP			
	3	EAT M172	M071	T003	M171 C O		ATM		EAT	M071	M171 C S		M093 S	S/HK	EAT	M071	S/HK		PH	M071	SLEEP				

GET 346:30

Day	Crew-men	HOURS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16	1	EAT M172	M071	S/HK			ATM		EAT	M071	S020	M131 B O	M131 B S	M093 O	M093 S	EAT	M071	ATM		PH	M071	SLEEP				
	2	EAT M172	M071	T003	D008	D008	ATM	M131 B S	M092 O	EAT	M071	S/HK	T003	M131 B O	M093 S	M093 O	EAT	M071	PH		ATM	T003	M071	SLEEP		
	3	EAT M172	M071	ATM			M131 B O	M092 S	EAT	M071		M131 B S	ATM		S/HK	EAT	M071	S/HK		PH	M071	SLEEP				

under "medical" are actually studies of the interaction between Man and his equipment. Among other benefits these experiments will provide the detailed data which, when accumulated and analyzed, will determine whether the effects of weightlessness are tolerable for long periods, or require a new approach to space exploration. The manufacturing processes the astronauts will investigate, though elementary, will provide a base on which to plan more complex experiments later. (See Analog, December 1970, for a more detailed article on manufacturing in space.) The technology experiments, efficiency studies, and physiological measurements of the astronauts at work will prove out operating concepts developed on the ground.

The numerous and complex Skylab support systems will be semi-automatic in operation, a necessity considering the workload of the crew. As usual in manned space missions, a large percentage of the work of running the spacecraft will be performed by Controllers on the ground. The 50° launch azimuth will result in the first manned flight pattern with extensive coverage of the entire United States, and consequent frequent direct communication with the flight controllers at the Manned Spacecraft Center in Houston. When overflying other areas of the world, signals to and from Houston will be relayed by the world-wide Manned Space Flight Network stations operated by the Goddard Space Flight Center in Maryland. During the intervals when Skylab has no line-of-sight contact with a ground station, data can be stored in the communications system in the AM and "dumped"—tapes played, recorded by the station, and cleared to receive new data—by ground command from the next station in line. A great deal of work will be performed at night—the astronauts will maintain normal U.S. working-sleeping hours—while the astronauts are off-duty, or sleeping.

Including the normal equipment in the CSM, there are fourteen communications stations in Skylab. These provide crew-to-crew, crew-to-ground, and ground-to-crew communications. All audio circuits operate through the CSM, however, and without it there will be no audio intercom capability. There is a teleprinter on board, and exchanges of technical data will probably be by printout, eliminating hand-copying and possible errors. Also, this enables Ground Control to prepare new instructions, or furnish requested data overnight. The astronauts, on awakening, can tear off the previous night's printout and receive anything from yesterday's ball game scores to technical instructions on the day's planned activities. Skylab will also have a television broadcast system similar to that successfully used on Apollo mooncraft, but no TV receiving ability. Their planned

10-hr. workday and six and one half day week would leave precious little time for watching television in any case.

Skylab uses both passive and active systems for internal thermal control. The passive are primarily a choice of reflective or absorbent external surfaces exposed to the sun, while the active involves heat transfer within the interior. The sides of the modules exposed to the sun will reach a temperature of 250°F, while the shade side will be approximately 0°F. When Skylab passes into Earth's shadow the entire exterior will drop to -125°F. A large system of ducts and fans, in all modules, will circulate air from the hot to the cool sides to maintain a constant temperature. Excess heat will be dumped into space from the large radiator on the shade side of the MDA—see Figure 1—and extra heat can be added when needed from heaters in the air ducts.

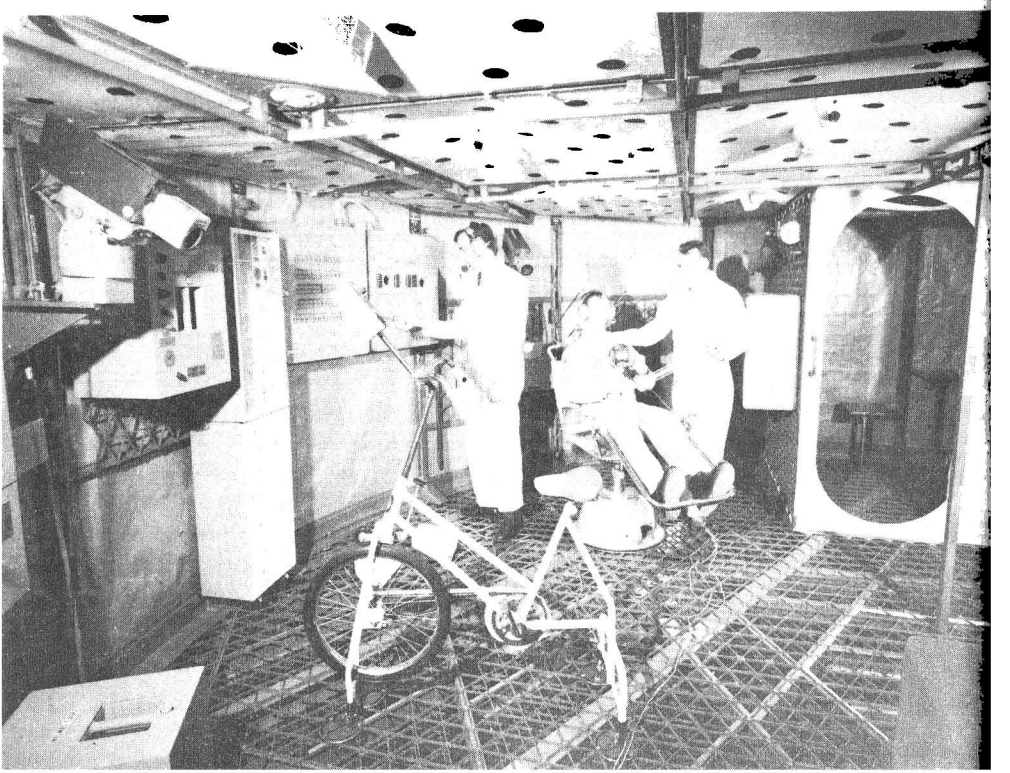
The OWS and ATM solar panels together can produce up to 22 kw. of power. The average requirement during operation will be 6.4 kw. When the astronauts are operating the EREP equipment Skylab will be taken out of the solar inertial mode and assume an Earth inertial, in order to permit a constant focus of the instruments on the surface below. In this mode the solar panels will receive insufficient sunlight for normal power generation. The batteries have the capacity to operate all systems except the ATM for two revolutions, after which Skylab must reassume the solar inertial position. The excess power available from the panels can then operate all systems while still recharging the batteries.

Another "system" that will have an excess capacity will be the Skylab means of waste disposal. A crew of three men living and working for fifty-six days will generate an astonishing amount of waste. Clothes, for example, will probably be worn several days and discarded, not washed. Loose objects in Zero-G can be dangerous, and all food containers, damaged instruments or tools, defective parts that have been replaced by spares, et cetera, must be discarded. The amount of each astronaut's body wastes will be carefully monitored by the specially designed equipment, and daily urine samples taken to be returned to Earth for later analysis, but the remaining bulk will be substantial. Fortunately, there is a very large container immediately available, the S-IVB stage liquid oxygen (LOX) tank. A specially designed air lock will protrude above the floor of the work space on the lower level—see Figure 3. Wastes not automatically conveyed to the tank will be placed in the air lock by the astronauts. When the top lid is closed and the bottom one opened, the vacuum in the tank will yank all objects inside. At periodic intervals the accumulated wastes, all in solid form due to the cold and vacuum, will be discarded through an air lock from the

LOX tank to space. Dumping will be performed when the Skylab is aligned with the Earth in such a manner the wastes will enter the atmosphere and burn up. The thrust reaction will be damped out by the Control Moment Gyros on the ATM and the Thrust Attitude Control System on the OWS if extra power is needed.

The workload for Skylab astronauts will be flexible, but a full schedule has been programmed. Figure 4 shows two typical carefully planned days, in this case the fifteenth and sixteenth of the first mission. The GET above each barchart stands for "Ground Elapsed Time," or time from launch. In the upper chart, Day 15, the astronauts awake at the 323rd hour into the mission, probably at 6:00 EST. When he has completed his ablutions and dressed, each man performs the first experiment of the day, M172. Each astronaut sits in a shaft-mounted, backward tilted chair in the laboratory area–see Figure 5–and straps himself in, or is strapped

Figure 5. Mockup of laboratory area at Marshall Space Flight Center. The astronaut sits in all-purpose medical chair, with exercycle in foreground. All equipment shown will not necessarily be aboard Skylab. Mockups of all work areas are prepared and carefully tested on ground prior to flight.



in by a fellow—all operational details are not known at this time. Another crewman touches a switch and a spring releases pressure against the shaft, driving the tilted chair forward in a short arc. A braking system stops the chair's movement—hopefully without too much jar—and the amount of force used to arrest the mass of the astronaut's body is carefully measured and translated into pounds. The data entered in a log. Since several million people in America perform a similar weighing ceremony before eating each morning, the real variation in the astronaut's schedule is the type of scale used.

When an astronaut eats the intake of food is itself part of an experiment, M071. He drinks water from a "gun" reserved exclusively for his use, and this gun contains a meter to record the amount consumed. Every bite of food is carefully checked, with the known weight and type of each item consumed meticulously recorded. Some further aspects of this experiment are that all fecal and urine eliminations must be identified to the astronaut, measured, and processed. Sweat samples are taken each week, and samples of all urine voiding, all feces, and all vomitus must be returned with the sweat for detailed analysis on Earth.

The astronauts start their day's work. As shown on the barchart in Figure 4, Crewman One spends the first two hours of his morning in S/HK—Systems/House Keeping. This is a euphemism for cleaning up the remnants of the meal, attending to minor housekeeping, and similar chores, probably including equipment repairs if needed. A glance at the chart will show that S/HK duty alternates from crewman to crewman after each meal. Crewman Two starts preparing for Experiment M171, while Crewman Three removes the Aerosol Particle Analyzer—Experiment T003—from its cabinet. He then translates through the air, using the various gripping aids available, to Crew Station 12, where he takes a sample. He reads the result on the analyzer, records the data in a log kept for the purpose, and returns the analyzer to its cabinet. Crewman Three then joins Crewman Two, who is ready to start work on M171. Crewman Three will be the observer, as indicated by the "0" in his block on the chart, while Crewman Two will be the subject, indicated by an "S".

There are three modes to M171, heavy exercise on an exercycle, constant maintenance work without a spacesuit on, and constant work while wearing a spacesuit. Each crewman performs all three modes three times during his stay. It is Crewman Two's day for Mode C, the latter one—the "C" appears below the Experiment number on the chart—and he is dressed in his spacesuit. When Crewman Three reaches him Two begins work on a specific function to be performed at the taskboard, and continues for seventy

minutes without stopping. The data generated by the performance of the particular task is recorded and telemetered, including the comments of both the subject and the observer. The subject will probably have his suit's communications jack plugged into the nearest system receptacle, and be in direct contact with Ground Controllers, assuming they are over a receiving station. If the astronaut has the usual problems implicit in working while wearing the bulky suits, the Ground Controllers will probably hear some very choice comments.

While Crewman Two is getting out of his spacesuit Crewman Three reports to the ATM Control & Display Panel in the MDA. He operates the ATM, perhaps scanning the sun with one of the two H-alpha telescopes in search of a flare, for a little less than two hours. While he is thus engaged Crewman One and Two prepare the equipment and perform M092, with One as the subject and Two the observer. In this experiment the subject sits in an airtight device which seals at his waist; air is then removed from the unit to produce a pressure below the ambient 5 psig. The subject wears sensors on his body, including one over the heart. He must spend twenty-eight minutes in the device, and the data is again both recorded and telemetered to a ground station if one is within range.

All three Crewmen stop work for lunch, which is again measured as part of Experiment M071. After lunch Crewman Two has S/HK duty, while Crewmen One and Three perform a second M171 in the C Mode, this time with Three becoming the subject while One takes the part of observer. While Crewman Three is getting out of his spacesuit after the test, Crewman One reports to the MDA and mans the ATM C & D Panel. Crewman Two, who has finished his housekeeping duties, gets out the Aerosole Particle Analyzer and takes another sample, which is dutifully recorded. He then joins Crewman One, who has rested for thirty minutes and is ready for a vectorcardiogram, as required in Experiment M093. (The thirty-minutes rest between strenuous exercise and a vectorcardiogram is mandatory.) While Crewman Three is putting away the M093 equipment One and Two are moving to the negative lower body pressure unit. It is Two's time to be the subject and One's to be the observer, the reverse of their roles that morning. After finishing this second M092 they are joined for dinner by Three, with the usual measurements of food and liquid intake that are a part of M071. (The astronauts may become very tired of M071 after several weeks in orbit.)

After dinner it is Three's turn for S/HK, while One reports for a stint of duty at the ATM C & D Panel. The PH in Two's block stands for "Personal Hygiene," which could cover a large number of possible personal activities. After this break

Two relieves One at the ATM, and both One and Three take a similar break. After completing his time on the C & D Panel Two takes another aerosol sample for Experiment T003, and then all three astronauts prepare for bed, again including the inevitable measurements required by M071. It is difficult to tumble into bed in Zero-G, but it seems safe to assume that when the astronauts finally pull themselves into their sleeping bags they will experience the equivalent feeling of comfort and relief. It will have been a long day.

Probably no two days' activities will be precisely alike, but in the course of their twenty-eight-day stay the first three Crewmen will thoroughly perform all the medical checks and, in addition, obtain a great deal of data on their other assigned tasks, including extensive operation of the ATM. On the seventeenth day all three will don spacesuits and two will go outside to perform work on Experiement D021, Expandable Airlock Technology, and D024, Thermal Control Castings. On the twenty-seventh day they will perform another EVA, this time to retrieve the film canisters from the instruments on the ATM. (The cameras were loaded on Earth for the first mission; the second and third crews must perform an early EVA to load the cameras. The second crew, whose primary mission is to operate the ATM, will, in fact, load and retrieve two sets of film.)

An experiment that would normally require another EVA on the twenty-sixth day, but can be performed in the OWS due to the 30-ft. ceiling above the second floor—the conical top of the hydrogen tank—is T020. None of the personal propulsion systems tried to date have been completely satisfactory, and for the first time the astronauts will have available one that frees both hands for work. Here, with the feet alone, the astronaut can maneuver through space. In addition to the usual telemetry readouts from body sensors and spoken comments by the astronauts, the experiment will include having the observer photograph the movements of the subject with a hand-held camera. This enclosed flight will be repeated twice more by the third crew; there is no time for it in the second crew's schedule.

The astronauts will deactivate all SWS systems as necessary to prepare it for orbital storage, place all their samples, film, data logs, and other records—including actual parts of experiments where required—in the CSM, and reactivate it. Using the new batteries installed for the purpose to supply power, they will undock, maneuver away from the SWS, and fire the main engine to reduce orbital speed and enter the atmosphere. And after the splashdown, three very tired and undoubtedly very happy men will be plucked from the sea by the U.S. Navy, to

be—unless the Russians have established a prior claim—the first men to have lived and worked in an orbital space station.

In the Skylab Program all astronauts will be cross-trained as usual, but to a greater degree than before the extremely complex tasks to be performed will require specialists in certain areas. There is an excellent chance the second crew will contain an astronomer, for intensive work using the ATM, and the third crew a geologist, for work using the Earth Resources Experiment Package. These major experiments, and some of what we may expect to gain from them, will be discussed in detail in Part II.

TO BE CONCLUDED

TABLE 1. MEDICAL EXPERIMENTS

Experiment	*Location*	*Description*
M071 Mineral Balance	CSM & OWS	Precisely measure the input and output of calcium and nitrogen by the astronaut to quantify rates of gain or loss.
M072 Bone Densitometry	Ground	Make a densitometric comparison of preflight and postflight X rays of selected bones to evaluate bone demineralization under prolonged weightlessness.
M073 Bioassay of Body Fluids	CSM	Evaluate plasma and urine samples taken during flight to assess the metabolic changes in Man as a result of space flight.
M074 Specimen Mass Measurement	OWS	Demonstrate the feasibility of mass measurement without gravity to assess food intake, urinary output, and bone and muscle changes during flight.
M091 Lower-Body Negative Pressure	Ground	Apply negative pressure to the lower half of the astronaut's body before and after flight to ascertain the cardiovascular function changes resulting from space flight.
M092 Inflight Lower Body Negative Pressure	OWS	Record heart rate, blood pressure, and electrocardiogram data during flight with negative pressure on the lower body, to evaluate space flight cardiovascular deconditioning.
M093 Vectorcardiogram	OWS	Monitor electrical actions of the heart during space flight, using sensors and signal conditioners to obtain vectorcardiograms.

M111 Cytogenetic Studies of Blood	Ground	Determine the preflight and postflight chromosome aberration frequencies in the peripheral blood leukocytes of the crew.
M112 Man's Immunity—In Vitro Aspects	Ground	Assay humoral and cellular immunity as reflected by the plasma concentrations of the major innumoglobulin classes, study the functions of blood lymphocytes, and assay selected coagulation factors.
M113 Blood Volume and Red Cell Life Span	Ground	Document changes in red cell mess, red cell survival, and plasma volumes occurring as a result of space flight.
M114 Red Blood Metabolism	Ground	Determine the effects of space flight on red cell metabolism and membrane integrity.
M131 Human Vestibular Function	OWS	Evaluate the condition of the crew during flight to determine angular acceleration comfort zone and identify vestibular changes.
M151 Time and Motion Study	OWS	Use time and motion studies of standardized mechanical tasks to evaluate the relative consistency between ground-based and inflight astronaut performance.
M171 Metabolic Activity	OWS	Evaluate Man's metabolic effectiveness in space to determine long-duration requirements for logistics resupply, environmental control, and task planning.
M172 Body Mass Measurement	OWS	Validate a mass measurement device large enough to contain a man and to provide data for bone and tissue studies.
M415 Thermal Control Coatings	OWS	Determine degradation effects of prelaunch, launch, and space environments on the absorptivity, emissivity, and stability characteristics of various materials used for passive thermal control.
M507 Gravity Substitute Workbench	OWS	Assess the use of aerodynamic and electrostatic force fields as an aid in the manipulation of loose objects in Zero-G.
M508 EVA and IVA Hardware Evaluation	OWS and Outside In Space	Evaluate Man's capability to perform work under the conditions imposed by space flight, and develop quantitative design criteria applicable to future missions in space.
M509 Astronaut Maneuvering Equip.	OWS	Obtain data on the mechanical and human factor problems encountered by Man using maneuvering aids and devices in Zero-G.

TABLE 2. SCIENTIFIC EXPERIMENTS
(Excluding ATM and EREP)

Experiment	*Location*	*Description*
S009 Nuclear Emulsion	MDA	Investigate physical and chemical characteristics of cosmic radiation incidence on the Earth's atmosphere.
S015 Effects of Zero-G on Single Human Cells	CSM	Study the influence of Zero-G on living human cells and determine if the absence of gravity has a significant effect on their metabolism.
S019 UV Stellar Astronomy	OWS	Perform a partial sky survey of Milky Way star fields to obtain ultraviolet spectra, using a Ritchey-Chretien objective-prism spectrograph.
S020 UV Solar Photography	OWS	Obtain X ray/ultraviolet solar spectra by a grazing incidence spectrograph to support development of solar flare prediction techniques.
S061 Potato Respiration	CSM	Determine whether removal from the Earth's rhythmic geophysical environment will affect a well-known biorhythm.
S063 UV Airglow Horizon Photography	OWS	Secure photographs of the ultraviolet emission from the airglow layers of the upper atmosphere.
S071 Circadian Rhythm–Pocket Mice	CSM	Determine the effects on the physical functions of pocket mice when removed from gravity and the geophysical 24-hr. period.
S072 Circadian Rhythm–Vinegar Gnat	CSM	Determine the effects on the physical functions of vinegar gnats when removed from gravity and the geophysical 24-hr. period.
S073 Gegenschein Zodiacal Light	OWS	Measure the intensity and polarization of the night sky light in the Zodiacal and Gegenschein region.
S149 Particle Collection	OWS	Study flux, size, composition, and velocity of micrometeoroids in the near-Earth environment.
S150 Galactic X-Ray Mapping	Instrument Unit	Perform a high-sensitivity survey of a portion of the celestial sphere to determine galactic X-ray sources and develop an understanding of the apparent phenomenon of X-ray background radiation.

TABLE 3. TECHNOLOGICAL EXPERIMENTS

Experiment	*Location*	*Description*
T003 Inflight Aerosol Analysis	OWS	Determine the aerosol particle concentration and size distribution in the Skylab atmosphere as a function of time.
D008 Radiation in Spacecraft	CSM	Measure and record the absorbed radiation inside the spacecraft to assure astronaut awareness of any dangerous increase in radiation levels.
T013 Crew Vehicle Disturbances	OWS	Measure the effects of crew motion on the dynamics of their spacecraft and determine how these motions affect high-accuracy pointing experiments.
T018 Precision Optical Tracking	Instrument Unit	Track the Saturn vehicle with a laser-radar system during the early launch phase to determine liftoff motions.
T020 Foot-Controlled Maneuvering Unit	OWS	Determine the feasibility of this maneuvering unit for astronaut translation and rotational maneuvers in space.
D021 Expandable Airlock Technology	Outside In Space	Demonstrate the feasibility of employing expandable structures in an Earth-orbital environment.
D024 Thermal Control Castings	Outside In Space	Determine the effects of the near-Earth environment on thermal control coatings to gain new insight into the mechanisms of degradation.
T025 Coronagraph Contamination	OWS	Monitor the presence of particulate matter in the near vicinity of the spacecraft and provide measurements of the solar f-corona.
T027 Contamination Measurement	OWS	Measure the sky brightness background caused by solar illumination of contamination particles around a spacecraft, and determine the effect of contamination on the optical properties of lenses and mirrors.
M479 Zero-G Flammability	MDA	Determine the effects of Zero-G on the flammability of nonmetallic materials in a spacesuit.
M512 Materials Processing	MDA	Determine molten-metal flow characteristics under Zero-G and space vacuum conditions.

Telzey found
that being under
someone else's control
wasn't pleasant . . .
but the question was,
who is controlling whom?

JAMES SCHMITZ child
of the gods

I

The ivory gleam of the Jadel Tower, one of the great inner city hotels, appeared ahead and to the left beneath the flow of the traffic lanes. The urge became now to turn out of the lane and go to the Jadel Tower; and there was a momentary impression that on arriving there she would be directed to set the car down on a terrace of the tall structure. Telzey tensed slowly. If she could hold out against any one specific command, she might be able to loosen the entire set of controls. She kept the car on lane course.

The urge simply grew stronger. The psi hold on her was crude and incomplete, but whoever had obtained it knew what he was doing and had force to spare. In seconds, her muscles began to tremble, and sweat started out on her face. She gave in abruptly. The Cloudsplitter dropped out of traffic, went slanting down. She settled back in the seat, sighing. Let him get the impression she'd resigned herself to what was happening. She knew he hadn't invaded enough of her mind so far to be able to read her thoughts.

Moments later, the car moved clear of the main traffic—and now she should act at once before he realized she was about to attempt escape by a different route! She pushed the door open suddenly, tried to thrust herself out of the car.

Tried to. She felt a start of surprise on his side, then an instant painful clenching of her muscles, which held her frozen in position on the seat. After a moment, her arm flexed slowly, drew the door shut, locked it.

A flick of sardonic approval came from him. He'd guessed what she intended, checked her just in time . . . and, for the moment, she'd run out of tricks and would have to patiently wait for a new opportunity to come along.

She let herself relax physically. Mentally, tension remained. Not only to keep the other psi from increasing the advantage he held—if he gave her any kind of opening, she might still be able to jar him enough to shake him off. So far he'd been careful. In the two hours since she first encountered him, she'd gained hardly any impression of his personality, none at all of his purpose. She'd been at ease, doing a casual telepathic scan of whatever happened to touch her attention as she rested, half napping, when she sensed an unfamiliar pattern, a light, drifting, gentle awareness. Wondering what manner of creature was producing it—something small and fluffy and friendly seemed to fit—Telzey reached out toward the gentleness. But that appeared to cause alarm; it faded to a trace, almost vanished. So it had psi sense, too! Intrigued, she approached again, gradually and reassuringly. This time, whatever it was didn't withdraw; after a moment, it seemed to be responding to her.

Then, in a flash, she knew that this

was no natural impression but a trick, that while her defenses were relaxed, her attention distracted, a stealthy intrusion of her mind had begun. Instantly, she threw in every block she could to check the invader--nothing small and fluffy and friendly, but a human psi, a dangerously accomplished one. Her reaction kept him from taking complete control of her then and there, as he otherwise should have done. But she couldn't do much else, however furiously she fought to break the holds he'd secured, or to reach his mind in turn. He'd already established control enough to leave her effectively helpless; and when she realized it, she stopped struggling, though she continued to watch for any momentary weakening of the control pattern or any move on his part to extend it.

There were no indications of either. She discovered next that she couldn't get outside help. She was unable to inform anyone of her predicament; it was simply impossible. She had to act as if nothing had happened. For a while, there was no significant change in that situation. Then came an impulse to get out her car and start toward the center of Orado City, and she couldn't prevent herself from following the impulse. She knew he was making her come to him, and presently that he waited somewhere in the Jadel Tower. But after he canceled her attempt to jump out of the car and let the dropcatch system immobilize her, there was no way she could keep from going there.

Unless he slipped up at the last moment . . .

He didn't slip up. The Jadel Tower drifted closer; his controls remained locked on her mind, incomplete but adequate, and if it was causing him any stress to hold them, there was nothing to show it. She turned the Cloudsplitter toward a parking terrace at around the fiftieth level. A dozen private cars stood on it; a few people were moving about them. She set her car down in an empty slot, left the engine idling, unlocked the door on the driver's side, and shifted over to the adjoining seat.

A few seconds later, the car door opened. A man settled himself in the driver's seat and closed the door. Telzey looked over at him as the Cloudsplitter lifted back into the air.

His face was a featureless blur to her--he was covering up. Otherwise, she saw him clearly. He appeared to be fairly young, was of medium size, athletically built. And no one she knew.

The blurred face turned toward her suddenly. Telzey sensed no specific order but only the impulse to shift sideways on the car seat and put her hands behind her back. She felt him fasten her wrists together with light cuffs. Then she was free to resume her previous position and discovered that meanwhile the view outside the car also had blurred for her, as had the instrument console.

It reassured her somewhat. If he

didn't want her to know what he looked like, or where she was being taken, he must expect that she'd be alive and able to talk after this business was over. She settled back in the seat and waited.

Perhaps half an hour went by. Telzey remained wary, but while the mental hold the strange psi had on her didn't relax in the least, he didn't try to develop it. At last, he set the car down, shut off the engine and opened the door on his side. Suddenly, she could see her surroundings again, though what she saw wasn't very revealing. They were in a carport; beyond it spread a garden with trees, a small lawn, some flowering shrubbery. Patches of white-clouded sky showed above the trees; nothing else.

The man, face still a blur, walked around the car and opened the door on her side.

"Get out, please!" The voice was quiet, not at all menacing. He helped her climb out of the car, then took her by the elbow and guided her to a door in the back of the carport. He unlocked it, motioned her into a passage and locked the door behind them. "This way—"

She sensed a psi-block around them which might enclose the entire building. The appearance of the passage suggested it was a private residence. Probably the home of her kidnapper.

The blurred face said from behind her, "You did intend to jump from your car back there, didn't you?"

She nodded. "Yes."

"Aerial littering!" He sounded amused. "If you'd alerted the drop-catch system and been picked up by a sprintcar or barrier, you'd have found yourself in rather serious trouble! Rehabilitation's almost the automatic sentence for a city jumper."

Telzey said impatiently, "I could have got out of that. But I'd have been kept under investigation for three or four days, with no way to get to you, whatever I tried. I don't think you could have held on to me for three or four days."

"Not even for one!" he agreed. "It was a good move—but it didn't work."

"Am I going to be told why I'm here?"

"You'll be told very quickly," he assured her, stopping to open another door. The room beyond was sizable and windowless, gymnastic equipment set up in it. The man followed Telzey inside. "We haven't been acquainted long," he remarked, "but I've already discovered it's best not to take chances with you! Let's get you physically immobilized before we start talking."

A few minutes later, she stood between two uprights near the center of the room. There were cuffs on her wrists again, but now her arms were stretched straight out to either side, held by straps attached to the cuffs and fastened at the other end to the uprights. It was a strained position which might soon become painful.

"This is a psi-blocked house, as you probably know," his voice said from behind her. "And it's mine. We won't be disturbed here."

Telzey nodded. "All right. We won't be disturbed. So now, who are you and what do you want?"

"I haven't decided yet to tell you who I am. You see, I need the help of another psi. A telepath."

"I'm to help you with what?"

"That's something else I may tell you later. I'll have to make sure first that I can use you. Not every telepath would do, by any means."

"You think I might?" Telzey said.

"If I weren't almost sure of it, I wouldn't have hung on to you," he told her dryly. "You gave me a rather bad time, you know! If I'd realized how much trouble you were going to be, I doubt I'd have tackled you in the first place. But that's precisely why you should turn out to be the kind of dependable assistant I want. However, I can't say definitely until you let me take over all the way."

"Would you do that, in my place?" Telzey asked.

"Yes—if I were aware of the alternatives."

She kept her voice even. "What are they?"

"Why, there're several possibilities. Drugs, for example. But I suspect they'd have to depress your psi function to the point where I couldn't operate on it. So we'll pass up drugs. Then I might be able to break your remaining blocks by sheer force—after all, I did manage to clamp a solid starting hold on you. But force could do you serious mental harm, and since you'd be of no use to me then, I'd try it only as a last resort. There's a simple approach I can follow which should be effective enough. See if you can use your pain shutoffs."

Telzey said after a moment, "I . . . well, I seem to have forgotten how to do it."

"I know," his voice said. "I was able to block that from your awareness before you noticed what was happening. So you don't have that defense at present—and now I'll let you feel pain."

There was a sudden intolerable cramping sensation in her left arm. She jerked violently. The feeling faded again.

"That was a low-intensity touch," he said. "I suppose you've heard of such devices. As long as their use is confined to arms and legs, they can't kill or do significant damage, but the effect can be excruciating. I know somebody I could bring to the house in a few minutes who'd be eager to help me out in this because he likes to hurt people. If you were being jolted constantly as I jolted you just now, I doubt you could spare enough concentration to hold up your blocks against me. Because there'd be nothing to distract *me,* you see! I could give full attention to catching any momentary weakening of your defenses, and I'd say it would be at most an hour then before I had com-

plete control. But meanwhile you would have had an acutely uncomfortable experience for no purpose at all. Don't you agree?"

Unfortunately, she did. She said, "Let me think about it."

"Fair enough," he told her. "I happen to be in something of a hurry, but I'd much sooner settle this without any unpleasantness."

"How long would it take to help you in whatever it is you want to do?" Telzey asked.

"Perhaps four or five days. A week at most."

"You'll let me go when it's finished?"

"Of course," he said reassuringly. "I'd have no reason to keep you under control any longer."

That might be a lie. But a good deal could happen in four or five days, and if he was to make use of her as a psi, he'd have to leave her some freedom of action. "All right," she said. "I'll give up the blocks."

"How do you feel?" his voice asked presently.

"My arms are beginning to hurt." He hadn't released her from the uprights and he was still somewhere in the room behind her where she couldn't see him.

"I didn't mean that," he told her. "You're aware of the changes in you?"

Telzey sighed. "Oh, yes. I know how I felt before you started."

"And now?"

She reflected. "Well . . . I'll do anything you tell me to do, of course, or try to. If you haven't given me specific instructions, I'll do whatever is to your advantage. That's more important now than anything else."

"More important than your life?"

"Yes," she said. "I know it's not at all sensible, but it *is* more important than my life."

"Not a bad start!" There was satisfaction in his voice. "You're aware of the manner in which you're controlled?"

She shook her head. "If I were, I might know how to break the controls. That wouldn't be to your advantage. So I can't be aware of it."

"How do you feel about the situation?"

Telzey considered again. "I don't seem to have much feeling about it. It's the situation, that's all."

"And that's also as it should be," his voice said. "I noticed you have connections with the Psychology Service, but if you keep your shield tight—as you will—that won't be a problem. So aside from a few additional modifications, which I'll take care of presently, we'll consider the job done. Let's get you out of those cuffs."

She was freed a moment later and turned to look at him, rubbing her arms. He was smiling down at her, face no longer a blur. It was an intelligent and rather handsome face but not one to which she'd feel drawn under ordinary circumstances. Of course, that didn't matter now.

"I make it a rule," he remarked,

"to use psi only when necessary. It lessens the chance of attracting undesirable attention. We'll observe that rule between us. For example, we don't talk on the thought level when verbal communication is possible. Understood?"

She nodded. "Yes."

"Fine. Let's have some refreshments, and I'll explain why I want your help. My name is Alicar Troneff, by the way."

"Should you be telling me your name?" Telzey asked. "That is, if it's your real one."

He smiled. "It's my real name. Why not? Federation law doesn't recognize human psi ability, so this is hardly a matter on which you could take me to court. And the Psychology Service makes it a rule to let independent psis settle their own differences. Your friends there might interfere if they knew what was happening, but they'll take no steps later on."

"I might tell them Alicar Troneff is a psi, though," Telzey remarked.

He grimaced. "Unfortunately, they already have me on record as one! It's made some of my operations more difficult, but I have ways of getting around that obstacle."

Over plates of small cakes and a light tart drink in a room overlooking the garden, Alicar came up at last with some limited information. "You know what serine crystals are?" he inquired.

Telzey nodded.

"A fossil deposit," she said. "Mined on Mannafra, I think. The cosmetic industry uses it."

"Correct on all counts! I located a serine bed last year, acquired rights to the area and brought mining equipment in to Mannafra to extract the crystals. It isn't a large mine, but it could easily produce enough to meet all my financial requirements for the next dozen years. I went back to Mannafra two days ago after an absence of several months and discovered I had a problem at the mine. I need a telepath with high probe sensitivity to investigate it further for me. You should be perfect in that role."

She looked at him. "A psi problem?"

"Psi seems to be involved. I won't tell you what I noticed, or think I noticed, because I want your unbiased opinion."

"And you think an investigation might be dangerous," Telzey added. "Or you'd do it yourself."

Alicar smiled. "That's possible. I've told you as much as you need to know at this stage. You're to think of some good reason now for being absent from Orado for about a week, and, of course, you'll avoid arousing anybody's curiosity. We'll leave in my private cruiser whenever you're ready. How long will it take you to make the arrangements?"

She shrugged. "A few hours. We can start this afternoon if you like. Anything special I should take along?"

"The kind of clothing you'd want in a desert climate with a wide range of temperature," Alicar said. "We might be going outdoors—at least, you might be. I'll take care of everything else."

He added, "One other thing before you go. While I was setting up my controls, I checked over a few of your past experiences and realized belatedly that I'd taken more of a chance in trapping you than I'd thought. It seems that if I'd made any mistake in that initial encounter, I might have been fortunate to get away with my life!"

Telzey nodded. "Perhaps. If I could have reached you, I'd have slammed you with everything I had."

"Yes." He cleared his throat. "Well, I'm going to install a prohibition against your use of psi bolts, and another one against your techniques for controlling others as I control you at present."

"But why?" she said, startled. "I might need all I know if I'm to handle a psi problem, and particularly a dangerous one, for you. I wouldn't use anything against *you* now. I *couldn't!*"

Alicar's handsome face hardened, and became thereby rather ugly.

"Probably not," he said. "But I had to leave considerable flexibility in the control patterns to let you function satisfactorily, and there might be moments when my overall hold on you will become a little lax. I'm making sure there'll be no disagreeable surprises at such moments! If a situation calls for it, I can always rearm you—but I'll be the judge of that. You'll go blank now on what happens during the next few minutes."

II

Alicar Troneff had approached Mannafra on the night side and activated a psi-block in his spacecruiser's hull while they were still high above the surface. Nine tenths a desert world from pole to pole, Mannafra looked almost featureless under the starblaze. Mining complexes and an occasional government post dotted some areas; between them, the sand dunes rolled from horizon to horizon, broken here and there by dark mountain ranges. Perhaps an hour after they'd entered atmosphere, Alicar's cruiser dropped down behind such a range, moved through winding passes, and presently came to rest on a wide rock shelf high above the desert floor.

"We're now about fifteen miles from the mine," Alicar said, shifting the engines to idling, "and that's as close as I intend to get to it until you've done some preliminary scouting."

"I'm to scout the mine from the car?" Telzey asked. There was a small aircar stored in the rear of the cruiser near the lock.

Alicar handed her a respirator.

"Fit that over your face," he said. "We may use the car later, but at present you're simply going outside.

You wouldn't actually need a respirator, but it'll be more comfortable, and it has a mike. Put on a long coat. You'll find it chilly."

"You're staying in the cruiser?"

He smiled. "Definitely! Behind its psi-block. The scouting job is all yours."

She got out her warmest coat, put it on, and fastened the respirator into place. They checked the speaking attachment.

"What am I to do when I'm outside?" Telzey said.

An image appeared in her mind. "Take a look at that man," Alicar told her. "It's Hille, the mine's manager and chief engineer. I want you to identify him at the mental level. Think you can do it?"

"At fifeen miles? I might. How many other people are around?"

"Twelve in all at the mine. It's run by a Romango computer. There isn't another installation within nine hundred miles."

"That'll make it easier," Telzey acknowledged. "Anything else?"

Hille's image vanished; that of another man appeared. "Ceveldt, the geologist," said Alicar. "Try him if you can't locate Hille. If you can't find either, any of the minds down there should do for now. But I'd prefer you to contact one of those two."

She nodded. "No special difficulties? Any probe-immunes among them?"

Alicar shrugged. "Would I have a probe-immune working for me?"

"No, I guess you wouldn't," Telzey said. "All right. Is there something specific I'm to scan for?"

"No. Just see what general impressions you pick up. Above all, probe cautiously!" He cleared his throat. "It's possible that there's a telepathic mind at or near the mine. If you get any indication of that, withdraw your probe at once. We'll consider then what to do next."

She reflected a moment, not greatly surprised. "Could the telepath be expecting a probe?"

"I don't know," Alicar said. "So be careful about what you do. You'll have plenty of time. I want as much information as I can get before daybreak, but it'll be another two hours before it begins to lighten up around here."

Even in her coat, it was cold on the shelf of rock where Alicar had set down the cruiser. But the shelf extended for about fifty feet ahead of her before the mountain sloped steeply down. To right and left, it wound away into night dimness. She could move around; and that helped.

So now to find out what was going on at the serine crystal mine! The crystals were skeletal remains of a creature belonging to an early geological period when there still had been water on Mannafra. Sizable deposits had been found here and there at what presumably were former lake sites. Their commercial value was high because of a constant demand for the processed product; and no doubt there were outfits around

that'd be interested in pirating a working serine mine.

Nevertheless, Telzey felt sure Alicar was holding back information. He'd said the mine wasn't a large one, and competent psis had no reason to involve themselves in criminal operations at a relatively minor level. When they had larcenous inclinations, it still simply was too easy for them to come by as much money as they wanted without breaking obvious laws. If psis were creating a problem at Alicar's mine, the cause wasn't serine crystals; and he probably knew what it was. At a guess, she thought, some enemies had trailed him to this point on Mannafra and were waiting for him to return. It wasn't at all difficult to imagine Alicar Troneff making enemies for himself among other psis.

Well, she'd see what she could do for him . . .

She opened her mental screens, sent light search thoughts drifting through the starlit night. The desert world wasn't dead; whisperings of life began to come into her awareness. But for a while, there was nothing to indicate human life or thought, nor any guarded and waiting telepathic mind. Alicar, watching her in the cruiser's screens, remained silent.

Perhaps half an hour later, Telzey opened the respirator's mike switch, said, "Getting touches of human mind stuff now! I'll let it develop. Not a psi, whoever he is."

"Good," said Alicar's voice. "Take your time."

A few minutes passed. Then Telzey went on. "Someone called Ponogan—"

"Yes," Alicar said. "One of the machinists. You're there! Specific impressions?"

"Nothing useful. Imagery. He's probably asleep and dreaming. It could be a drug fantasy. Something like a big round drop of water rolling across the desert toward him . . . Traces of another mind now."

"Yes?"

"Haven't made out much about it so far. Shall I work on that, or probe directly for Hille?"

Alicar said after a moment, "Try Hille first."

She projected Hille's name and appearance lightly among the mental impressions she was touching, sensed, seconds later, a faint subconscious response. "Hille, I think," she said. And after a pause: "Yes, it is. Self-awareness. He's awake . . . Calculating something . . . Alone . . ."

"Don't try probing in depth!" Alicar said quickly. "Simply retain light contact and see what impressions you get."

She said, with a touch of irritation, "That's what I'm doing." Couldn't he trust her to handle this? Another minute or two went by. She murmured, "Picking up that other mind again. No, wait!" She shifted to Ponogan, strengthened her contact with him.

"Now here's something odd!" she

said suddenly. "Both Hille and Ponogan—" She hesitated.

"Yes?" There was alert interest in Alicar's voice.

"I'm not sure what it means," Telzey said. "But each of them seems to have a kind of psi structure attached to him. Quite complicated structures! They seem almost part of their minds, but they're independent—sort of pseudominds." She hesitated again. "And I think—" She stiffened. "Djeel oil!"

"What?"

"*Djeel oil!* Hille's thinking about it. Alicar, they're processing djeel at your mine."

There was silence for a moment. Then Alicar's voice said: "Come back inside."

He looked around from the console as Telzey came into the cruiser's control section. But the face wasn't Alicar's, didn't resemble it in the least. She checked, startled.

The face smiled. "Life mask, of course," Alicar's voice said. "Nobody at the mine knows what I really look like. No need to explain why now, is there?"

She sat down. "*You're* mining and processing djeel ore here?"

"I am," Alicar said dryly.

She stared at him. "I didn't know there was any on Mannafra!"

He shrugged. "No way you could know. I'm reasonably sure I'm the only one to have come across it here, and I haven't advertised it."

Telzey shook her head. Djeel was a substance in a class by itself, located so far on only a handful of worlds. The processed ore yielded djeel oil—and djeel oil was believed to have unidentified properties which had scooped a hundred-mile semiglobular section out of a planetary surface, producing cataclysmic secondary effects. Any djeel detected since then had been confiscated by the Federation for removal and disposal in space. She said, "Aren't you likely to work yourself into the worst kind of trouble? If you get caught importing djeel anywhere in the Hub, they'll hang medals on whoever shoots you!"

"I haven't imported it anywhere in the Hub," said Alicar. "The oil processed by the mine in its first three months of operation is at present stored away on an asteroid chunk only I can identify. The reason I came back three days ago was to pick up a new load. Let's drop that subject for the moment. Just before Hille started thinking about djeel, you seemed to have an idea about those psi structures associated with him and Ponogan. What was it?"

"Well, that," Telzey said. "I'd have to check a lot more closely to be sure. But I think they're automatic control mechanisms—something that lets the men seem to function normally but cuts in if they're about to think, or do, something that isn't wanted. Was that what you noticed three days ago?"

"Yes," Alicar said. "But I didn't stay around long enough to analyze

it. Apparently everyone at the mine has been equipped with such a mechanism—we can check on that presently. The immediate question is why it was done."

Telzey nodded. "Do you have any ideas?"

"Nothing definite," he said. "Look, let me give you the background on this—I want your opinions. I was scouting around last year, looking for good investment possibilities. Most of Mannafra's mining is concentrated in sections where rich strikes have been made. This whole general area has been almost completely neglected. But something about the formations down there looked interesting to me. It was mainly a hunch, but I came down, and inside an hour I knew I'd found a quite respectable deposit of serine crystals.

"If I hadn't been doing my own analysis, that's as far as it would have gone. There were djeel traces in the samples I'd taken." Alicar smiled. "Those, naturally, weren't the samples submitted with my application for mining rights, and I got the rights under an identity which goes with *this* appearance." He tapped the life mask's cheek.

"Well, now wait!" Telzey said. "Why did you want djeel oil in the first place? If they're right about what happened on Tosheer, it's horribly dangerous. And I've never heard that it was supposed to be good for anything. Though—" She paused abruptly.

"So now it's occurred to you!" Alicar nodded. "Something capable of releasing energies of that magnitude isn't going to be simply ignored. You can be sure the djeel ore the Overgovernment obligingly hauls off wherever it's found isn't being dumped into some solar furnace, though that's the story."

"You know that?"

"I know it. A good many other people suspect it." Alicar chewed his lip. "I spent a large part of the past year trying to find out just what is being done with it, but that's one of the best-guarded operations around. I couldn't even establish what government branch is involved. Incidentally after we've cleaned up the problem here, continuing that investigation may be your next assignment."

Telzey said after a moment, "I didn't think you really intended to let me go again."

He laughed. "No, not for a while! You're too useful. I have several jobs lined up for you. You can see that a supply of djeel oil would have a fabulous value if the right people can be contacted safely."

"You want to sell it?"

"I might. I'd prefer to set up a research project designed to harness djeel, but I may decide it's too risky. Because *that's* where djeel oil becomes dangerous—the experimental stage! It's not general knowledge, but it's been processed and stored without incident in much greater quantities than this mine, for ex-

ample, would produce in years. Unfortunately, nobody seems to know what kind of experiments that industrial outfit on Tosheer was conducting with djeel when the planet's mantle erupted.

"Now to get back to the present situation. The mine went into operation roughly seven months ago. It took careful preparation, and the personnel had to be handpicked. Of the twelve men down there, nine knew only that we'd be producing serine crystals—which, aside from serving as our cover, has turned out to be sufficiently profitable in itself. The three involved in the processing of djeel oil are Hille, Ceveldt and Gulhas who is the Romango computer technician."

Telzey said, "You were controlling those three?"

"No. As I've told you, I use psi only when it's necessary. I did check their personalities carefully, of course, and knew they'd go along with me dependably in the matter of the djeel. During the first month, we worked only serine. Then the secret djeel operation began. As soon as it was underway, I left Mannafra."

"Why?"

"Because *I* intend to stay in the clear in this, Telzey! The chance of discovery seemed remote. But if it happened, all Hille and his colleagues could point government investigators to was this substitute identity of mine. It was created to give me cover in other activities which might have brought me into conflict with various authorities. I can drop it at any time."

Telzey said, "If you still are in the clear, wouldn't this be a good moment to back out of the djeel project and discard your cover identity for good? You'd be safe then."

Alicar smiled. "No doubt. But I'm not going to give up that easily!"

"We don't know at all what's happened here," she pointed out. "Supposing we go on with the investigation and I get caught."

"That would be unfortunate," Alicar told her. "I wouldn't like to lose you."

"I suppose it was a stupid question," Telzey said after a moment. "You'd simply kill me before I could give you away—"

"I'd have to, wouldn't I?" Alicar said. "But we'll take every reasonable precaution to keep you from getting caught. You know as much as I can tell you now, so let's get on with this. You say we don't know what's happened here. But we do know one thing, don't we? A psi's been operating on Hille and Ponogan, and probably on all the mine personnel. In other words, they're now controlled."

"That's what it looks like," Telzey agreed. "But so far, the picture doesn't make sense."

"Why not?" said Alicar, watching her.

"Well—somebody outside realizes djeel is being processed at the mine. If that somebody is government,

they'd want to catch the absent owner—"

"Mr. Ralke," supplied Alicar. "It's the Ralke Mine."

"All right—Mr. Ralke. They can't locate him elsewhere in the Hub because he becomes nonexistent there. So, knowing he's come back once to pick up the processed djeel oil, they stake out the mine. In your other activities, have you given anyone reason to suspect Mr. Ralke might be a psi?"

He shook his head. "I doubt it very much."

"But it's possible?"

Alicar shrugged. "Let's say it's possible."

"If that were discovered," Telzey said, "it would bring in government psis—the Psychology Service. But then why control the mine people with mechanisms that would make any probing telepath suspicious? They have to assume that Mr. Ralke, psi, does probe his employees before showing himself at the mine."

Alicar scratched his chin. "It really doesn't make very much sense, does it?"

"None at all," Telzey said. "If it were the Service and they thought Ralke might be a psi, everything at the mine would look completely normal now. In fact, it would *be* normal—except that there'd be a strike group sitting up here in the mountains somewhere, one of them a third-string Service telepath. And he'd be in watch-contact with someone at the mine, probably Hille, and as soon as you came back, he'd know."

Alicar pursed his mouth, frowning. "Well, let's say it's not the Service then. How does an independent psi operator like myself look to you?"

"Not much better," Telzey said. "Unless it's someone you know."

"Huh? Why that?"

"Somebody who doesn't like you," she explained. "It probably would be a hot-shot psi, because if those mechanisms are as complicated as they seemed to me, I don't think either you or I would be able to construct something like them."

The expression on Alicar's life mask indicated he didn't enjoy the suggestion. "There might be someone like that," he said slowly. "What would be his purpose?"

Telzey said, "He needn't be interested in djeel as such. But he knows you own the mine and will come back to it. So he sets up a psi phenomenon you're bound to detect and which you'll have to investigate before you risk setting foot in the mine." She grimaced briefly. "In that case, something very unpleasant—I don't know what—is supposed to happen to you while you're probing the phenomenon. What he couldn't know, of course, is that you'd do your probing by proxy."

Alicar's eyebrows had lifted. "An interesting theory!"

Telzey went on. "It isn't some psi who doesn't know you and simply wants to take over the djeel project.

Because, while he might have some reason for constructing those mechanisms, he'd certainly slap shields on Hille and the others besides, so nobody else could catch them leaking thoughts about djeel."

"Yes, that omission's a curious aspect," Alicar said. He regarded her a moment. "Any more theories?"

"Only one—that's completely wild."

He smiled. "You've been doing well so far! Let's hear the wild one."

"I was wondering whether it might be the djeel that created those psi mechanisms."

"The djeel?" Alicar repeated.

"It's supposed to be a unique form of matter, isn't it?" Telzey said. "Mystery stuff?"

"Yes, it's that. But still—" Alicar shook his head. "Well, we're speculating! And we seem to have speculated sufficiently. In the light of what's actually established, what do you suggest as our next step?"

"Our next step? That's obvious. Let's get out of here!"

He laughed. "No. You might be surprised at how quickly I could get out of here if I had to. But I don't intend to do that unless we come across a very definite reason for it."

She sighed. "Then I'll have to go on probing. And if I go outside again and do it from here, there's too much chance of diffusion. A telepath might pick me up."

"I can work you in a good deal closer," Alicar said.

"How much closer? I suppose your Romango computer has defensive armament?"

"Of course. That's standard in a region like this. There's an automatic defense zone with a three-mile radius. Normal sensor range is three times that, and can be extended."

"Nine miles," said Telzey. "That's still hardly an ideal condition."

"One and a half miles," Alicar said. "We'll use the aircar and the arrangement will be the same. You'll be outside, and I'll be in the car and behind a psi-block. The car's gun, incidentally, will be pointing at you in case something goes wrong. So try to make sure nothing does."

"How are we going to get within one and a half miles of the mine?"

He grinned. "There're blind spots in the defense system because of the surrounding dunes. I checked them out when we first set up the installation. A car that's hugging the ground can avoid the sensors. I'll take you there. The rest will be up to you."

III

To Telzey's right, the section of sky beyond the gray-black mountain range where Alicar had left his spacecruiser was beginning to lighten. Morning wasn't far away. The top of the sloping hill of sand which hid the Ralke Mine from her, as it hid her from the mine computer's sensors, was thirty feet above her head. She sat, shivering, knees drawn up under her coat, arms

wrapped around them, looking back down the slope at the small aircar which had brought them here. It hovered eight feet above a straggly patch of dune vegetation, shifting back and forth in occasional surges of wind. Concentrated on what she was doing, she wasn't aware of it.

Then Alicar's voice came suddenly from the speaker in her respirator. She gave a slight start.

"Anything new?" There was an edge of impatience in his voice.

She cleared her throat. "Nothing that seems important. Gulhas is in the computer control room now. He was thinking about you a minute or two ago."

"In what connection?"

"That blip the Romango picked up and identified as an aircar before you ducked behind the dunes. Gulhas thought of it and wondered then when you'd be coming back to Mannafra. That's all. It slipped from his mind again immediately."

There was a moment of dissatisfied silence before Alicar said, "You're sure you didn't miss anything? There should have been further reflections associated with that."

"There should have been," Telzey agreed. "But there weren't. I wouldn't have missed them. You're apparently one of the subjects they don't have reflections about there now! Gulhas simply has his mind on what he's doing. Routine start-of-day checks. Nothing else."

"What about the rest?"

"No change. Ceveldt and his assistant are at their operational stations. They don't think about what's being brought up, so it's probably djeel ore. Hille's fast asleep now, and the remaining three are still sleeping. When they dream, the dreams have nothing to do with the Ralke Mine. And there's still no mind or life trace of the other five people who should be there. Unless they're behind the psi-block around your office area—"

Alicar interrupted. "I told you it's out of the question that anyone could be in there! To open the office in my absence would take something like a blast almost heavy enough to flatten the mine."

"Well, in that case," Telzey said, "those five are either dead, or they're gone. And whichever it is, nobody thinks about them either."

Alicar swore in exasperation. Telzey shrugged.

"That's the way it is," she said. "The controls have been extended since I did the first probe from the mountain. The men are more limited in their thoughts, apparently including even their dreaming thoughts. Whether that's a temporary precaution, connected with the fact that the Romango recorded a passing aircar, I can't tell. It might be a reaction to my earlier scanning—say, a prearranged defense pattern against a telepathic encounter. The men think of nothing, remember nothing, that has to do either with djeel or with anything abnormal in the situation at the mine. That goes on down through the unconscious

levels. The mechanisms block out the prohibited material."

"A reaction like that could be an automatic one," Alicar remarked.

"It could be. But at a guess, there's a psi around, and he's on guard."

"If there is one around, he couldn't be physically at the mine?"

"No, definitely not. With established controls, he wouldn't have to be there, of course. I should have picked up some trace of him by now if he were even within ordinary scanning range."

There was a pause until Alicar said, "Could you take one of those control mechanisms apart?"

"Taking them apart shouldn't be difficult in itself," Telzey told him. "They're only mechanisms, after all, and they don't hold much energy. But I'm rather sure we'd get a drastic reaction if I started doing it. There must be a kind of shared sentience between them to explain what's going on. So it would be noticed."

"What if you and your subject were behind a psi-block?"

"Then it wouldn't be noticed," Telzey said. "What psi-block?"

"My offices at the mine. I'm beginning to believe I can get us inside without undue risk."

"Well," Telzey said after a moment, "I suppose they might let us in. And, frankly, I wouldn't mind getting out of the cold. But I think you'd be stepping into a trap."

"No, it should be the other way around. When I first got the Romango, I arranged to have it accept voice override from me against any other instructions given it. Once we're there, I can take over the internal and external defense system at any time. Nobody at the mine knows about that. I'll have you work the psi controls off one or two of the men in the office area, and we should soon know exactly what the situation is and what we can do about it."

Alicar added, "You'll have to put up with the cold a little longer. I still intend to reduce the risks as much as I can, so we won't leave this place until shortly before daybreak. You're to remain alert for any changes in the situation at the mine—and in particular, of course, for any indications of activity on the part of a psi."

The starblaze was fading by the time Telzey finally climbed back into the car. She'd had nothing of significance to report in the interval; and as the door closed behind her, her residual contacts with the mentalities at the mine were shut off abruptly by the car's psi-block. She took off her coat, grateful for the warmth, sat down, pulled off the respirator and massaged her chilled face.

Neither of them spoke while Alicar maneuvered the car back along the low ground between the dunes until they were well beyond the range of the Romango computer's sensors. Then they lifted into the air and headed west, away from the mountains.

"Nothing showing in the screens," Alicar observed presently.

Telzey glanced at him. "Did you think somebody would follow us?"

"Somebody might—if they suspected I was around."

"What would you do if we did get trailed?"

"Lead them toward the Federation's Mannafra Station. If that didn't discourage them, I'd feel we were dealing with the Psychology Service, after all, and I can't afford to play around with that outfit! I'd cut back to the cruiser in that case, and get out."

"Supposing we're overtaken?"

He grunted. "This is a modified racing car. There's not likely to be anything on Mannafra that could overtake it, but for emergencies it has a very powerful little gun. Besides"—he indicated a distant brown-tinted cloud bank—"you never have to look far here to find some sizable dust storm to lose yourself in. Enough of the dust's metallic to blind sensors. Don't worry about that part of it. Now let's get that mind shield of yours open and make sure you're still the completely dependable little helper you're supposed to be . . ."

He remained silent for the next few minutes, blinking in concentration now and then. Telzey couldn't sense the scan; so that specific awareness had been sealed away, too. Presently her shield locked again.

"Well, you've done your best to carry out your assignment so far, and the opinions you've given me were honest ones," Alicar acknowledged. "I think I have you safe enough!"

There didn't seem to be much question about it. Telzey said after a while, "It wouldn't really explain anything, but those five men who've disappeared from the Ralke Mine—you said they didn't have anything to do with the djeel operation."

Alicar nodded. "They didn't. At the time I left, at any rate, it was still simply a serine crystal mine as far as they were concerned."

"Supposing," Telzey said, "they found out about the djeel and decided they didn't want to be involved in something like that? Couldn't they have gone to the authorities?"

"Meaning that's why the mine is staked out now?" Alicar shook his head. "No. Aside from the fact that it doesn't, as you say, explain the present situation, it's unlikely in itself. The system we developed was automatic and foolproof. The only way those five could have got information about the djeel would be accidentally through one of the three men in the know." He added, "And if that had happened, they wouldn't have gone bearing tales to the authorities! Hille and Gulhas control the computer, and you can be sure Hille would have rigged up some plausible mining accident. I was careful to choose the right kind of man to be manager here."

The screen scanners picked up several dozen air vehicles in the next few hours, but none were moving in

the same direction, none came near them, and certainly none seemed interested in following their car. Alicar appeared to be going out of his way to advertise their presence. They flew past a number of installations, coming close enough to one to alert its defense zone and draw a standardized communicator warning from the guard computer, followed by discourtesies from the computer's operator. The car's cooling system had switched on shortly after Mannafra's yellow-white sun lifted above the horizon—the days evidently were as hot in this region of the planet as the night had been cold. Alicar said finally, "Close to noon! We've given any interested parties plenty of time to take action, and they haven't. So now we'll tackle the Ralke Mine! If there's no hitch on the approach, we'll go in, and once we're inside, we'll move fast. I'll take over the Romango at once from my offices, in case we run into difficulties."

Telzey said nothing. She felt uneasy about the prospect; but from Alicar's point of view, regaining control of the djeel oil operation was worth taking some personal risks. There was nothing she could do about it. Something less than two hours later, the car began to slant down toward the Ralke installation. The pink glow of a semiglobular force field appeared abruptly in the forward viewscreen, centered above the mine structures. The communicator went on simultaneously.

An uninflected voice said, "Warning! You are approaching the defense zone of the Ralke Mine, which is visible at present in your screens. You are required by law to provide verbal or code identification, or to change your course and bypass the zone. Failure to comply promptly will result in the destruction of your vehicle."

Alicar tapped out a signal on the communicator. The pink glow vanished, and the voice resumed. "Your identification is acknowledged. The defense zone has been neutralized. Your approach to the vehicle storage section is clear."

The communicator shut off. Alicar said in a taut voice, "*That* part of it is normal anyway! Let's waste no time . . ."

The car swept down, skimming the tops of surrounding dunes, toward the central building of the Ralke Mine. A circular door opened at the building's base—a door easily large enough to have let Alicar's spacecruiser pass through. He snapped over a switch, said to Telzey, "Psi-block's off! Start checking!" and she felt the block fade about her.

She'd been waiting for it; and her mind reached out instantly toward the minds she'd previously contacted here, picking them up one by one, aware that Alicar's mental screens had tightened into a dense shield. The car slid into the vehicle section. Telzey was opening the door on her side as it stopped. She slipped out, glancing around. A big loading crane stood in one corner; otherwise the

section was empty. Alicar was beckoning to her from the other side of the car; she joined him and trotted along beside him as he walked rapidly toward a door in the back wall. It opened as they came up. Simultaneously, the entry door snapped shut.

They went through into a passage. A man was coming along it toward them, moving with a quick, purposeful stride. Ceveldt, Telzey told herself, the mine's geologist, one of the three involved with Alicar in the original djeel conspiracy.

"Mr. Ralke!" Ceveldt said, smiling. "We'd been wondering when you'd return." He looked questioningly at Telzey. "This young lady—"

"Nessine, my assistant." Alicar's right hand was in his pocket, and Telzey knew the hand rested on a gun. He went on. "She's part of our private operation. Everything still going smoothly there?"

Ceveldt's smile widened. "It couldn't be going better!"

Alicar nodded. "There've been some highly promising developments outside in the meantime. I want to see you and Hille in my office in about five minutes."

"I'll inform Hille," Ceveldt said.

He went toward a door leading off the passage. Alicar glanced briefly at Telzey. "Come along, Nessine!"

They didn't speak on the way to his offices. It took Alicar some seconds to open the massive door, which evidently was designed to respond to the keys he produced only after it had registered his body pattern. As it swung shut behind them, the psi-block installed about the area closed and cut off Telzey's contacts with the mine group again. They passed through an outer office into a larger inner one. There Alicar motioned to Telzey to remain silent, then spoke aloud.

"Code Alicar!" he said.

The Romango computer's voice responded promptly from a concealed speaker. "Code Alicar in effect. Verbal override acknowledged. Instructions?"

"Scan my companion for future reference," Alicar said.

"The companion has been scanned."

"Her name is Nessine. You'll recognize her?"

"I will."

"No further instructions at present," said Alicar. "I'll repeat the code before giving you new ones." He drew in a breath, looked at Telzey. "Well, that's in order!" he remarked. "I control the Romango. Now, what's happened here since this morning? Ceveldt acted as if nothing had changed after I left."

Telzey nodded. "And that's how it seems to him now! The mechanisms have modified their control patterns again. Not just for Ceveldt—as far as I could make out, the same thing seems to have happened to everyone else here. Of course, they all still have the impression that everything

is normal at the Ralke Mine. But the three who should know about djeel now know about it; the others have no suspicion it's being hauled up and processed. I believe the shift was made as soon as you identified yourself from the aircar."

"To give *me* the initial impression that everything was normal here," Alicar said. "That much could be preplanned and automatically activated by my arrival. But, obviously, I wouldn't retain the impression very long. For one thing, I'd soon be asking what happened to the five missing members of the staff. So this setup is intended simply to gain a little time! For someone who isn't at present at the Ralke Mine."

"Enough time for the next move," Telzey said.

"A move," said Alicar, "which I should have already forestalled by shifting ultimate control of the computer to myself . . ."

A bell sounded as he spoke. He turned to a desk, switched on a small viewscreen. It showed the passage outside the offices, Ceveldt and another man standing before the door. "Ceveldt and Hille." Alicar switched off the screen. "We'll soon know now!" He pressed a button, releasing the outer door.

"Gentlemen, come in—be seated!" he said as Hille and Ceveldt appeared in the door of the inner office. "Nessine, get the files I indicated."

He hadn't indicated any, but she went back into the outer office, stood there waiting. After some seconds, Alicar called, "All right, you can come back in!"

Hille and Ceveldt were slumped in chairs when she rejoined him. Alicar had placed a face mask and a short plastic rod on the table beside him. "They both got a good whiff of the vapor and should be fairly limp for a while," he told her. "If necessary, I'll repeat the process. Now get them unhooked from those mechanisms enough so they can tell me what's been going on."

Telzey said, "I could do it easier and faster, and perhaps safer, if you'd knock a few of *your* controls off me! At least, until I finish with these two."

He grinned, shook his head. "Not a chance! I like you better on a short leash. You're doing fine as you are. Get to work!"

She sat down in another chair, went to work. Alicar remained standing, gaze shifting alertly between her and the men. Two or three minutes went by. Telzey closed her eyes, carefully wiped sweat from her face.

"Getting results?" she heard Alicar inquire.

She opened her eyes, looked at him.

"Yes!" she whispered.

"Well?"

She shook her head.

"I can tell you one thing right now," she said. "We should get away from here as fast as we can!"

"I'd need to hear a very good reason for that," Alicar said.

"Ask *them!*" she said. "They can talk to you now. Perhaps they'll convince you."

Alicar stared at her an instant, swung to Hille. "Hille?"

Hille sighed. "Yes, Mr. Ralke?"

"What's happened here since I went away?"

Hille said, "Soad came and made us see what we'd been doing."

"Soad?" Alicar repeated.

Ceveldt nodded, smiling. "The Child of the Gods. You see, djeel oil is god matter, Mr. Ralke! It wasn't intended for men. Only the Children of the Gods may use it. Soad wants djeel oil, so we've been processing it for him. He's forgiven us for taking it for ourselves."

Alicar looked exasperated. "Telzey, get them out of this trance or whatever they're in!"

"They're in no trance," she told him. "I've neutralized the control mechanisms enough to let them say what they really think. The Child of the Gods converted them, don't you see? They believe him. The only djeel oil stored at the mine at this moment is what's been processed during the past week. He comes by regularly to collect what they have on hand for him."

"Who *is* that Child of the Gods?"

She giggled helplessly. "A great big drop of liquid rolling like mercury across the desert at night! Ponogan was dreaming about it when I checked the mine from the mountain. I mentioned it, remember? That's Soad. And, believe me, he is big!"

Alicar stared at her. "There's no creature like that on Mannafra!"

Ceveldt said, "Soad came from far away. He needs djeel oil to return, and it's been our privilege to provide him with what we could. But it isn't enough."

Hille added, "Mr. Ralke, he wants the djeel you took away from Mannafra. That was terribly wrong of you, but you didn't know it. Soad's forgiven you and has been waiting for you to return. He'll come tonight, and you'll understand then why you must go with one of his servants to bring back his djeel."

" 'Servant' meaning one of those control mechanisms," Telzey put in.

Alicar looked startled. "I doubt he could do that to a shielded psi mind!"

She giggled again. "Couldn't he? Remember how you stumbled across the djeel ore in the first place? You said you were flying by overhead and turned down on a hunch to take mineral samples—possibly at the one point on Mannafra where djeel can be found. On a hunch! Doesn't it look like Soad was waiting for someone to come within psi range who could dig up and process the stuff for him? He slipped up then in letting you get away with the product of the first three months of operation. He'd like it back, of course. And he put full controls on the people who remained at the mine after you'd left,

to make sure nothing like that could happen again."

She added, "Whatever he is, he has a use for a ready supply of protoplasm, too! He's collected the five missing members of your mine personnel along with his djeel."

"Well," Ceveldt said mildly, "it was required. The desert offers insufficient nourishment for Soad. Naturally, we're no longer interested in mining serine crystals, and those men weren't needed in the full production of the oil. It was an honor for them to serve him in another way."

IV

Alicar shook his head, drew a deep breath. "Code Alicar!" he said sharply.

The Romango computer's flat voice came into the office. "Instructions?"

"Close and seal every section of the installation to make sure the personnel stay where they are. Free passage at will is permitted only for myself and Nessine!"

"Complying," said the computer.

"Unlock the vehicle section and open its exit."

"Complying."

"Accept no further orders until I address you again."

"Understood."

"End of instructions." Alicar jerked his head at Telzey, started for the door to the outer office. "Come along!"

Hille and Ceveldt began to push themselves up from their chairs, the vapor-induced weakness still evident in clumsy motions.

"Mr. Ralke," said Hille, "you mustn't attempt to leave! That's against Soad's wishes!"

Alicar swung around to them, and now his gun was in his hand.

"Shut up!" he said savagely. "Stay in those chairs! If you try to follow, you're dead men . . . Come on, Telzey!"

They left Hille and Ceveldt staring after them, hurried through the outer office, along the passage.

"Soad's more than I counted on!" Alicar's voice was unsteady. "We're leaving, of course!"

"Hille was thinking the computer wouldn't obey you," Telzey told him.

"Well, he's wrong! He didn't know about the code override. You heard it acknowledge my instructions. The Romango's one thing their monster can't control. But hurry it up! I won't feel safe until I'm off the planet."

They ran back the way they'd come. There were blurred impressions of various minds in the surrounding structures, but Telzey tightened her shield and ignored them. For once, she agreed with Alicar—getting completely out of this area seemed the best immediate thing they could do. If possible.

They came to the passsage leading to the vehicle section, to the door at its end. Alicar grasped the door handle, pulled at it, then strained,

putting in all his strength. He swore furiously.

"Still locked! What—"

"Can you check with the computer?" Telzey asked.

"Not here! No voice pickup around!" Alicar chewed his lip, added, "Stand back!" and stepped away from the door, leveling his gun. Long darts of scarlet flame hissed around the lock. Metal flowed under the flame, hardened lumpily again. The air in the passage grew hot.

Alicar switched off the gun. He stepped forward, rammed the sole of his boot against the surface of the door. The door flew open.

"Come on!" he gasped. "We can open the exit manually!"

They started through into the vehicle section, came to a stop together.

The big work crane which had been standing in a corner when they arrived at the mine hadn't stayed there. It was near the center of the compartment, swinging around toward the door on its treads as they caught sight of it. Crushed parts of their aircar lay scattered about. The crane started rolling toward them then. They backed hastily out into the passage.

"Now what?" Telzey felt short of breath. "Your override system's a fake—a trick! Hille was right. Somebody spotted it while you were gone!"

Alicar stared at her, mouth twisting.

"Gulhas," he said. "The technician! Where is he?"

"In the computer room, I think. I'll check."

"Do it while we're on our way there. Get into full contact with him at once! Come on!"

"Alicar," she said, running along behind him. "You'd better let me—"

"I'll have you put Gulhas under control when we reach the computer room. Don't bother me now. We might have other problems."

Telzey didn't reply. She caught an impression of Gulhas, lost it again. Contact wasn't easy. She had to give attention to keeping up with Alicar, and there was another distraction. Something was going on; she wasn't yet sure what. But—

"Alicar!"

"Come on!!" He didn't glance back.

"*Wait!* Hille—"

Telzey broke off. They were passing through the mine's storage area; and now two men had appeared suddenly in the aisle ahead, stepping out from behind packing cases. Hille and Ceveldt. Guns in their hands, pointed at Alicar. And Alicar, hand hovering above the pocket that held his gun, came to an abrupt halt. She'd stopped twenty feet behind him.

"Mr. Ralke, don't move!" Hille said quietly, walking forward. He might still be unsteady on his legs, but his face was hard and determined, and the gun didn't waver. He went on. "The situation has

changed! Your actions indicate to Soad that it might be too dangerous to send you back to get the djeel oil you stole. Therefore—"

The gun in his hand went off as Alicar threw himself to the floor and rolled sideways. It went off again, and so did Ceveldt's, and Telzey saw one of the scarlet darts of Alicar's gun flash into Hille's chest. Ceveldt fired again, and Alicar jerked violently around, the gun flying from his hand and skidding down the aisle toward Telzey. She scooped it up, darted behind a piece of machinery on her left, and crouched down, heart pounding.

There was stillness for a moment. She worked herself in farther between the machines and the wall. From there, she could see a section of the floor, Hille lying on his back. She tried to reach his mind, found it disintegrating in death. Alicar—no, Alicar wasn't dying, not yet! But he was badly hurt and unconscious.

Slow, cautious footsteps. Ceveldt. She shifted contact to his mind. Ceveldt was uninjured and coming watchfully toward the array of machines behind which she crouched, not knowing exactly where she was. She couldn't see him and didn't need to. She knew what he was going to say before he spoke.

"Soad can't permit you to live either, Nessine or whoever you are," his voice told her. "He knows what you've done, and it seems you might cause a great deal of trouble here before he made you understand it was wrong. You can't get away—the doors are locked now. So come on out!" He added, "It will be painless and quick."

Did he know she had Alicar's gun? No, he didn't; he'd seen it spinning away from Alicar's hand, but his attention had been on the man, not the weapon. He'd seen her dart out of sight behind the machines, and he wanted to make sure of her before he went back to finish off Alicar, if that was required.

She felt him reach a decision, and crouched lower. Overhead and to her right, something thudded against the wall; heat washed briefly over her, and when she glanced up, she saw a small section of the wall glowing where the bolt had struck. She crept over to a point directly beneath it. He was less likely to fire at that exact spot again in trying to flush her into sight.

There were a dozen more shots, some crashing into metal, some against the wall. Then Ceveldt, not knowing whether he had reached her or not, was coming around the end of the array of machines where he had seen her disappear.

She rested Alicar's gun on a piece of steel and held it there unsteadily, thumb against the firing stud. She nearly wasn't quick enough then. Most of Ceveldt's strength had returned to him in the interval; he was suddenly in view, standing beside the wall, seeing her. He shot. She fired into a blaze of light, felt a succession of shocks jolt through Ce-

veldt, felt intense heat above her and a spray of fire pain across her back. She dropped flat and rolled over to crush out the sparks on her shirt.

That took only moments. She turned again and crept forward until she was past the impact area of the last shot, then got to her feet. Ceveldt was down, and Ceveldt was dead. She stepped around him and came out from behind the machines.

Alicar's left thigh was an ugly, seared mess, and Hille's gun had punched a hole through his right shoulder. That wound was bleeding heavily. She could stop the bleeding and would—if she had time left for it. The control mechanisms attached to Hille and Ceveldt might not understand death, but she sensed them reacting to the fact that their charges weren't performing as they were supposed to perform. That reaction was being picked up by the other mechanisms here—and, no doubt, being communicated to Soad.

She started to kneel down beside Alicar, then hesitated. A sound behind her? She turned quickly, bringing the gun around. For a moment, she stood frozen.

Hille's body had turned on its side. His hand was groping with slow, fumbling awkwardness toward the gun he had dropped. He hadn't come back to life—Soad's mechanism was forcing the corpse into a semblance of action. The fingers stretched and curled, reaching. The boots scratched against the floor

Unnerved, Telzey hurried toward the contorting thing, snatched up the gun, then ran to check on Ceveldt. And dead Ceveldt, too, was being driven to attempt to regain the weapon he'd lost.

She had both weapons now; but there was a furious thudding on a distant door as she ran back to Alicar, and a feeling of despair came to her. Ceveldt and Hille had secured the doors to the storage area from within; and if that lock system had been under the Romango computer's control, the doors would have reopened by now. So it wasn't. But it could be only minutes before Soad's other slaves forced their way in by one means or another; they'd come armed, and that would be the end. Given more time, she might have pried them away from their psi mechanisms in turn. Given the capabilities of which Alicar had so carefully deprived her—

Realization blazed through Telzey.

She thought: "But of *course!*"

She stood staring down at Alicar then in such utter concentration that the racket of the assault on the door receded completely from her awareness. Seconds went racing by. *Here* was where he'd blocked her—and here! And here! The controls dissolved as she came to them. Abruptly, she knew she was free.

She drew a deep breath, reached confidently for one of the minds she'd touched before, restored contact. Psi flashed over the line of contact,

struck with calculated violence. That mind went blank.

Barely a minute later, there was only one human mind besides her own still functioning consciously at the Ralke Mine. It was that of Gulhas, computer technician.

Gulhas was as much a convert to the Child of the Gods as Hille and Ceveldt had been, but he became Telzey's property before he knew what was happening. She detached Soad's mechanism from him, disintegrating it carefully in the process, and had him come with a float carrier and medical kit to the storeroom where he helped her do what could be done immediately for Alicar. Then they placed Alicar on the carrier and went to the Romango's control room with him.

As they arrived there, Soad found Telzey. There was a cold surging of psi, and the palms of her hands were suddenly wet. For a long moment then, Soad was looking at her as a man might look at a domestic animal which has turned unexpectedly intractable. She was prepared for an immediate attack, but none came. Gradually, the awareness of Soad withdrew, though not entirely.

Telzey let her breath out in a sigh. Her mind shield was tight: and whatever the Child of the Gods might be, it was unlikely that he could accomplish much in a direct assault on that shield. The danger should take other forms.

She said to Gulhas, "Give me verbal override on the computer," and to make sure there'd be no slips, she kept most of her attention on him as he went through the brief process, though he was no more able to go against her wishes now than she'd been able to go against those of Alicar. Some attention, however, she kept on the lingering shadowy presence of Soad, not knowing what that entity might be up to—and, particularly, not knowing where it was at the moment. It hadn't been in the vicinity of the Ralke Mine when she'd been scanning the area; she should have picked up some indication of the alien mentality otherwise. But the situation might have changed by now.

The Romango acknowledged her identity and control and asked for instructions.

"Activate the Ralke Mine's defense zone," she said.

"Activated."

She felt a little better. "You've been given the identification of a being called Soad, or the Child of the Gods?"

"I have. This is the recorded image."

A panel before Telzey became a viewscreen, and in the screen appeared a picture much like the one she'd seen in Ponogan's mind as he dreamed: a great liquid-seeming globe rolling along the side of a desert dune under the starblaze.

She said, "Is Soad at present in your sensor range?"

"No."

Her tensions lessened again, but she remembered how far Alicar had been able to maneuver them in toward the mine. She said, "If you do sense it, inform us immediately."

"Complying."

She went on. "And if Soad appears within the defense zone, attack it with every weapon you have until it's destroyed."

There was the shortest of pauses. Then the computer said, "The instruction is not comprehensible."

Startled, Telzey glanced at Gulhas. He said, "That's correct. Soad told us to see to it that the mine's armament couldn't be turned against him, and the Romango was programmed accordingly. Your override doesn't affect that because the computer doesn't know it's been programmed. An order to attack Soad simply has no meaning for it."

"Then get it unprogrammed fast!" Telzey said. "But first have it put me in communicator contact with the Mannafra Federation Station." She hesitated, seeing the response in Gulhas's mind. "So it's been programmed against that, too!"

The Romango had, in fact, been programmed against letting a communication of any kind go out from the Ralke Mine. The Child of the Gods hadn't relied entirely on conversion and psi mechanisms to maintain its hold on the humans. Telzey asked a few more questions, saw how complete their isolation had been. Except for the automatic contacts with vehicles approaching the defense zone, the computer's external communication system was shut off. There was no other communicator at the mine, and the only air truck and two groundcars had been destroyed.

Nor would it be at all easy now to turn the Romango into a weapon against the Child of the Gods, or to restore the use of the communicator. Gulhas hadn't been involved in installing the prohibiting programs. Hille had let the machine calculate for him how it should be done, and how the programs then could be deleted from record and made inaccessible to its locators, leaving it unable to act on later instructions to erase something which for it had no existence.

Telzey then had Gulhas set the situation up as a theoretical problem. Could a method be developed to track down and eliminate such lost programs? The computer said it was possible, but warned that a number of the procedures involved might reduce it to uselessness before the task was accomplished.

Since it was effectively useless as it was, Telzey told Gulhas to go ahead. His pessimistic estimate was that if the job could be done, it should take several hours to carry it out. But that couldn't be helped.

She had time now to give attention again to other matters. Alicar was deeply sedated; unless and until they got him to a hospital, there was no more to be done for him. She'd

scanned the remaining personnel occasionally, half expecting to find Soad's mechanisms attempting to make the same kind of awkward use of the unconscious bodies as they had of Ceveldt and Hille, but all was quiet in that area. It couldn't have made much difference in any case. The approaches to the computer room were sealed, and throughout the mine's structures every security lock controlled by the Romango had slammed shut. Even if the men had been awake, they wouldn't have been able to interfere with her here.

She turned to Soad's presence at the fringes of consciousness. Gradually and very cautiously—since she didn't know what he might do if he chose—she began to develop her awareness of him.

V

"Gulhas," she said presently.

The technician started, looked around at her. "Yes?"

"Will talking distract the computer?"

Gulhas shook his head glumly. "It's out of communication. There's nothing to indicate whether that's a malfunction or a necessary part of the tracing process. But it won't respond to any type of signal, and couldn't register our voices."

"It *is* still trying to trace out Hille's programs?"

"It's still doing something," Gulhas said. "I don't know what. Our problem set sections of it working against other sections. It may have destroyed itself in part and gone insane in its fashion. That was the risk we took."

"I know." Telzey reflected. "You can get a screen view of what it looks like outside, of the area around the mine?"

"Yes. A three hundred and sixty degree view. That screen on your left!" Gulhas pressed a button. The indicated screen lit up. He said, "You think Soad may be out there somewhere?"

"Not yet." Telzey's glance slipped over the screen, held on Mannafra's pale hot sun hanging low above the dunes. "How long before sunset?" she asked.

Gulhas looked at a console chronometer. "Perhaps half an hour."

"Does it get dark quickly after that?"

"Quite quickly in these latitudes. It will be night in approximately another half hour."

"I see." Telzey was silent a moment. Gulhas, watching her, said abruptly, "You're a mentalist, aren't you?"

She glanced at him. "A telepath, a psi, yes."

"I thought you must be," Gulhas said. "It seemed the only explanation for what's happened." He cleared his throat. "I want to thank you. I still feel something like loyalty toward Soad, but I realize now that loyalty was forced on us. We never would have served such a creature of our own will."

"No, you hardly would," Telzey agreed.

"He seems to know what's been going on since you and Mr. Ralke arrived."

"Unfortunately, he does," she said.

"Then why hasn't he appeared?" Gulhas asked her. "You'd think he'd act immediately to restore the situation he created here."

Telzey said, "He can't move now. Sunlight would kill him. Even the starblaze produces more radiation than he likes, but he can stand that. He'll come when it's night. He's waiting."

"So we have till then!" Gulhas blinked at her. "That's why he always came at night for the oil—we thought it was simply that he was trying to reduce the chance of being seen from the air. You're certain he'll come?"

"Quite certain. He's changed his plans."

"In what way?"

Should she tell him? Telzey decided it could do no harm to weaken further his enforced subservience to Soad. She said, "He's given up on getting back the djeel oil Mr. Ralke took from the mine. He'd be safer having it, but he's been experimenting with what he's collected and thinks he already has as much as he really needs—especially if he adds to it what's been processed here during the past days. So he'll come for that."

"Then he'll leave?" Gulhas asked, staring at her.

"That's what he intends. We gave him a surprise he didn't like today. He hadn't expected to have any trouble with humans."

"In that case, why not let him know he's welcome to the djeel oil?" Gulhas suggested. "Perhaps—"

Telzey shook her head.

"If we did, he wouldn't just pick it up and go," she said. "Everybody at the mine, dead or alive, would be going with him. He isn't leaving anybody behind to talk about the Children of the Gods—or about what they use djeel oil for either."

"No," Gulhas said after a moment. "You're right. He wouldn't want that." He reflected. "Can't you use telepathy to have someone outside send over a few aircars to pull us out of here?"

"It's not too likely," she told him. "I've been trying, but that kind of thing generally doesn't work when you most want it to."

"I see." Gulhas sighed heavily. "I'm not really myself yet," he remarked. "I know I should be horrified by this situation, but somehow I'm not extremely alarmed. It's as if someone else were sitting here. . ." He shrugged. "Well, I'll keep watching the Romango. If it gives me an opening, I'll cut in and let you know. Then we might be able to do something. But our prospects don't look good there either."

He swung about in the chair and settled himself again before the console. Telzey said nothing. There was

no reason to tell Gulhas that she hadn't been letting him feel frightened. He knew enough now to make sure there'd be no lingering subjective hesitation to help her act against the Child of the Gods if the opportunity came. She'd equipped him with a provisional psi screen, which should reduce Soad's awareness of what went on in the technician's mind. But it couldn't be completely effective. The less Gulhas was told of what really counted here, the better.

She returned her attention fully to Soad. She'd found out a great deal about that entity. Soad didn't seem to have the equivalent of a human psi's shield; and apparently it was a while before he began to suspect that she might be gathering information through the contact between them. Then he'd suddenly interposed a confusion of meaningless psi impressions, which she wasn't trying to penetrate at present.

Soad was in a machine in the desert west of the Ralke Mine. Telzey wasn't sure of the distance, but it might be something like forty miles. The machine was almost completely buried in sand drifts and screened against metal-locating devices. She'd thought at first it was a spaceship; but it wasn't that, though it could serve as one. It was more like Soad's permanent home and base of operations, and in time of need apparently also his fortress—a single massive block threaded by a maze of chambers and narrow tunnels, through which his protean, semi-metallic body flowed with liquid smoothness. He'd been stranded on Mannafra with the machine for a long time.

He needed djeel oil to get away. He might have enough now, but his tests indicated it would be enough by a narrow margin at best. That made it essential to add the oil on hand at the Ralke Mine to his stores. If Telzey hadn't made an unanticipated nuisance of herself, there would have been no problem about it.

It seemed likely that his kind hadn't developed the ability to shape psi energy into killing bolts, as she and other human psis had done. Otherwise, he should have attacked as soon as he saw that she was threatening to interfere, at least temporarily, with his plans. So far, she'd made only a restrained use of the weapon herself, in knocking out the mine personnel.

Used to its full extent, she thought it might stop Soad. But that was a possibility to hold in reserve. There was no doubt that the Children of the Gods were savagely formidable beings. They preyed on other species and warred regularly among themselves; and minds like that must be dangerously equipped, in ways still unknown to her. Any serious mistake she made about Soad now was likely to be a fatal one.

So she attempted no immediate new moves. She maintained light contact with the meaningless-seeming flow of psi impressions which veiled Soad's mentality, and probed

cautiously at the mentality itself whenever she could, trying to outline further its alien strengths and weaknesses. She thought Soad might be doing much the same thing.

More distantly, Telzey probed also for the touch of any human mind she might use to inform the Federation Station of Soad's presence on Mannafra, and of the plight of the survivors at the Ralke Mine. She'd need luck there, particularly since she could afford to give only partial attention to it; and as the minutes passed, it seemed luck wasn't going to be with her. In the viewscreen, the dune shadows lengthened while the sun dropped toward the horizon. Then the sun was gone and the desert lay in shadow everywhere. Above it, the starblaze was brightening.

And, finally, there was a development.

Telzey wasn't immediately sure what it was. There was psi charge building up, and building up here, at the mine. She waited. Something took shape, was formed swiftly. And now she knew. Soad, having studied her, was constructing a slave mechanism specifically designed for her, an involved and heavily charged one. She didn't think it could affect her seriously through her shield, but she didn't care to take chances with the alien device. Her psi knives slashed through it, shredded and tore it apart, then took care of two designs she found beginning to attach themselves to Gulhas and Alicar.

Now she and Soad again had learned something about the other's capabilities; but Soad had learned more than she. That couldn't have been avoided; and since she was no longer giving anything away, she destroyed the other control mechanisms still functioning at the mine in quick sequence in the same manner. Frustrated anger washed about her as she did it—so he had intended to use those constructions in some way when he came.

Minutes later, she realized suddenly that he already was on the move.

"Gulhas," she said, "any change?"

He shook his head without looking around.

"None whatever!"

Telzey reached through the defensive screen she'd closed about his mind, and took full control of him.

She was sitting in the Romango's operator chair soon afterwards, while Gulhas lay stretched out on the floor beside Alicar's carrier. Both men were in an unconscious paralysis from which nothing, specifically new mechanisms employed by Soad, was likely to arouse them during the next few hours. So was everybody else at the mine. At least, Soad wouldn't be able to turn enslaved minds against her again in some still unpredictable way.

The Romango type of computer was unfamiliar, but that didn't make much difference now. If the machine

resolved the blocks they'd set it to work against, a panel on the console before Telzey would turn green, informing her that the communication systems had been released. She'd be able to take the Romango under voice control then, assuming it was still functional. Her eyes moved between the panel and the screen which showed the surrounding desert, scanners defining every detail of the landscape as clearly as in bright daylight. Somewhere on the dunes, Soad would presently appear.

She knew the moment wasn't far away; and if the computer remained out of commission, the Ralke Mine's mechanical barriers would be no obstacle to Soad. His strange body could form its substance into heavy battering rams; he'd break through, flow inside, and when he came to her at last, she'd be destroyed. If that wasn't to happen, she must prevent it herself. Her psi weapons were ready, but she wouldn't begin to use them until she caught sight of the swiftly moving great shape in the screens. There was a personal limit to the sheer quantity of destructive energy she could channel into a single bolt, a personal limit also to the number of such bolts she could handle within a given time period. Having tested herself to the danger point, she knew rather closely what the limits were. At peak effort, she might last a little more than four minutes. If Soad could absorb such an assault and keep coming, she couldn't stop him. Nor would she know she'd failed. She'd be unconscious, probably close to death.

So she waited. Then it was Soad who struck first.

Telzey didn't realize at once that it was an attack. There'd been a gradual increase in the vividness of the random psi impressions Soad was pouring out as if he were trying to shroud himself more completely during his approach. The impressions were distracting enough; she had to give conscious effort now to maintain awareness of him. Then something like lines of fire flickered behind her eyes, blurring her physical vision, and a psi storm burst about her like shrieking sound, an impossibly swift swirling of hallucinations at every sensory level.

She knew then what was happening. Soad wasn't able to reach her mind directly through its shield. But he could let her face chaos. None of it was real, but she couldn't ignore what seemed to hammer at all her senses simultaneously. Her attention was torn this way and that.

It was sweeping to her through her psi contact with Soad. She could stop it in an instant by breaking the contact.

And that, of course, was what Soad intended. If he put her out of effective action during the critical period, the mine would have no defense against him. Telzey thought that if she waited any longer, he'd succeed. She either would lose contact with him and find herself unable to regain it in the short time left, or

get bludgeoned into temporary insanity.

She lashed out with the heaviest bolt she could muster, sensed shock pass through Soad. The storm of illusion faltered. She struck again at once, and illusion was gone, replaced by reactions of agonized violence.

Soad had expected nothing like this. His kind never had encountered such a weapon. Telzey, committed now, slamming in bolt after bolt, searching for vital centers in the alien mind, felt him slow to a wavering halt, knew then that he'd already almost reached the perimeter of the mine's defense zone.

Stop him there—paralyze him . . .

His desperation and fury howled at her. Troublesome as she'd been, Soad had looked on the human psi as an essentially insignificant opponent. Belatedly now, he drove himself into the full destructive action he would have taken in an encounter with one of his own grim species. Chaos crashed at Telzey again, intensified, and her mind seemed to flow apart. She clung to shreds of awareness of Soad, of herself, slashed blindly into something horribly damaged but unyielding, was whirled through an exploding universe and knew abruptly that she was no longer reaching Soad, while the tumult still seemed to increase. Vast thunders shook her then, and blackness folded in about her.

"No, I didn't do it," Telzey said. "That Child of the Gods was simply too much for me! I was finished. I did hurt him rather badly and slowed him down, but even so he'd come halfway through the defense zone when the computer finally got itself unblocked."

"And you ordered it to attack the creature?" asked Alicar Troneff. He was lying in a narrow hospital vat half filled with something that looked like green mud and smelled like vinegar, in the process of getting his beam-mangled left leg restructured.

Telzey shook her head.

"No. I was completely out of it by then. But I didn't have to give the order. I'd told the Romango earlier to cut loose on Soad if he showed up in the defense zone, and the instruction was recorded. So that's the first thing it did. The radiation guns finished him at once then, of course. He couldn't even stand sunlight. That was an awfully close call, Alicar!"

"Yes, it was," he agreed. He regarded her a moment. "And it seems I'm no longer in control of you . . ."

She smiled. "No."

"I never did trust you!" Alicar remarked dourly. "But how did it happen? You shouldn't have been able even to try to identify my controls, let alone tamper with them."

Telzey said, "If you'd left it at the specific controls, I probably wouldn't have been able to do it. At least, not in time. But you put me under a binding general injunction besides, remember? Whatever I did had to be *what was best for you—in your inter-*

est. That overrode everything else. After you'd been shot, I realized it would be very much in your interests if I got back every scrap of ability I'd had, fast." She laughed. "And that broke the whole spell, Alicar! Including the injunction itself, since considering what might, or might not, be to your advantage from moment to moment in that situation certainly would have handicapped me in dealing with something like Soad."

He grunted, scratched his chin with his left hand. "Mind telling me where I am at present then?"

"Well, you're not going to like that part of it," Telzey said. "You're on a hospital ship of the Psychology Service."

He swore softly and bitterly. "I suspected something of the sort! I noticed the area is psi-blocked."

"Yes, it is," Telzey said. "But don't take it too hard. If I'd been looking out only for you, this still is exactly where you'd have wound up."

"What do you mean?"

"Soad wasn't the only problem we had there."

"Huh?"

"His supply of djeel," she said. "After we got to the mine and he decided it might be too risky to send you back for the oil you'd taken away, he began experimenting with what he'd collected to find out how close he was to the minimum he'd need. He miscalculated finally and started a reaction—the same kind of reaction that tore up Tosheer. That's why he was desperate to get what was at the mine. He needed it at once to balance out the reaction."

Alicar had paled. "And did—"

"No, it didn't," said Telzey. "But I'd picked that up from him at the end, and as far as I knew, it *was* going to happen. So as soon as I started thinking again, I had the Romango connect me with the Federation Station. When I mentioned psi was involved, the Service moved in, and everyone on Mannafra was evacuated in an awful hurry."

"But the djeel didn't go off then, after all?"

"Oh, it went off, all right," she said. "Four hours later. All it did though was to leave a hole in the desert about five hundred yards across where Soad's machine had been. It seems there simply hadn't been enough djeel affected by the reaction to do more than that."

Alicar said after a moment, "Not that the information is likely to be of much use to me, but exactly what does djeel oil do?"

"I don't know exactly what it does," Telzey said. "And I'm not going to try to find out. In general though, processed djeel oil interacts with psi energy. The Service already knew that, though they haven't talked about it. As to what it does when it works as it's intended to, the Children of the Gods use it in connection with psi as their main form of transportation. They still have accidents with it, at least planned ones. Soad seems to have been in a fight

with some of the others, and they started an uncontrolled psi reaction in the djeel of his machine that whipped him and the machine across intergalactic space—"

"Intergalactic space?" Alicar repeated.

Telzey said, "That's not really the way to put it. He was simply somewhere else, and then he was here in the Hub. But that somewhere else doesn't seem to have been even one of our neighbor galaxies! Still, he could have made it back to his starting point with a fresh supply of djeel oil. The reaction had almost exhausted what he had, and the nearest ore bed his machine could detect was on Mannafra. Soad barely made it there. But he had no way of processing the ore, so he had to wait then for something with enough intelligence to do it for him to come along. He waited a long time. Finally, you came."

Alicar nodded. "And, of course, that clears me! If I was under that monster's influence, I can't be held responsible for what's happened."

Telzey looked at him a moment.

"Well, Alicar," she said, "If you think you'll get the Service to believe that, give it a try! Since they've been checking around in your mind while you were out, I doubt you'll have much luck. And, frankly, I don't feel you should get away with it. Seven men died at your djeel mine; and the way you made use of me was cold-blooded, to say the least. Besides, I think—though that's not my business now—that I had several predecessors who didn't last very long as your controlled psi proxies. You've been letting others take chances for you for quite a while."

She added, "All things considered, I understand they're letting you off rather lightly. You were thinking of experimenting with djeel oil, and you'll get the chance, in one of the Service's high-risk space projects. You know too much about it to be turned loose anyway."

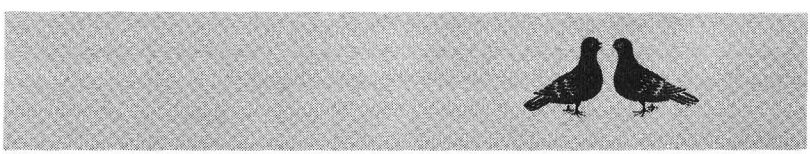
Alicar glowered at her.

"What about yourself?" he demanded. "You know at least as much as I do!"

Telzey stood up. "True," she said. "But the Service found out a while ago that I'm good at keeping secrets. I'll be starting back to Orado in a few minutes. I just stopped in to say good-bye."

He didn't reply. She went to the door, looked back at him.

"Cheer up, Alicar!" she told him. "It's still better than working for Soad until he decided to make a meal of you—which is what you would have been doing if things had turned out just a little differently!" ■



How honestly just would a real race be
in allowing such an experiment to continue freely?

By VERNON W. GLASSER

Society for Prevention of
Cruelty to Life Forms,
Complainant,
vs.
Bio-Chem Labs, Inc., et al,
Respondent.
Civil No. 4794
Memorandum Opinion
and
Order

This matter is presented on an Order to Show Cause why the Respondents herein, Bio-Chem Labs, Inc., and its Officers and Directors, should not be enjoined against further implementation of a certain social and biological experiment, identified on the books and records of the company as No. BCL 362, on the grounds that it violates Title 18, Chapter 32, Sec. 584(a) of the Galactic Code, as amended, which reads in pertinent part as follows:

"The right of human life . . . to develop free of exterior control . . . shall not be abridged, nor shall any devices or procedures be utilized for the purpose of limiting, expanding, or in any way altering the structure of the genetic endowment of any person . . . or the ability of any person adequately and freely to respond to his environment."

The legislative history of the cited Act discloses that it was motivated by the need to set bounds to the science of genetic surgery, subparagraphs (b) and (c) thereof expressing the highly limited exceptions within which hereditary manipulation is permitted. Nevertheless, the language is broad enough—"any devices or procedures"—to include the activities followed by the Respondents as hereinafter explained.

Complainant, the Society for Prevention of Cruelty to Life Forms,

has, heretofore, filed a motion for Discovery under Rule 23(b) directing the Respondent to produce its books and records respecting the experiment in question. The motion having been granted, all such records are now before the Court.

Experiment BCL 362, as shown by the records of the Respondent and as amplified by testimony, is on a grand and literally planetary scale. In order to insure proper isolation, an uninhabited—and indeed uninhabitable—solar system, in one of the remote fringes of the galaxy, was purchased. A planet in this system was then selected, more or less at random, to house the experiment. Necessary conditions of isolation were insured by total sterilization of the other planets and satellite bodies. Finally, conditions were artificially created—heat, moisture, mineral content, irradiation, et cetera—which resulted predictably in the proliferation and development of a type of "life" which had been implanted there. Since the exact nature of this "life" is essential to the question before us, there is set forth below an excerpt from the testimony of G. K. Woodrow, head of the BCL project.

Q. For about how long, now, has your company been conducting this experiment?

A. Oh, a long time. A very long time. I am the forty-second Director of the project, and I suppose that means more than a dozen generations have passed.

Q. Would you say that the Company has a great deal of money invested in it?

A. Of course.

Q. Can you tell me, was the creation of an intelligent life form initially contemplated? Was that what they had in mind when the whole thing started?

A. That was the main purpose. Plainly, experiments cannot be conducted with human beings as subjects. We needed, that is to say science needed, an experimental human, and the only way we could get that was to make an artificial human.

Q. Was there anything unusual about this creation, this making of what the Complainants call life?

A. How do you mean, unusual?

Q. Well first—what exactly did you produce?

A. A simple one-celled animal of a very low order. We could have commenced even lower, say with a virus, or even a chain of protein molecules, but for our purpose this was unnecessary.

Q. Then, Dr. Woodrow, was there anything different or unique about this one-celled animal? Can you distinguish it from the forms of life, unicellular or even multicellular, which are being made artificially every day in laboratories everywhere?

A. I see. No, I must say this was in no respect unusual. There is certainly no secret about the process. In fact, had we so desired, we could

have made complete little animals such as we normally manufacture for commercial and medical purposes, and stocked our planet with them.

Q. But you preferred to start at the very beginning.

A. Yes.

Q. And you physically manufactured only the original unicell. Can you say, then, that you also manufactured the intelligent being into which it ultimately developed? Can you say that was part of the manufacturing process?

A. I would certainly say so. The principles, the processes, are the same. The difference is one of scale only. In the laboratory, we manufacture life forms in the test tube, as it were. But project BCL 362 used a planet for its test tube. That's the only difference.

Having thus produced, artificially, the basis of life, and having constructed a suitable environment within which it might thrive, Bio-Chem Labs, Inc., proceeded to guide its development to higher forms. Although normal evolutionary procedures were utilized, they were so encouraged and so directed as to greatly accelerate the emergence of the final desired product, that is, a sentient being very closely resembling man. This identity comprises another area of dispute, and was denied by Abel Benning, one of the executive-directing operators, under cross-examination by Counsel for the Complainant:

Q. But these beings you produced, Dr. Benning, they are men, aren't they?

A. They are the terminal result of a natural process which we set in motion.

Q. But they are men?

A. That would depend on how you define "men." Let me use the expression "human being." I deny that this artificially produced entity is a human being.

Q. But it resembles one, doesn't it?

A. Yes.

Q. If we had one of these beings here in this courtroom, wearing clothes similar to ours, we could not tell the difference, could we?

A. I suppose not.

Q. And they do wear clothes?

A. Of course.

Q. And they are divided into two sexes just as we are, and they think, and they have a variety of written and spoken languages, and they have cities and schools and factories and courts, haven't they?

A. Yes, they have.

Q. Then how do they differ from men, or from human beings, if you prefer to use that term?

A. They differ, I would say, in a very fundamental way, there is a most fundamental difference. The subjects of BCL 362 were created deliberately, artificially, for a scientific purpose. Their evolution was speeded up fantastically. Whole populations were repeatedly decimated

by various agents in order to observe genetic and behavioral results. Whole breeds—races, you would say—were mingled, or created, for the same reason. We did not always know what we would get, but we observed, we recorded. In order to accomplish our ends, we had to develop creatures with a very short life span, with generations succeeding each other at an incredibly rapid rate.

Q. But with all this, they bear an uncanny resemblance to men?

A. They resemble us, yes.

Q. I call to your attention that the ultimate origin of life, I mean our own form of life, has never been determined with certainty. But we, too, probably started with some kind of a one-celled animal, long long ago. We, too, developed through the agencies of evolution, natural selection of favorable mutations, and so on. Our origin and evolution could have been accidental, or it could have been the work of God, as we are playing God with these creatures. And if the latter, if our own origin and development was the work of God, are you saying that we, too, are artificial creations and not men?

A. Of course not. But I deny that the subjects of BCL 362 are human beings, as we understand that term.

The issues so far delineated, as may be seen, are two; first, whether the life which inhabits the planetary test tube of Bio-Chem Labs, Inc., is true life or only an artifice which simulates life, and secondly, whether the admittedly intelligent beings evolved by the guided processes of Bio-Chem may constitute such "human life" as to bring it within the terms of the cited Statute, 18 GC 584(a).

Considerable testimony has been adduced before this Court with respect to the definition of the word "life." The dictionary refers to a quality that distinguishes a living being from a dead body; which, for our present purposes, merely begs the question. Other definitions, old and new, refer to "irritability," to reproductive capacity, to sensory response capability, or to other inherent qualities, all of which must be conceded to be present in the life form here in question. The Respondents themselves, indeed, have failed to suggest a single recognized criterion of life not present in their creation, other than the fact that they themselves created it. Certainly our own life is considered by most men to be the work of God, however God is defined; thus, in our view, life to be life need not be accidental to be real. It is, therefore, the opinion of this Court, and we so hold, that the form of life created by Bio-Chem Labs, Inc., in connection with the experiment called BCL 362 is indeed life and no different under the law from any "natural" form of life known to us.

However, the Statute under which this action for Injunction was

brought affords its protection not to "life" but to "human life." It requires further that the prohibited activity be such as will alter genetic structure or the ability to make a free and adequate response to environment.

Reference to the dictionary, again, discloses that by the word "human" we mean only something which relates to man, as opposed to the lower animals. Anthropologists distinguish several varieties, or species, of man, one still living and the others extinct. Numerous sub-varieties, or races, are still among us, but all are human. All sprang from the same parent stem here on our planet, all are similarly related to the lower animals who were their remote ancestors, all are related to each other. Each of us in this courtroom, in this city, in any place on this globe, may say to the other "we had a common ancestor, no matter how long ago or in what form."

Is common ancestry alone, however, the mark of humanity? Suppose one of our spaceships, ranging widely, should find—what it never yet has found—sentient life on some other planet, life which by a quirk of chance, or parallel evolution, is as close to ours as that of BCL 362. Would we be justified in saying that such persons were not "human" and thus beyond the scope of our law? Or, if one of the "men" of BCL 362 were to come here to our planet, and make a contract, or be the subject of a criminal assault, are we to say that

he is denied the equal protection of our laws? I think not.

For that matter, where do we draw the line in our conception of the common ancestor? The line between things organic and things inorganic is fine indeed. Since life did not always exist on our planet, it must have arisen, or have been created, from a combination of nonliving matter and energy. Thus the rocks themselves, the granite mantle of our planet and the radiation from space which envelops it, are themselves ancestors. And where did the experimenters of BCL 362 draw the materials and the energy with which they manufactured the one-celled animal for their experiment? Why, right here. We refer to the testimony of Dr. Woodrow, this time under cross-examination.

Q. You have stated, I believe, that you completely sterilized all planets of the solar system which you chose as the site of your experiment?

A. Yes.

Q. That is, you sterilized them before you implanted the seed of life which you manufactured?

A. Yes.

Q. Why was that?

A. Well, although we were confident that no life existed, or ever had existed, in that entire system, we naturally could not be positive. In order to avoid complicating the problem, or should I say in order to make the results valid, it was essential that the only life in our experiment be a life which we had produced and, therefore, could define. It is exactly the same as preparing a bacteria culture; you could hardly explain the product if you had used a contaminated container.

Q. You are then quite confident that the only life on the planet is that which originated from the start you gave it?

A. Quite confident. Quite sure.

Q. This life with which you seeded the planet—where did you get it?

A. Where?

Q. Physically, from what location.

A. Why, it was manufactured right here in our own laboratories, less than twenty miles outside this city.

Q. Out of what material?

A. Chemicals which we purchased on the open market.

Q. Then this life which informs BCL 362 in fact originated right here on our own planet?

A. I suppose so.

In view of the testimony set forth above, and other pertinent parts of the record, we find ourselves unable to distinguish between our own "life," that which is the inner mainspring of our own cells, and the "life" which presently exists on the BCL 362 planet. Both originated here on our own world, neither are native to any other spot in the universe. Thus we conclude, and we so hold, that the inhabitants of the BCL 362 planet constitute human life

within the meaning of our law.

The last question to be determined requires a finding as to whether the Respondent has, in the words of the statute, utilized any devices, or procedures, "for the purpose of limiting, expanding, or in any way altering the structure of the genetic endowment of any person . . . or the ability of any person adequately and freely to respond to his environment." To illuminate our findings in this regard, we set forth below a portion of the testimony of Walter Simons, Chief of Behavioral Studies for Bio-Chem Labs, Inc.

Q. The general physical setup, then, was quite as important as the specific or immediate?

A. Certainly. For example, our experimental planet has only one moon, compared with our seven. Further, that moon presents only one face to the planet, and, it is marked, to the naked eye, with certain shadow features. The mere existence of such a moon has had a significant . . . well, I should say an enormous . . . effect upon the religions and literatures of the inhabitants. Its size and mass exert a force upon the planet so great as to result in a periodical, rhythmical, lifting of the ocean bodies.

Q. The seas lift?

A. They do. Thus life along an ocean strand presents a very interesting situation, with sea level never the same.

Q. What other environmental pressures were brought to bear upon these inhabitants?

A. During the formative period, when we were still engaged only in the accelerated evolution of a rational being, the pressures were all physical.

Q. Such as?

A. Oh—alternating periods of drought and flood; recurring eras of drastically lowered, or increased, temperatures; these things would carry with them, of course, changes in mean ocean level, storm patterns, vegetation cover, and so on. Because the life span of these creatures has been kept so short, the changes, on their scale, have been gradual enough to serve our ends. At intervals also we heavily increased the radiation from space, thus speeding up the mutation rate. Some of these mutations would be favorable, and upon their appearance we could encourage them.

Q. What environmental influences, other than physical, did you exert?

A. Well, after the emergence of a rational being, social influences were used.

Q. Such as?

A. To a certain extent, physical and social forces interact. A difficult environment has a tendency to produce a hardy breed, and when this is accomplished, an extended drought, or other disaster can be used to induce migration to lands occupied by others, with consequent interbreeding.

Q. Didn't this usually result in large scale warfare?

A. Not always.

Q. But often it did, didn't it?

A. It seems to be a natural result.

Q. Do you directly interfere with the life of an individual?

A. No, no, of course not. We may smooth the way for a new religion, or assist in the development of a new concept, but this is never done directly. In my opinion, it cannot be done directly without running the risk of revealing our existence and thereby invalidating the entire experiment.

Q. Do you ever use natural catastrophes, like earthquakes, pestilences, floods, and so on?

A. We have done that.

Q. Then the tools of your trade, Dr. Simons, are flood and fire, drought, disease, war and the forced migrations of whole peoples?

A. That is putting it very hard indeed. We have protected these creatures also. Repeatedly, their passions have put them in positions where they faced disasters of really frightful magnitude, and we have preserved them.

Q. In order that the experiment might go on?

A. Naturally, it would fail without the required subjects.

Q. And what, sir, is the result? What have you gained by creating a people just like us, and then subjecting them to so many trials?

A. We have gained a great deal. Precisely because these creatures are so like us, we learn how we would very likely behave under similar circumstances. We have gained something never before possessed by any people, that is, the ability to carry out social and economic experiments with—well, not real people, but the next best thing. We can discover how different political theories, different types of religion, or different social systems really will work. We are now at a critical point in our experiment. If we should be stopped now, much of the real gain will be lost. But, if we are permitted to continue, we will secure such knowledge that the future of our own planet, our own human race, may at last be planned with confidence. We will *know* which systems work and which do not, and we will know why. And we are at a crucial point, as I said; not only for our work but for the very creatures you seem so anxious to protect.

Q. Why for them? Why is their situation critical?

A. Because they are at a point where their ethics are too heavily overbalanced by their technology. Our present plans are to lead them away from their potential disaster, which has resulted from a complex of international and economic systems which we now are convinced will not work. We will lead them away from that and into another experimental system, now being devised by some of our best brains, in which we have great confidence.

The testimony of Dr. Walter Sim-

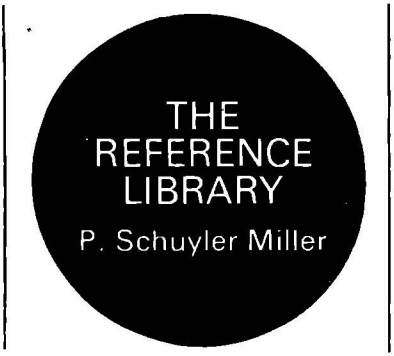
ons, above, leaves little doubt in the mind of this Court that the genetic endowment of the men created for BCL 362 is of primary importance. Dr. Simons' words were "Just because these creatures are so like us, we learn how we would very likely behave under similar circumstances." They are "so like us" because they were made to be like us, and it would follow that, if the experiment is to continue, their genetic endowment must remain like ours. The life span of these experimental men is so short that it rarely exceeds sixty, or seventy planetary revolutions—see transcript, p. 471—and thus, if they are left to their natural development, they can be expected to evolve rapidly in some unknown direction. Since our own lives are well over 4,000 times longer than theirs, it may reasonably be assumed that they will alter, genetically, 4,000 times as fast. But the very nature of the BCL 362 experiment forbids such change. They must remain "so like us" in order for the lessons learned from their behavior to have any meaning for us. Thus it is absolutely necessary for the Respondent to permanently control the genetic endowment of these creatures, as well as their ability to respond to their environment, in order to make their more rapid evolutionary process keep pace with ours, and in order to make sure that it keeps parallel to ours.

We are not insensible to the dangers inherent in granting this Injunction. It has been pointed out that the inhabitants of the experimental planet have been led to a crisis which, if left uncontrolled by Bio-Chem Labs, Inc., may possibly lead to their destruction. But this is by no means certain. If they are indeed "so like us," there must be many among them who recognize the problem and who are capable of solving it. The whole force and thrust of the statute, 18 GC 584(a), is to prevent tampering with the right of others to meet their crises in their own way, whether this may mean victory or defeat.

It has been suggested also, with a certain thrill of fear, that the rapid evolutionary pace which was built into these creatures, when taken in conjunction with their brief lives and great fertility, may soon culminate in the production of an intelligence greater than ours, and thus present a danger to us. Man, it is suggested, may yet storm the gates of Heaven. But such a fear is unworthy of us, and particularly out of place in a Court of Justice.

In view of the foregoing, it is the opinion of this Court that the Respondents, Bio-Chem Labs Inc., and its officers and directors, should forthwith cease and desist from any and all control over the planet which is the subject of this controversy, and from all life, sentient or otherwise, now inhabiting it. The men of BCL 362 shall hereafter be free to stand or fall by their own efforts.

So ordered. ■



INNER SPACE

I don't know who coined the term "inner space." It has a fannish ring to it, apart from the obvious contrast with "outer space," and if I could find my copy of Dick Eney's "Fancyclopedia," everything would undoubtedly be made quite clear. More recently the tag has been revived—by Judith Merril? perhaps, perhaps not—for the "New Wave" of English speculative fiction, especially the experimental stories of J. G. Ballard.

But "inner space" stories don't have to abandon communication and follow the tangled trail of William Burroughs, any more than science fiction has to pattern itself on Edgar Rice Burroughs. Two new novels by Robert Silverberg make that abundantly clear.

"A Time of Changes" has appeared both as a Signet paperback (No. Q4729; 220 pp.; 95¢) and in a Science Fiction Book Club edition (181 pp.; $1.49). It should be a contender for best SF novel of 1971 if the condensation in *Galaxy* doesn't tangle up the voting. Of the two, it probes deeper into true inner space, for it is a true psychological novel whose protagonist—I suppose he must be called an anti-hero in the present jargon—is first tormented by his struggle to conform to the requirements of his society, then tortured because of his revolt against them.

Borthan is a harsh planet, settled by refugees from Earth who shaped a psychologically harsh society for themselves. Under a strictly observed Covenant, they are literally selfless: they may not use the first person in conversation, or thought, without being guilty of obscenity, or blasphemy, or both. They have the institution of "draining," which is something between the confessional and psychiatry, yet the drainers are a despised caste in a feudal society. (If I had not seen the jacket of the Book Club edition, I would not wonder whether at an even deeper level, the society of the Covenant is not based on some African tribal structure.)

Kinnall Darival tells the story in retrospect, after his fall. A prince of one of the more advanced nations, he has had to go into exile when his brother took the throne. Always tormented by doubts and passions that seem alien to the Covenant, he is a natural target when a trader from Earth tempts him to take a mind-releasing drug that puts him into telepathic and empathic identity with the person who shares the drug with him. Rather like a Timothy Leary

with LSD, Kinnall sets out to share his discovery with others—a missionary of togetherness, if you will—and he destroys himself and them, and starts the destruction of his society.

Like any convert, Kinnall is ultra-devout in his new cause of self-revelation. He can't stop talking about himself—since this is the prohibition against which he has revolted, from which he has freed himself. You may grow bored with him, but through his self-conscious babbling he reveals his society and himself in intimate detail. Schweiz, the Earthman, is less convincing—but, after all, that is how the tormented Kinnall would see him as he goes to his death, certain to the end that he is the martyr of a new order of love, never really understanding the selfishness or selflessness.

"The World Inside" (Doubleday & Co., Garden City, N.Y.; 1971; 201 pp.; $4.95) also dissects a society, though less subtly and, on the whole, less deeply. The society is our own, some four centuries from now; you have read the opening chapter as "A Happy Day in 2381" in Silverberg's recent short-story collection, "Moonferns and Starsongs" (Ballantine 02278.5), and elsewhere.

This is the vertical society of the urbmons—the urban monads. The Chicago/Pittsburgh megalopolis of our own near future has restructed itself into more than a hundred colossal, self-contained skyscraper complexes, a thousand stories high, each containing nearly 900,000 people. Through some sort of symbiosis, food flows in through rural communes in the farmlands outside the monads. (We get a glimpse of one, when a technician from Urbmon 116 goes outside, but the relationship is merely sketched in.)

Within the urbmons, each group of floors is a "city." There is a strict social stratification, and a caste system which keeps the delvers and grubbers in the depths and lets the "cream" rise, but it is sexualized to the extent that permits nightwalking men to command intercourse with any woman in any city, from early puberty. It is a society dedicated to uninhibited, unlimited expansion and reproduction, as we see when an outsider is shown around in that opening chapter, and when Michael Statler has his brief adventure outside. It is a rigidly patterned society, which we see through the eyes of a series of somewhat interlinked participants—a young couple who are to be forced out of the city to pioneer a new one, a member of a sound-and-light combo, a historian probing the origins of his society, a teen-age administrator on the rise to the Louisville level, the computer interfacer who is tempted to go outside.

Books like these show that science fiction can explore "inner space" without becoming sterile or non-communicative. "The World Inside" is written in the present tense, but the departure from what we are used to is never obtrusive, never interferes

with the communication of ideas, as does the self-consciously structured "stories" by Ballard, Michael Moorcock, Kingsley Amis, and others of the English school of speculative fantasy. For my money, Robert Silverberg is doing more to bring science fiction back into the mainstream of literature than any of these much extolled "masters."

SCIENCE FICTION STORY INDEX: 1950-1968

By Frederick Siemon • American Library Association, Chicago • 1971 • 274 pp. • Paper, $3.95

If you answered the ad in the September Analog, as I did, you probably got your money's worth, but you may be disappointed.

The advertisement claims that the index covers 90% of the science fiction anthologies published in the United States and England during the eighteen years in question. Mr. Siemon is more cautious: he claims only 74% of the anthologies listed in the library reference books he consulted. Neither the book nor the ad tells you anything about his background, but I suspect he is a librarian and not really accustomed to the exotic references published by science-fiction enthusiasts, and reported here whenever I can find one. Any librarian should know that their main continuing reference, the "Cumulative Book Index," unabashedly ignores a great many books by a great many small publishers.

The book's major fault, I think, is that Mr. Siemon just doesn't know much about science fiction. The next greatest is that his choice of anthologies seems erratic. He apparently doesn't know the difference between science fiction and the supernatural—and he's not the only one! He doesn't distinguish between anthologies—books made up of stories by a number of authors—and collections of stories by the same author. He considers the *Amazing Stories Annual* an anthology rather than a magazine.

The book to measure this one against is, of course, W. R. Cole's "A Checklist of Science Fiction Anthologies," published in 1964. Cole stuck to science fiction, and he stuck to anthologies; no weird tales, and no one-author compilations. He listed the contents of 227 antholgoies, with about 2,700 stories. Siemon says he has checked 237 out of 321 SF anthologies said to have been published in his time span, and that he has indexed more than 3,400 stories. It seems to me that since he includes paperbacks, he should include all paperback anthologies—and he doesn't. If he is including weird tales and fantasies, he should have checked the really important anthologies—and he hasn't. (Missed me on both counts!)

I know from experience that professional librarians—*most* professional librarians: some of 'em are fans—resent advice from laymen. I've come up against this in other fields. They're bound to do it their

way . . . and their own colleagues won't know the difference. Come the millennium, librarians and fans may get together and produce some really good bibliographies. (The Toronto Public Library is well on the way, with its "Spaced-Out Library" based on Judith Merril's personal collection, its project to put complete SF magazine files on microfiche, and its sponsorship of a major conference last fall—it's in the future as this is written, but in your past as you read it; I'll report if I get there. Until that happens, Cole's anthology is one you can get only from rare book dealers and it cost $7.50 when it was new. The ALA *Index* is in print, and costs only $3.95. Use your own judgment.

CAMP CONCENTRATION

By Thomas M. Disch • Avon Books, N.Y. • No. V2348 • 175 pp. • 75¢

This book, with Brian Aldiss' "Barefoot in the Head," was published in the English magazine, *New Worlds*, in 1968 and was a sensation there. Both books had American hardback publication in 1970, but I never succeeded in getting my hands on a copy of Disch's novel.

Unlike the Aldiss book, which became entrapped in its own experimental techniques, "Camp Concentration" is perfectly straightforward science fiction. It is based on the relatively recent biomedical research which suggested that hereditary syphilis and brilliance may go together. (I don't think that, even in 2016, hematologists will type blood in an electron microscope, or use a slide and cover glass . . . but that's a quibble.)

The immediate parallel that will occur to you is Michael Crichton's "The Andromeda Strain." In both—especially the film—there is a suggestion that an experiment in biological warfare has backfired . . . but it's no suggestion in this book. The narrator is a political prisoner who is made a guinea pig in a CBW experiment with a mutant strain of the syphilis organism. The experimenters have reason to hope that the infection will amplify human intelligence by several orders of magnitude—and it does, but that isn't all it does. The prisoners in the experimental concentration camp are doomed to deaths that make the final stages of ordinary syphilis look like measles.

The novel explores what happens to a group of men imprisoned under these conditions. It's the epitome of "inner space" science fiction of a kind that doesn't discard the tested values of the old. That is, it is really *science* fiction—not just speculative fantasy. But the people, not the gimmick, is what matters.

In fact, my one complaint is that Disch allows the whole thing to collapse into a stereotyped science fictional cop-out in the end. I think it may kill the book's lasting power. I'm no critic to tell him what he should have done, but what he did do is something he shouldn't have. Too bad.

BRASS TACKS

Dear Ben:

I would appreciate your informing your readers of the effort now underway to get a commemorative postage stamp issued in honor of John W. Campbell.

Those who have followed Astounding/Analog over the years know of his work in training and developing top authors and in raising science fiction from the level of pulp adventure and gadgetry to that of serious literature.

The United States Postal Service regularly issues postage stamps in honor of men and women who have contributed to science and the arts. A stamp showing a picture of John Campbell, with a background of stylized rocketships and saucers and an Apollo vehicle, and the caption "John W. Campbell, Jr.—science fiction author and editor" would seem no less appropriate.

I have heard some people object on the ground that John Campbell is not sufficiently known by the general public to merit a postage stamp. However, in recent years postage stamps have been issued in honor of artists Frederic Remington, Mary Cassat, John Trumbull, John Sloan, William C. Harnett, poets Edgar Lee Masters and Emily Dickenson, historian Francis Parkman, conservationist John Muir, playwright Eugene O'Neill, basketball's inventor James Naismith, "father of the blues" W. C. Handy, and Walt Disney. I doubt that most Americans have heard of many of these people.

There is a citizens' "Postage Stamp Advisory Committee" in Washington which considers the various proposals for postage stamps. Interested readers should address their letters to:

The Postmaster General
United States Postal Service
Washington, D.C. 20260

It is important to use a serious tone that will counteract the initial "Lookit the funny crank letter" reaction that may come from some Committee members. Anyone with a "respectable" title or professional designation should use it. Most effective would be letters from persons whose name, or position, would be recognized by Committee members as "prominent people in the community."

Do not use form letters, or petitions. This is not a political move-

ment. The idea is to convince the Committee members of the serious merit of the proposal, not just its public support. Letters should contain factual statements as to the merit of science fiction in general and John Campbell's contributions in particular.

Most unhelpful of all, of course, is the person who agrees that a Campbell stamp is a good idea and vows to write his letter "next week after I finish all this other stuff . . ." Which never happens.

A. JOSEPH ROSS
20 Notre Dame Road
Bedford, Mass. 01730

This would be a fitting memorial to John Campbell; Analog's readers can play a vital role in making it happen.

Dear Editor:

As a reader of some thirty years standing, I find myself in close agreement with the editorial entitled "Balance and Ecology" in the July issue.

Regarding the ill-fated SST, however, it would be a disservice if the editorial gave the impression that the main objections to the project, from an ecological standpoint, are that it will scare the wildlife. I quite agree with you about the insignificance of this aspect of the problem—the wildlife won't be bothered by the bangs. But people will. And if the SSTs do as much damage to the ultraviolet-filtering properties of the upper air as some seemingly well-qualified scientists fear, it is going to bother everybody.

I travel by air almost continuously, and the SSTs would be a considerable convenience to me. Nevertheless I strenuously oppose the idea that it is justifiable to impose the bangs on people all over the world in order that a very small minority of air travelers may get to their destination just a bit quicker—and I am the typical person for whom the SSTs are supposed to cater. Also, as a personal matter, I have no intention of being exposed to the excess radiation which is, seemingly, inescapable at the heights that these planes will fly.

I hope that some future editorials will bring out clearly the very valid ecological objections to the SST. The money could be far more usefully spent on the Space Shuttle and Orbiting Space Laboratory, et cetera.

DAN E. MAYERS, A.I.M.E.
Lorien
Wadhurst, Sussex, England

Since no one is really certain of the ecological effects of the SSTs—how about spending some research money on answering that question?

Dear Sirs:

I have been reading Analog a long time—I'll bet half your mail begins this same way—and have become fascinated with Kelly Freas's drawings. (I don't mean to slight anyone else—he just appeals to my particular tastes.) In fact I usually thumb through and look for his pictures before beginning a story or even an article . . .

I would also like to comment on

your science fact articles. I usually find them very well done and very readable. Often I discover I am reading about something I knew nothing about before, understanding it, and learning a great deal. I have even referred to and used parts of them when I was teaching advanced sixth and seventh graders. (Admittedly the children did not usually read them all themselves, but the information and the order were there for me to refer to.)

V. J. CAMPBELL

1727 E. 8th Street
Davis, California 95616

Good science fiction is based on science—which can be as exciting and stimulating as fiction. Glad to hear that the factual articles are appreciated, and useful.

Dear Sir:

In reference to "Ecological Notes" in the September issue of Analog, I admit I don't have the answers only that someone had better get some *soon.*

We live in a farm area approximately eighty miles southwest of Chicago. A few—twenty-five or so—short years ago the telephone and power wires were beautifully festooned with red-winged blackbirds by the thousands, a bird who is incidentally a song bird. This year I have seen less than a dozen of them. Redheaded woodpeckers and Wild Canaries were common here not too long ago—now they are rare.

Last fall and winter we were delighted to watch a hawk—plain old chicken hawk—the first we had seen in several years hunting our pasture along with his mate. They are great mousers you know. The hawk is probably the most beautiful bird to watch in flight . . . He is gone now thanks to some city folk out camping who were so thoughtful to bring their .22 along for "target practice."

Rabbits and foxes were once a nuisance here now they are a rarity.

I don't know what the answer is, but something must be done. Frankly, I may be antisocial but I prefer my wild neighbors to most of what the cities spew out upon us. They—the wild ones—are far more useful and beautiful and do much less harm.

In addition to our hawk the city folk with the .22 killed a neighbor's prize winning Angus cow, put a hole in our Arab stallion—fortunately in his rump, little damage except for a large vet bill, left pasture gates wide open so that livestock got in the corn fields . . .

I don't know the solutions, I admit, but someone had better find some soon. I recently heard one farmer suggest putting a fence around the cities and keeping the city dwellers in their "galloping slums."

JAYNE HARPLING

Route 1
Sandwich, Illinois 60548

Controlling pollution means controlling people. If self-control doesn't work—what's next?

Gentlemen:

I do not like "And Silently Vanish Away," because it makes us seem as the enemy who is out to destroy the world. Our military are not the only ones with nuclear devices. Why didn't the story devote more time to the destruction of the weapons of the communist nations? It is a story of American traitors. How about some American heroes one of these days?

PETER ACABA

Hotel Landseer
245 West 51st Street
New York, N. Y. 10019

You can't please all the people, all the time!

Dear Sir:

If I have to look at an illustration of the upraised finger, in the well-known obscene gesture, or at some being's naked rear end, I'll give up the magazine first.

You people in New York City seem not to realize that out here in the provinces, we aren't nearly so blasé. This is an outrageous thing, and for what it's worth, I'm telling you so.

R. C. CRENSHAW

1333 Oak Drive
Eugene, Oregon 97402

Dear Sir:

I am hardly what any of my acquaintances would call a prude, but there is no excuse for an illustration such as Kelly Freas's sketch at the beginning of "Foundlings Father"—December 1971! You might require Mr. Freas to read a story before illustrating it, as there was no such scene described in that story.

I had hoped that Analog would not follow the trend to include explicit sex in either text, or pictures. Your magazine has been my Number One reading material for a number of years now, and I do hope I will be able to continue enjoying it.

Please, I implore you, do not let your publication become just another moral cemetery.

JUANITA L. BROKOFSKY

2108 South Artesia
Santa Ana, California 92701

Dear Sir:

I have read and enjoyed Analog for nearly nine years. It's my favorite magazine and always good science fiction.

I'm sorry if I appear too thin-skinned, or overly prudish, but it would seem that with the death of Mr. Campbell the snickering little boys have taken over.

It does offend . . .

MARY HEYWOOD

622 Carlane Lane
Escondido, California 92025

These letters refer to the illustration by Kelly Freas of Jack Wodhams's story "Foundlings Father," in the December 1971 issue. Both the story and the art work were bought by John Campbell.

How do you other readers feel about this?

continued from page 7

But suppose that the recent stir that resulted from the Attica massacre actually causes real public concern. What could science and technology do for the prison system?

Quite a lot.

First, there's the matter of security systems. Why do prisons have to be built like medieval fortresses? Stone walls do not a prison make, nor iron bars a cage; but every prison I've ever seen has plenty of both. And guards armed with clubs and guns.

Is it any coincidence that this sort of physical setup is accompanied by a medieval attitude toward the prisoners? A jail is a grim, foreboding place where men are locked away from society. For what end result? Rehabilitation? Reform? That's the mythology. Actually, they're put in jail for punishment, for revenge, or just to get them out of circulation.

There's no reason why a jail can't be built more along the lines of, say, a military base. Modern electronic and surveillance systems can watch the prisoners much more effectively than human guard patrols. Electrified wire, nonlethal gas, automatic gun stations guided by radar and infrared sensors—such as those mounted on military aircraft—and firing nonlethal darts—all these can make much more effective barriers than high, stone walls.

Some might say that nonlethal weapons aren't much of a deterrent to desperate men. Well, the lethal weapons haven't stopped breakouts. The real *deterrent* to escape is the knowledge that it won't work. And an electronic system that's scanning twenty-four hours a day, that can't be bribed or held hostage, that can't even be turned off by the prison authorities themselves should make a much stronger deterrent than a fallible human being with a shotgun.

All right, modern technology can help to keep the convicts inside the prison. What do we do with them while they're guests of the state?

Change them, of course.

The techniques for changing human behavior fall under the very general heading of education. Now before you start muttering "bleeding heart" or "do-gooder," think about the problem for a moment. Certainly there are many convicts who cannot be reached by any means we know of today. Put them in a classroom and they'll mug the teacher. Beat them over the head and they'll nurse their revenge until they get a chance to return the compliment. These are hopeless cases. Today.

On the other end of the spectrum, there are an even larger number of offenders who *can* be reached. First-timers, youngsters mostly. In our present prison setup, the things they learn best are how to deal with a corrupt system and how to become more proficient at illegal activities.

They can be taught, trained, edu-

cated, brainwashed—use any term you like. They can be *changed.* Not by sitting in a cell, or walking around an exercise yard, or making license plates. But by using all we know today about teaching. Not the school way, the industry and military way. If high school dropouts can be taught to program computers, prisoners can learn, too. If we use what we know about teaching, we might be able to change a large number of those prisoners.

Think of the benefits to taxpayers!

For one thing, we will have a laboratory for teaching techniques. It might seem callous to use convicts as guinea pigs in this manner, but it's an opportunity for them and for us. Convicts have often volunteered—sometimes unwillingly—for medical experimentation, testing new vaccines and such. How about getting them to volunteer for new psychological techniques? They have little to lose, and we have much to gain. For this psychological-teaching laboratory has a built-in feedback loop. If the "student" returns to jail after being released, the technique failed.

"Teaching" in the context we're using here, doesn't mean handing out geography lessons. It's a broad panoply of psychological and educational techniques, designed to radically alter the "student's" outlook on life and his behavior. It might include the necessity to remove the "student" from the envi-

ronment that he originally came from. That is, when released, the ex-prisoner might be "deported" to a totally different part of the country for a new start in life. This fractures most of the prisoner's civil rights, of course. But it's demonstrably true that all the hard work in the world can be useless if the convict is returned to the same dirty streets, the same dead-end jobs, the same incentives for law-breaking that got him into jail in the first place.

The toughest thing in the world is to change somebody's mind. But it's done every day, by experts who work in television studios as well as schools. If we can pull together what we know about computer-assisted instruction, motivational research, and other modern educational techniques, we might start to make a dent in the steadily-growing prison population.

Such an approach would be enormously expensive. But if we look at the total cost of our present way of dealing with criminals, we'll find that the cost of maintaining prisons is just a small fraction of the whole. Organized crime costs us billions per year. Unorganized burglary, mugging, armed robbery, and miscellaneous mayhem—much of it due to the high cost of narcotics—cost more than we pay for prisons. If we can use our high technology to reduce these costs, then the high-technology approach could well pay for itself, in the long run.

There's another high-technology technique that might be used as a sort of ultimate weapon with incorrigible prisoners.

Today we teeter on the brink of a dilemma. Crimes of violence are going up, death penalties are going down. It is morally distasteful to many citizens to sentence a fellow human being to death—even though he might be a murderer.

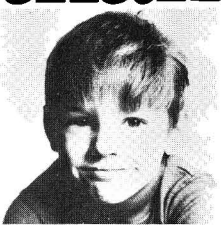
Now then—there are people living today who have arranged to have their bodies cryogenically frozen when they're pronounced clinically dead, in the hope that some future developments of medical research will allow them to be thawed and cured of whatever killed them.

We could consider murder as a symptom of deep-rooted psychological illness. Instead of executing a murderer—or jailing him and eventually paroling him—we might consider freezing him, until such time as his disease can be cured. This fractures all the civil rights on the books, but then, executing a man is perfectly legal, isn't it? Is putting him in cold storage better, or worse, than killing him?

We can improve our prison system enormously, merely by applying some of the aspects of our high technology. The cost will be considerable, but the profit should be even larger.

And until we stop worshiping the myths of our prison system and start paying attention to the realities, we are all born losers. THE EDITOR

How come this kid has more money saved than you do?



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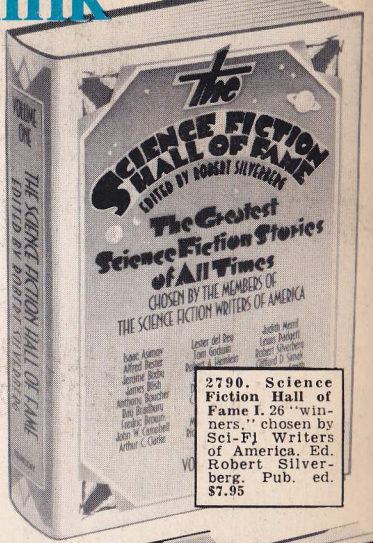

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